First Annual Report
on the

EGYPTIAN NATIONAL PROGRAM
to
Combat Desertification

May 1999

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SUMMARY

Introduction

Egypt played an active role in the formulation of the United Nations Convention to Combat Desertification (UNCCD) which was concluded in Paris in June 1994. The Convention has come into force in December 1996 since the required number of countries completed the ratification process; Egypt stands number four at the top of the list. Parties to the Convention have to meet their commitments, foremost of which is the preparation of a National Action Program (NAP) to combat desertification. The main objective of NAP is to identify factors contributing to desertification, and the appropriate measures to combat it.

Definition of the Problem

Egypt extends over one million square kilometers in the northeastern corner of Africa with an extension into Asia. The climate is hot and dry in summer and warm with occasional rainfall in winter. The northern region of the country, being bounded by the Mediterranean Sea, enjoys more moderate climatic conditions.

The major water resource of the country comes from the River Nile, which sustains an irrigated agricultural system in the Nile Valley and the Delta. At present, the river provides Egypt with 55.5 billion cubic meters of water every year, 85% of which is used by the agricultural sector. Water is the limiting factor in the production system, and more lands can be cultivated provided that more water resources are made

available, or a greater portion of the available water is recycled for irrigation.

Rain-fed agriculture is common on a narrow strip along the Mediterranean coast. Many schemes of water harvesting are constructed by local inhabitants to grow crops; mostly barley, wheat, figs, and olive. A rangeland area is located farther south of the Mediterranean strip, and another area is located in Sinai and along the foothills of the Red Sea mountains. Moreover, oases in the Western Desert are inhabited by small communities, and underground water is used to irrigate land in a low-input production system. Socio-economic factor limit utilization of the existing resources to their full potential capacity.

The Egyptian population now stands at 62 million, living mostly in the Nile Vally and the Delta. The high population density has placed the lands resources under serious pressure. Most lands are overexploited, with short periods of fallow, and high doses of fertilizers are added. In some places where subsurface drainage facilities are absent or inefficient, water logging and the concomitant salinity and sodicity are degrading the lands.

Components of the Egyptian NAP

The Egyptian Environmental Affairs Agency (EEAA) is the National Coordinating Body (NCB) of the UNCCD. Within the organizational structure of EEAA, a National Coordinating Committee (NCC) was established and a Focal Point (FP) was identified.

The NCC is chaired by the Chief Executive Officer of EEAA and membership includes representatives from relevant Ministries, the People's Assembly, experts, the private sector, cooperatives, and NGO's.

The NCC adopted a rational agenda to formulate the National Action Program of Egypt. First, it was decided to proceed simultaneously on several tracks. Awareness of desertification and the UNCCD by stakeholders has been emphasized by organizing meetings, workshops, and through the media. Second, defining problems and potentials, and as such, completed projects were assessed to learn from gained experience. Third, the multi-sectoral aspects of desertification and its control were stressed especially those pertaining to the socio-economic aspects. Fourth, it was realized that the Egyptian NAP may best be initiated by establishing interconnections between current relevant projects undertaken by individual sectors. Thenafter, as the process develops in the future, forthcoming projects would be more institutionally oriented toward the real multi-facet spirit of the UNCCD.

This report is being submitted to meet an Egyptian obligation to the UNCCD. It begins by outlining the environmental aspects of resource management, and then reviews the magnitude of resources and the strategic considerations for their utilization. The recent structural re-arrangement of the national economic policies and the open market economy are relevant issues. The report cites examples of completed, current, and forthcoming projects concerned with combating desertification, then the report concludes by an outline on indicators.

The projects of this report were selected to reflect the wide range of Egyptian efforts to combat desertification within the context of

sustainable development. The examples given cover all types of land use: irrigated and rain-fed agriculture as well as rangelands. The examples also reflect work undertaken and/or planned to improve the physical environment and improve the institutional capacity of relevant stakeholders. Moreover, they represent both of work done and/or to be done on the local scale and work of regional and far reaching consequences.

INTRODUCTION

Egypt played an active role in the formulation of the United Nations Convention to Combat Desertification (UNCCD) which was adopted in Paris in June 1994. The UNCCD is the first multilateral legal instrument after Rio, which is concerned with major threats to sustainability in countries of the dryland region of the world. The convention stresses the need for an implementation process and places a considerable emphasis on activities at the local or community level to insure genuine participatory approach of all stakeholders. These activities are sustained and supported by enabling measures that would be taken at the national level.

Parties to the UNCCD have to meet their commitments, foremost of which is the preparation of a National Action Program (NAP) to combat desertification. The main objective of NAP, as given in articles 9 and 10 of the convention, is to identify factors contributing to desertification and the appropriate measures to combat it. The convention stipulates that NAP would serve as a frame within which the commitments of the country and the UNCCD principles are translated into concrete actions. Furthermore, it stipulates that these actions are components of the national plan for sustainable development.

The Egyptian Environmental Affairs Agency (EEAA) is the National Coordinating Body (NCB) of all environmental conventions; inclusive of the UNCCD. Within the organizational structure of EEAA, a National Coordinating Committee (NCC) was established, and a Focal Point (FP) was identified.

The EEAA, located in Cairo with subsidiary branches in several governorates, is decreed to have public juridical personality and is affiliated with the Ministry of Environment. The Chairman of EEAA is appointed by a Presidential decree upon the nomination and recommendation by the Minister of Environmental Affairs and the Prime Minister.

The EEAA shall formulate the general policy and prepare the necessary plans for the protection and promotion of the environment. Also, it shall follow up the implementation of such plans in coordination with relevant administrative authorities. The EEAA shall be the competent national authority for strengthening environmental relations between Egypt and other countries and international organizations. Also, the EEAA shall recommend the necessary legal procedures to join regional and international conventions related to the environment.

The Board of Directors of EEAA is the supreme authority of the Agency. It shall be chaired by the Minister of Environmental Affairs and the membership comprising the Executive Chairman of EEAA and representatives form the ministries of Agriculture and Land Reclamation, Public Work and Water Resources, Interior, Industry, Transportation, and Health. Membership also includes representatives of academic institutions and non-governmental organizations.

Egypt is a party to most international environmental conventions. Both the Biological Diversity Convention and the Framework Convention on Climate Change were signed by Egypt on 09/06/92 and ratified on 20/06/94. The UNCCD was signed by Egypt on 14/10/94 and ratified on

07/07/95; being Party number four on top of the list. The respective date of entry into force was a bit delayed until 26/12/96 when the required number of parties completed their ratification process.

The NCC is entrusted with leading the national effort to formulate and implement the NAP. Such task, by definition, is a continuously evolving process. Therefore, it was important to enumerate problems and set priorities. Two starting points were considered most important in the initiation of the Egyptian NAP. First, identification of stakeholders groups including local communities, government departments, NGO's, and CBO's. Second, sensitization and awareness raising, and exchange of information to share past experiences and assess current challenges

The Egyptian NCC shall encourage activities that would lead to a greater awareness of the UNCCD and a common understanding of its spirit and provisions, including the national commitments to the convention and the inherit extended opportunities.

Given the circumstances, combating desertification has been integrated with the every day life of the average Egyptian for long centuries. Therefore, the ideal set up of an Egyptian NAP should build upon the present local as well as national activities and capacities with a view to identify gaps and needs for possible re-orientation. Identification of gaps requires apriori analysis of available data sets related to desertification, and recognition of rational management procedures to utilize the natural resources. In a subsequent phase, identification of priority areas through national programs and projects are to be formulated and implemented. Simultaneously, alternative funding resources, development of resource mobilization strategies, and establishment of flexible mechanisms to channel resources to the local level will have to

bee defined. Moreover, consultation with the international donor community and parties to the UNCCD on the sub-regional and regional levels will be continued to ensure the complete, proper, and comprehensive implementation of the convention

ENVIRONMENTAL PERSPECTIVES

Introduction

Egypt covers a land area of over one million km^2 mostly in the hyper-arid regions of North Africa and West Asia astride the Sahara and the Arabian deserts, with an annual rainfall in most parts of less than 50 mm. The Nile is the country's basic life sustaining system, providing more than 95% of its water requirements. About 4% of the land area is cultivated and occupied by a population over 62 million, resulting in a high population density of about 1,300 people per km^2. Therefore, environmental problems and issues are dominated by the critical need to manage these scarce common resources of water and cultivable land more effectively to meet the growing needs of a population which was growing at a rate of 2.4% per annum in the last decade between 1980 and 1990.

The fact that the population and resource variables are set on a collision course imposes the urgent environmental imperative of containing excessive population growth and dictates a development strategy based on a more efficient use of limited natural resources. The government is pursuing a population program, which is expected to reduce the growth rate of population to 1.8% per annum between 1989 and 2000, and the program will continue to receive a high priority. The government now wishes to focus on actions for a more efficient use of natural resources, particularly land and water, and to stop the degradation of its heritage and the urban environment.

In Egypt, the scarcity of cultivated land and water are related. The scarcity of water makes it difficult and expensive to expand the cultivated area or protect soils with natural cover. There is a growing concern that the very limited water resources are becoming increasingly polluted because of the excessive and improper use of the resource, and that the nation will have to bear heavy costs in terms of health and productivity of its population, unless actions are taken to improve resource management. Poor water management in agriculture is also leading to the salinization of good agricultural land, reducing its productivity and requiring large investments for rehabilitation of such lands.

Degradation of Natural Resources

To support actions for the improved management of Egypt's natural resources, the institutions involved in environment would also need to be strengthened. Legal framework, Institutional options, and decentralization are been considered of urgent priority. Therefore, the quality of environmental data, informing decision makers, improving policy analysis and planning, and training are relevant issues. The government has already started actions on these lines under its structural adjustment program, and continued forceful implementation would create conditions under which investments in environment can be accelerated.

This section summarizes the magnitude of problems related to pollution and degradation of Egypt's natural resources of land and water. It identifies sources of the pollution and degradation, and their health and economic consequences. A plan of actions is suggested to stop the on-going deterioration of the environment. Soil salinization and water logging are problems affecting productivity of agricultural lands. Aquifers are threatened with salinization and general pollution. Irrigation

canals and drains increasingly suffer from eutrophication, weeds and the accumulation of pesticides.

Rain fed agriculture is limited and is found in both the extreme Mediterranean coastal plains of North-Western Matruh Governorate and east of North Sinai Governorate, where the annual rainfall is higher than 80 mm and supplementary irrigation is provided by run off and/or groundwater.

Flood regulation of the Nile River by the Aswan Dam allowed the expansion of irrigation, notably on the western and eastern fringes of the delta. However, the problem of agricultural land losses either in quantity or in quality remains a major issue for the country since the availability of easily cultivable land is limited by fresh water availability. According to the land master plan, only 2.3 million feddans of new lands are potentially irrigable from Nile River water and, despite the considerable investment for reclaiming those lands, the utilization factor remains low: to date, only two thirds of the reclaimed areas are more or less productive.

Annual presentations of routine monitoring results are provided by the Drainage Research Institute for the drainage water in the Nile Delta. This monitoring is based directly on criteria for use of water for irrigation, and hence pollutants like organic matter (biochemical oxygen demand, BOD; chemical oxygen demand, COD), nutrients, toxic compounds and bacteria are not considered. Other monitoring activities are more or less related to project oriented field surveys and therefore unsuitable for trend detection and a detailed overview of the transport and behaviour of various pollutants in the complex network of waterways.

These problems make it difficult to do water quality policy analysis on a scientific and objective basis. This is systemic problem which affects the monitoring of pollution in other media such as land and air also. This is the role of the Egyptian Environmental Affairs Agency (EEAA) in facilitating collection and exchange of consistent information on a systematic basis, assuring quality of the information collected, and its use for environmental policy analysis and dissemination.

Sources of Land and Water Pollution

Urban and rural municipal sources

It is estimated that 80% of the urban population have acceptable sanitation, including toilet facilities. This is better than the average situation in developing countries. Moreover, 77% of the urban population is connected to public sewers. Currently, there is little coordination between household water hook-ups and sewer connections, which tends to lag behind water connections.

In rural areas, only 5% of the population is connected to sewers and only about 25% is considered as having some sanitary facilities. Wastewater and latrine fills are directly absorbed underground or discharged by truckloads in the canals and drains. Less costly and more easily manageable options at local level might also be considered, particularly the possibilities of non-conventional on-site disposal systems, lagooning, aerated infiltration, sewage-farming, etc.

Industrial sources

The Water Master Plan of 1981 provides an overview of water use and wastewater disposal from industrial activities. More recent

information was collected during the preparatory work within the framework of the Environmental Action Plan. It was found that the Egyptian industry utilizes 638 million m3 every year, of which 549 m3 are discharged to the drainage system. Industrial activities in the Greater Cairo and Alexandria regions use 40% of the total.

Salinity and water logging

The total area of cultivated land in Egypt is about 7.5 million feddans. About 35% of this area is reportedly affected by salinity. The major portion of the salt affected land is found in the lower delta. Attempts are now underway to prevent the salinization process and to rehabilitate affected lands by the construction of a subsurface drainage network. Up to now, about 3.5 million feddans, mainly in the Nile River valley and upper delta, have been provided with field drains and 5.5 million feddans with open drains.

Moreover, a land improvement program has been initiated by the government; the Executive Authority for Land Improvement Projects (EALIP) is vested with this responsibility. Subsoiling, land levelling by laser technology and gypsum application to prevent sodicity are the types of amelioration procedure.

2.50 Shifting sand dunes are particularly detrimental to agriculture and human settlements. They are particularly active on both sides of the Nile Delta and along the western windward margin of the Nile River valley between Beni-Suef and Assiut. Within the Western desert, great dune fields, i. e. the Ghard Abu Muhariq, north of Kharga basin, move south and threaten the oases, with sand engulfing villages and palm plantations.

MANAGEMENT OF WATER RESOURCES

Introduction

The climatic conditions of Egypt are typical of those of the arid regions in the world. The average annual rainfall seldom exceeds 200 mm along the northern coast. The rainfall declines very rapidly from the coast to inland areas, and is negligible south of Cairo. This meagre rainfall occurs in winter, in the form of scattered showers, and cannot be depended upon for agricultural production. Thus, reliable availability of irrigation water is an absolute necessity for agricultural development.

Surface Water Supply

The main and almost exclusive source of surface water is the River Nile. The High Aswan Dam was constructed in 1964 to assure long-term availability of water for the country. The annual Nile flow at Aswan for the past one hundred years indicates that the average flow 84 billion m3 shared between Egypt and Sudan. The Joint Egyptian-Sudanese Committee has outlined several development programs, the first of which is the construction of the Jonglei Canal. Initially, the first phase of the project was expected to have been completed around the mid-1980s, which would have provided an additional 4 billion m3 of water at Aswan to be shared equally by the two countries. The total loss in the Machar swamps by evapotranspiration is about 10 billion m3. Conservation schemes in this sub-basin are expected to yield an average gain of 4.4 billion m^3 at the White Nile or about 4.0 billion m3 at Aswan. The above estimates of water savings from the proposed conservation projects in the Upper Nile sub-basins adds to a minimum of 18 billion m^3. However,

finalizing these schemes depends on agreements between the Nile basin countries and the investment requirements.

Groundwater Supply

Groundwater in Egypt can be divided into two categories. The first comprises the Nile Valley and the Delta system. The total storage capacity of the Nile Valley aquifer is about 200 billion m3, with an average salinity of 800 ppm. Another 300 billion m3 is the storage capacity in the Delta aquifer. The current annual rate of extraction rate of 4.9 billion m^3.

Groundwater also exists in the Western Desert, generally at great depths. Most recent studies have indicated that this is not a renewable resource. Preliminary estimates indicate that the total groundwater storage in this area is of the order of 40,000 billion m^3, with salinity varying between 200 and 700 ppm. Use of this fossil water depends on the cost of pumping, depletion of storage, and potential economic return over a fixed period. Investigations in the New Valley indicate that about one billion m^3 of groundwater can be used annually at an economic rate. This will allow irrigation of 150,000 feddans, of which 43,000 feddans are already being cultivated. An additional 190,000 feddans can be irrigated in the East Ewainat area (southern part of the Western Desert) by groundwater from the deep Nubian Sandstone aquifer. More studies are under way to investigate the groundwater potential within this regional aquifer. This work is being carried out in cooperation with Sudan and Libya.

Groundwater is available in Sinai in numerous aquifers of varying capacities and qualities, but it is generally believed that it is in limited quantities. Shallow aquifers in the northern coastal areas are replenished by the seasonal rainfall. The thickness of the aquifer varies between 30 and 150 m and its salinity increases from 2,000 ppm to 9,000 ppm near

the coast. In the north and central parts of Sinai, groundwater aquifers are formed due to recharge by the rain storms falling and collected in the valleys. Deep aquifers with non-renewable water exist in Sinai, where wells are drilled to a depth of 1,000 m to supply water for domestic use. The El-Arish - Rafaa coastal area in north Sinai has always been of importance. The present extraction rate from the Quaternary aquifer in El-Arish is estimated at 52,000 m^3 /day. This area is now facing a state of quality deterioration in space and time. The system is being exploited and it needs to be safely managed. The groundwater investigations in South Sinai include several shallow and deep reservoirs which have a definite potential for development, but again of limited scale.

Water Use

Total water-use in Egypt in 1990 was estimated at 59.2 billion m^3, of which 84 percent was used in agriculture. Industrial, municipal, and navigational use accounted for additional 8, 5, and 3 percent, respectively. Current estimates indicate that the total water-use will increase to 69.4 billion m^3 by the year 2000. The share of water-use by the agricultural and municipal sectors will remain almost similar to 1990, but the share of industry will increase by 50 percent, and the navigational use will decline very substantially.

Agricultural water use

While the amount of water used for agriculture has declined slowly during the past decade, it still accounts for the largest share (84 percent) or 49.7 billion m^3 per year. This amount does not include an annual estimated loss of 2 billion m3 due to evaporation from the irrigation system. The government has launched a national program for irrigation improvement and water management. Surface irrigation systems are used

in most cultivated lands of the Nile Valley and Delta and their efficiency is considered to be low. Excess applications of water to crops contribute to problems of salinity and high water-tables. It must also be noted, however, that excess irrigation water contributes to groundwater, a good part of which is pumped or partially reused through cycling. All of which increases overall water-use efficiency to a reasonable level. The measured drainage water out of the system amounted to about 11 billion m^3 during 1990. In the new lands, modem irrigation systems such as drip and sprinklers are used. The government does not give permits for new water to lands unless evidence is given of the use of new irrigation technologies.

Domestic water use

Annual domestic water use for 1990 was estimated at 3.1 billion m^3. It is also estimated that the level of distribution losses is 50 percent. It is assumed that the domestic water-use could be held at 3.1 billion m^3 by the year 2000 by reducing distribution losses to 20 percent.

Industrial water use

It was estimated that industry used 4.6 billion m^3 in 1990. This estimate is based on the extrapolation of the 1980 survey carried out for the Water Master Plan.

Navigational water use

From February to September, water releases for irrigation are sufficient to maintain water levels in the Nile for navigation. Irrigation demands from October to January, however, are not enough to maintain a navigational level in the river. This period is the peak tourist season, when tourist boats make regular sailing between Aswan and Luxor. Some 1.8 billion

m3 of water has to be released during this period to maintain the navigational level. The Esna Barrage will provide better control of the Nile water level in the area. By the year 2000, annual navigational water requirements could be reduced to only 0.3 billion m3 through better control of water level and the establishment of storage in the northern lakes.

Re-use of Treated Water

Wastewater has been re-used indirectly in Egypt for centuries, but the first formal use of wastewater was initiated in 1915 in the Eastern Desert area of Jabal El-Asfar, northeast of Cairo. After primary treatment, wastewater was used for desert agriculture, bringing into cultivation an area of 2,500 feddans. As new wastewater treatment plants come on-line in Cairo and other urban areas, the amounts of treated wastewater available for agricultural activities will increase steadily during the next three decades. Total wastewater available from the Greater Cairo area will increase from 0.9 billion m^3 in 1990 to 1.7 billion m^3 in the year 2000 and 1.93 billion m^3 annually by the year 2010, according to estimates.

Agricultural drainage water in Upper Egypt is discharged back into the Nile. This affects slightly the quality of the Nile water: its salinity increases from 250 ppm in Aswan to 350 ppm in Cairo. The drainage water in the Nile Delta is of lower quality, and accordingly is collected through an extensive drainage network. The total amount of drainage water discharged to the sea depends on many factors, e.g., the amount of water released at Aswan, cropping patterns, and irrigation efficiency.

Surveys and monitoring of the quality and quantity of the agricultural drainage water in the Nile Delta have shown that it is possible to re-use part of this water in irrigation. When salinity is low, the water is used directly. When it is high, it is mixed with fresh canal water. Water with higher salinity and water contaminated by municipal and industrial wastes cannot be used in irrigation. Under most circumstances a substantial portion of drainage water must be discharged into the sea to maintain the salt balance in the Nile Delta.

Land Resources

For any country like Egypt, the prime factor which makes land productive is water. Thus an analysis of arable land can be best divided as pre- and post-High Aswan Dam periods. Fortified by increased and more reliable water that was made possible by the construction of this dam, and assisted by technological developments, it has been possible both to intensify cultivation in the old lands and to expand agricultural activities in the new lands.

The most detailed analysis of land resources of Egypt was completed in 1986 under the Land Master Plan (LMP). This plan concluded that 2.82 million feddans of land could be reclaimed by using the Nile waters. In addition, another 570,000 feddans could be reclaimed by using the groundwater in Sinai and the New Valley. Thus the total land that could be reclaimed, subject to water availability, was estimated at 3.40 million feddans. The LMP study considered land only for irrigated agriculture. Other uses of land like fisheries, forestry, and wildlife habitat were not considered. The LMP study divided the potentially reclaimable land into five categories depending on one or

more land-use and management options. These options considered cropping patterns, irrigation and drainage systems, and farm types.

The present estimate of cultivated area in Egypt is 7.49 million feddans, of which 7.21 million feddans are in the Nile Valley. Estimates of land-lost at present due to top soil skimming and urban encroachment average 30,000 feddans per year. It is essential to reduce the loss of arable land to urbanization for three important reasons. First, with increasing population, existing agricultural land areas should not be allowed to be lost. Second, land reclamation is an expensive process, hence it would be desirable not to lose any additional land that is already productive, and then try to compensate for that loss by reclamation. Third, often land lost due to urbanization is more productive than the reclaimed land.

Land reclamation in Egypt has been practised over several thousand years. For most of this period, reclamation was concentrated primarily in the Nile Valley and the Delta, since land could be reclaimed with low levels of technology and investment. Impressive progress was made in land reclamation in the nineteenth century, at the beginning of which the cultivated area was estimated at 2 million feddans, of which 250,000 feddans could be cultivated only in the summer. By 1848, the area cultivated land increased to 2.6 million feddans; by 1880 to 4.7 million feddans; and by 1900 to 5 million feddans. Thus, during the nineteenth century, the arable land area increased by 150 percent, or 3 million feddans. Construction of the High Aswan Dam significantly increased both the supply and reliability of irrigation water. This, in turn, considerably hastened the process of land reclamation. Thus, between

1960 and 1971, a total of 912,000 feddans of land were reclaimed, much of which was in the Western Delta.

In Egypt, land can be productive only if water is available for irrigation. As population grows and enjoys a better standard of living and more industrialization, water demands for the municipal and industrial sectors will increase. Since these two sectors are most likely to have higher priority than the agricultural sector, the future of reliable water supply for the reclaimed areas should receive serious attention. Accordingly, efficiency of water-use has to be increased to ensure that lands will continue to receive their water requirements.

THE STRATEGY OF AGRICULTURAL DEVELOPMENT

The Government of Egypt places great importance to the agricultural sector recognizing its significant role in the national economy. It accounts for about 20 percent of both G D P and total exports, and about 34 percent of total employment. The agricultural sector contributes to the overall food needs of the country and provides the domestic industry with agricultural raw materials. It promotes industrial development through expanding the market for industrial goods such as pesticides, chemical fertilizers, equipment and machines. Also, agriculture helps in financing economic and social development through the net capital outflow to other sectors of the economy.

The policy framework under which the agricultural sector operated up to the end of the 1 970s was characterized by heavy government interventions in production, trade, and prices. In the 1980s drastic reforms began to be introduced within the framework of an agricultural strategy. Since then, the agricultural sector has clearly been at the forefront of other sectors of the national economy in initiating liberalization and privatization reforms.

- The agricultural economic policy reform program has included a wide variety of measures, such as:
- Removing governmental controls on farm output prices (this does not preclude government crop price supports); crop areas; and procurement quotas with regard to all crops.
- Increasing farm gate prices of cotton and sugar cane to cope with international prices.

- Removal of farm input subsidies.
- Removal of governmental constraints on private sector in importing, exporting and distribution of farm inputs to compete with the Principal Bank of Development and Agricultural Credit (PBDC AC)
- Removing governmental constraints on private sector in importing and
- exporting agricultural crops.
- Diverting gradually the role of the PBDAC to financing agricultural development projects.
- Limitation on state ownership of land and sale of new land to private sector.
- Confining the role of the Ministry of Agriculture (MOA) to agricultural research, extension and economic policies.
- Adjusting the land tenancy system.
- Adjusting the interest rate to reflect the commercial rate.
- Adjusting the foreign exchange rate to reflect the real value of local currency.

The Ministry of Agriculture also developed a strategy for development in the 1990s to further deepen the economic policy reform program which was already initiated by the sector. Local, regional, and international economic, social and political changes were considered. Within this context, the main objectives of the strategy are:

- Ensuring the optimum allocation and utilization of agricultural resources (particularly land and water) together with conserving, improving and developing these resources to achieve sustainable

agricultural development, i.e., increasing production and incomes (efficiency or growth) together with attaining equity and combined with environmental aspects.

- Better utilization of comparative advantages to increase exports and to contribute to the over all food security of the country.
- Creating new opportunities for gainful employment in rural areas.

In outlining and formulating this strategy, the Ministry was guided by the discussions with political parties and the consultations with several international organizations, i.e., World Bank (\NB), United Nations Development Program (UNDP), Food and Agriculture Organization (FAO), World Food Program (WFP) and United Nations Environment Program (UNEP). The Shourah Council also discussed the strategy. This strategy was presented in the meetings of the World Hank Consultative Group for Egypt in Paris in January 1994 and it was submitted to 30 donors attending the meetings. The donors appreciated and endorsed the strategy and expressed their willingness to participate in financing the investment program and projects identified in the strategy. The agricultural Egyptian strategy places high priority to the following activities:

- Irrigation improvement and on-farm water management
- National agricultural research, extension, marketing and export promotion
- Agricultural intensification in the new and old new lands.
- Grant financed technical assistance for strengthening policy analysis capabilities of both MOA and Ministry of Public Works and Water Resources (MPWWR), for enhancing the involvement

of women in the rural economy and for restructuring and strengthening agricultural cooperative system.

It is worth mentioning that this is the first time that the agricultural sector is to include in the agenda of the meetings of the World Bank Consultative Group for Egypt. Although comprehensive quantitative studies on the impacts of economic policy reform programs on agricultural development have not been completed yet, preliminary indicators, however, show that these programs have significant positive impacts on the agricultural sector performance. Such indicators are:

- The area of farmed land increased from 6.2 million feddans in 1981 to 7.6 million feddans in 1993 and the cropped area increased from 11.2 million feddans in 1981 to 14.2 million feddans in 1993.

- The yields and total production of the main strategic crops, i.e., wheat, maize, rice, cotton, vegetables and fruits, have increased. The total production of cereals increased from 8 million tonnes in 1981 to 15 million tonnes in 1992.
- The voluntary deliveries exceeded the obligatory deliveries (procurement quotas), e.g. the voluntary deliveries of wheat in 1992 amounted to 1,442,000 tonnes while the obligatory deliveries of wheat in 1985 amounted to only 737,000 tonnes.
- Self-sufficiency ratios of food crops have increased, e.g., self sufficiency ratio of wheat increased from 25% in 1981 to 45% in 1992.
- The total value of agricultural production increased from L.E. 5,403 million in 1981 to L.E. 27,650 million in 1991 and the agricultural income increased from L.E. 3,748 million in 1981 to L.E. 20,472

million in 1991, and the rate of growth of agricultural production increased from 2.6 % in 1981 to 3% in 1991.

- The value of agricultural exports increased from L.E. 364 million in 1981 to L.E. 1,016 million in 1992.

However, there are some side-effects which usually accompany the economic reform programs particularly in the short run. Some effects are related to the increase in cost of agricultural production as a result of canceling input subsidies and increasing rents. Others are related to some marketing bottlenecks and the decrease in farm gate prices of some crops. The MOA is seeking financial support for the Agricultural Prices Stabilization Fund and is initiating a voluntary agricultural insurance system to protect and stabilize farmer's incomes.

A conference on the impacts of economic reform programs on food and agricultural development in Egypt was jointly conducted by the Economic Affairs Sector, MOA and the International Food Policy Research Institute (IFPRI) in Cairo in November 1993 where the preliminary positive and side impacts were discussed. Also a comprehensive quantitative study on this subject is being jointly conducted by the two Institutions.

The MOA is concerned with the impacts of the GATT agreement on production, exports and imports of the main agricultural products and particularly on exports of cotton, rice, vegetables and fruits and imports of wheat, sugar and oil seeds. The objective is to maximize benefits and minimize burdens.

THE PROCEEDINGS OF THE FIRST EGYPTIAN DESERTIFICATION AWARENESS WORKSHOP

The Egyptian Environmental Affairs Agency in collaboration with the Secretariat of the Convention to Combat Desertification organized a workshop on: Desertification Awareness Days in Egypt which was held in Cairo, May 22-23, 1995. Participants included representatives if some donor countries and institutions, and Egyptian experts in relevant ministries. Participants also included representatives of agricultural companies, farmers, non-governmental organizations, and the media.

The objectives of this workshop were:

- Introduce the main features of the Convention to Combat Desertification, (UNCCD) which was adopted in June 1994 and signed by Egypt in October 1994,
- Review projects implemented by executive entities to combat desertification,
- Define elements of priorities for the Egyptian Action Program to combat desertification, and,
- Assess the potential of regional and sub-regional cooperation with Africa and other countries.

After the opening session, six working sessions were held, where the following presentations were delivered and discussed:

- Possibilities of effective implementation of the UNCCD,
- Raise the public awareness of the UNCCD and its utilization at the national and regional levels,

- Review of current desertification research in Egypt and institutional relationship between research centers.
- Objectives and programs of water resource management in Egypt.
- Land use planning to combat desertification.
- Survey and evaluation of desertification processes by using remote sensing technology.
- Land amelioration projects to combat desertification implemented by the Ministry of Agriculture and Land Reclamation.
- Deterioration of lands due to pollution by heavy metals and required corrective measures.
- Combating desertification projects in Egypt from the perspective of the Food and Agriculture Organization (FAO).
- Land degradation processes in Egypt: operations and treatments for possible improvement.
- Non-agricultural land use of Egyptian deserts based on geographic and geological factors.
- Economic and social impacts of desertification.
- National planning in Egypt and coordination between projects to combat desertification and the State's general development plan.
- Role of Agricultural Cooperative Societies in protecting the environment.
- Role of Bedouin women in combating.
- Role of the Private Voluntary Groups and Non-Governmental

Organizations in combating desertification.

On the second day of the workshop, general discussions took place regarding desertification in terms of causes and mechanisms to develop and implement the national program to combat desertification in Egypt,

as well as the possibility of regional coordination. Then it was agreed to adopt the following resolutions:

- Building a broad national awareness of desertification problems and requesting the mass media to participate in a national campaign for maintaining, preserving and developing land resources.
- Establishing a regional early warning system to forecast the possibility of local and regional drought.
- Integrating plans and programs to combat desertification with the State’s general development plan.
- Strengthening the capability and the institutional capacity of research and executing agencies concerned with the desertification problems.
- Using indigenous knowledge in redressing problems of land degradation and encouraging individual initiative to provide alternatives.
- Allocating the necessary fund to stabilize sand dunes.
- Boosting regional and sub-regional cooperation between Egypt and other countries in combating desertification.

THE FIRST ARAB CONFERENCE ON WATER AND DESERTIFICATION

Introduction

The first Arab Conference on Water and Desertification in the Arab Region was held in Cairo 17-18April, 1999, hosted by the Egyptian Academy of Scientific Research and Technology with the collaboration of The Egyptian Environmental Affairs Agency, The National Water Research Center, The Ministry of Higher Education, and UNESCO.

The Conference reviewed a series of scientific and technical papers presented by experts and institutes from various Arab countries. The relationship between water deficit and desertification, and between availability of water and food security, were the principal themes in the Conference. Three proposals were endorsed:

Water Resources

Shortage of fresh water is a truly global problem, felt today in the regions of drylands including the Arab Region, and shall be felt tomorrow worldwide. National and regional collaborate research efforts should aim at:

- Enhancing the volume of available freshwater from existing sources, i.e. runoff in wadies.
- sustain the quality of both surface and groundwater resources.
- ensure cooperation and equity among users at local, national, regional and world levels, and treatment and reuse of wastewater, promote integrated management, particularly in drylands to deter overdrafting of water resources through appropriate demand management. An

international effort needs to be set and implemented with the aim of increasing the share of water available to the world life-support systems.

Areas of scientific and technological advancement that need to be addressed include: further development of technologies for desalination of salty and brackish water, further development of technologies for deeply seated groundwater, transfer of frozen fresh water from northern and southern oceans to areas of water deficit. In all these areas technological breakthroughs are required including the use of renewable sources of energy, re-cycling of water and protection of the environment.

Drought Early Warning System

Recurrent drought is a natural hazard as it relates to year-to-year variation in rainfall which is an inherent attribute of climate in arid regions . An early warning system for climate anomalies such as failure of rainfall (drought) or excessive rainfall flood needs to be set on international bases as it has to relate to teleconnections between distant climate regimes. Available studies indicate the likely relations between the "ENSO" phenomena of the Southern Hemisphere and climatic anomalies in various parts of the world, and the likely relations between the North Atlantic Climate and the climatic anomalies in the Indian Ocean and in the Mediterranean basin . An international facility could provide to all countries regular flow of information relevant to climatic anomalies.

International Research Center

It is proposed to establish a number of international research centers to be set in major eco-geographic regions of world drylands. Each center will:

- provide the countries of its region with technical and scientific assistance required for planning and implementation of national programs of action, assist countries in their plans for capacity building including training of technical and management personnel,
- carry out research programs that aim at filling gaps in scientific and technological knowledge relevant to sustained development of land-and-water resources in drylands, and establish experimental fields and site to test and demonstrate the application of the research results,
- act as a clearing house for technical means for stabilizing sand bodies, use of low quality water for irrigation, new species and varieties of species with capacity to tolerate salinity and/or aridity, use of new and renewable sources of energy, designs of environmentally sound human settlements, etc.
- establish and operate a network of benchmark sites for monitoring and assessment of desertification, regional networks will be parts of a world-wide system.

EL-QASR RURAL DEVELOPMENT PROJECT IN EGYPT'S NORTH-WESTERN COAST

Introduction

The Environmental Action Plan of Egypt calls for the conservation and safe utilization of the natural resources of the country. Remote areas away from the Nile Valley and the Delta, where the environment is particularly fragile, require special considerations and measures for their optimum development. One of these areas is the northwest Coastal Zone (NWCZ) along the Mediterranean Sea.

An area near Marsa Matruh city was chosen in 1987 to implement a project under the name of the "Qasr Rural Development Project", abbreviated QRDP. An integrated team of experts and technicians was formed to define a strategy and possible scenarios for the sustainable development of the area.

Three principles were considered most important prior to the implementation of the QRDP. First, an efficient water harvesting system would be established in the area, whereby water of the winter precipitation may be conserved for maximum utilization. Second, limited agricultural resources in the area would be utilized with due consideration to environmental consequences. Third, the native Bedouins population would be integrated into the ongoing development to guarantee their positive response to the extended opportunities.

History and Organizational Structure

This project was initiated to serve as a pilot project for the development of the entire North Western Coastal Zone of Egypt. The Project started in March 1988 with a three years orientation phase, collecting all data relevant to development, drafting development strategies, and implementing first pilot schemes in all main fields of rural development. Step by step, spreading of soil and water conservation measures and later improvements in agricultural services followed.

The Egyptian Environmental Affairs Agency (EEAA) is the project representative. The implementation of the Project is delegated to the Reconstruction and Development Authority for the NWCZ at Marsa Matruh (Ministry of Reconstruction). Under the chairmanship of the Governor of Matruh, a steering committee defines the Project's strategies and monitors and evaluates its activities. A technical committee advises the steering committee.

Features and Problems

The NWCZ of Egypt extends about 500 km along the Mediterranean Sea from Alexandria to Saloum at the Libyan borders mostly belonging to the Governorate of Matruh. This coast is well known in Egypt as a splendid summer resort, including numerous new tourist villages.

Some tribes of Arabic origin settled in the narrow coastal fringe with rain-fed agriculture. The annual mean precipitation is 140 mm at the coast and decreases rapidly towards the south. Characteristic as for all semiarid and arid zones, the exclusive winter rainfalls are erratic as to their seasonal and spatial distribution with high inter-annual variation. Years

with abundant precipitation alternate with those of poor rainfalls and even several consecutive dry years occur.

Adequate to the climatic conditions, the major parts of the region consist of rangeland. It is the basis of the traditional animal wealth. Close to one million sheep, goats, and camels are raised in the area.

With the introduction of agricultural mechanization, parts of the former range areas were ploughed for cereal cultivation, exposing soils to mainly wind erosion. Simultaneously, the number of animals raised on the remaining range areas was increased as well.. This resulted in the well-known effects of overgrazing. Large amounts of shrubs are cut annually for fuel wood, thus denuding soils and impoverishing range vegetation. Those factors add up to the degradation of rangeland. This technical term denominates a stepwise deterioration of the natural potential. The process starts with diminution of plant production, continues eradicating of mainly the palatable species, losses of soil and soil fertility until eventually desertification is induced.

The existing rangelands are nevertheless still considered rich if compared to. range areas in North Africa and the middle east under similar climatic condition. Whenever a suitable topography and deep soils are found, water supply by surface runoff enables cultivation of fruit trees and vegetables. Such favorable conditions are located in depressions, wadis, and in the coastal plains. While in the past the area depended mainly on animal husbandry, now horticulture production is becoming more important.

Erroneous choice of design, too large spacing, low structural quality, and disregard of specific local runoff characteristics lead to frequent failures of structures and thus caused heavy erosion. Car tracks on sloping areas are collecting surface runoff water and convert them to deep gullies. Development of the NWCZ has to consider the specific characteristics of the region, differing greatly from those of Nile water irrigated lands. Expensive basic investments for mainly soil and water conservation measures have to precede cultivation, adapting agriculture to low and erratic rainfall conditions. Specific plants and cultivation practices have to be chosen for the prevailing climate and soils. Both private and public infrastructure services are more difficult and expensive because of the large distances between isolated settlements and between production areas and markets, mostly in the Nile Valley.

Aims of the Project

Strategy, volume, and range of rural development projects are oriented at the gap between actual and potential value of its natural sources, comprising water, soil, plant societies, animal, and human resources. The Project was initiated on the postulation that soil and water resources in major parts of the region are yet to be developed up to their potential. By introducing and spreading of suitable land use practices, both the cultivated area and the productivity are expected to increase.

The aims of the QRDP were accordingly defined as increasing incomes of the rural population in environmentally sound and sustainable ways, with special attention to the support of women and rural poorest. Reaching the aim of increased incomes from agriculture is not yet sufficient. Its sustainability for the future has to be assured as well. Farmers have to be convinced of the beneficial effects of the proposed

change involving new methods and modern technologies. Only then will they maintain and spread them without further support from outside. Farmers generally adopt new systems easily wherever short or medium term profits are visible. Changing habitual practices is more difficult when only long term benefits, e.g. improvement of soil fertility or range, are concerned. Reaching the aims of the Project is consequently mainly depending on the consent, confidence, and conviction of the target group. QRDP, therefore, sought and found from the beginning of the Project the close cooperation with the Bedouin population, involving them in all steps, from planning till implementation. The latter require financial or in kind contributions of the target group. This assures the acceptance of the implemented measures.

Description of the Project Area

A representative section of the NWCZ, immediately west of the Governorate capital Marsa Matruh was chosen for the Project area. The "E1 Qasr" " in the Project's title derives from a village in the area with the identical name. The area extends 40 km along the coast and 70 km to the south, shaped to a triangle by its eastern border that coincides with the road from Marsa Matruh to Siwa. Comprising about 1750 km2 the area was chosen as adequately manageable for setting up and verifying development strategies as pilot schemes for the entire NWCZ.

Sixteen tribes, comprising about 20,000 persons are the inhabitants of the area and thus the target group of the QRDP. Apart from a higher population density along the coastal road, Bedouin settlements are scattered all over the area, far from each other and far from infrastructure services like schools, hospitals, electricity and public water supply.

Planning Approach

QRDP like all regional agricultural development projects needed surveys of natural resources and frame conditions with an impact on rural life. A comprehensive view of these data reveals the economic importance of particular agricultural branches and allows to define priorities, strategies, and volumes of investments. Among others, studies on rural income situation, ground and surface water resources, marketing, and range lands have been executed by QRDP.

Four climatic stations were installed, in addition to six rain gauges. They provide data on climatic characteristics, particularly on the spatial distribution of rainfalls. Three measuring weirs record wadi runoff and amounts of floods lost to the sea.

A station for the interpretation and processing of remote sensing data was set up and named "Land Use Planning and Environmental Monitoring" (LUPEM). Land classification utilizing satellite images consists of computer supported analysis of data and verifying ground checks and mapping of characteristic land use classes such as "dense rangeland" or "orchards". The classification reflects the situation of a specific season and year. A repeated land classification after a sequence of years will reveal altered land use practices and environmental changes. This will be employed at a later stage in monitoring the Project's effects. The evaluation will be supported by a monitoring and evaluation system, to which all Projects activities are recorded and processed.

Results of the studies were summarized in a "Regional Development Plan" reflecting assets and constraints of rural life in the area on differentiated spatial levels. Under consideration of natural resources the

plan proposes specific efforts of the QRDP as well as governmental measures for infrastructure and social services.

The installation of such a unit involved high costs for experts' training and update computer technology. It was chosen in respect of future identical works of land classification and planning for the entire NWCZ. After accomplishing the task for the QRDP area the station will be transferred from the Project to full Egyptian responsibility to serve the development of the entire Governorate.

Role of Engineering

Water is the most limiting factor for agriculture in the area. Despite of this, still large quantities of this precious source are lost by runoff to the sea, by evaporation, or deep percolation. By means of soil and water conservation measures, surface runoff is collected, conveyed, and stored for human, animal, and agricultural purposes. These measures are commonly known as rainwater harvesting practices where runoff areas are attributed to agricultural fields or cisterns. The methods are far from being new. Dating back to Roman times, traces of an intensive runoff agriculture with a sophisticated system of' channels and dams are abundant throughout the region.

Speculations of locals and outsiders about abundant groundwater resources caused the Project to intensive hydrogeologic investigations. Electro-soundings and even the findings of a water diviner were used defining location of assumed aquifers and location of test drilling. The completion of seven test wells indicated that in just some areas there is groundwater with low salinity and suitable for irrigation at depths of

mostly about 100 m but the very low productivity prohibit its exploitation on economic levels.

Improvements in Agriculture

The Project efforts cover nearly all agricultural branches as there are: range improvement, cereal cultivation, animal husbandry, horticulture, and vegetable production. The first three branches demand a common approach for development since they are interrelated, all serving animal husbandry.

So far, intensive range evaluations for different ecological environments have been executed. Observation of enclosures gave a good perspective on potentials. Range improvement measures in fenced areas have been started as well. A socioeconomic concept for range improvement is yet to be found, where controlled grazing or partial exemption from grazing allow introducing new palatable plant species and recovering overgrazed existing species.

The situation of sheep breeding and health is acceptable, since this is the traditional source of income for Bedouins and they are regarded as experts in animal husbandry.. Improved fattening methods will not substantially increase the number of animals, but alternately enable the establishment of an improved range management system.

Fig trees are the best-established fruit trees in the area, well adapted to the local soil and climatic conditions and generally well growing even without fertilizers. This is probably one of the reasons for farmer’s reluctance of applying fertilizers. QRDP seeks a broad spreading of further drought resistant fruit trees in the area, accompanied by specific

extension messages as to spacing of seedlings, irrigation requirements, pruning, fertilization, and pest control.

Support for Women and Rural Poorest

The tedious and time consuming daily work of Bedouin women is fetching water from far away cisterns on donkey backs or cutting shrubs in the range areas for fuel wood, gathering them to huge piles close to their houses. Homemade bread from clay ovens is basis of a Bedouins daily diet. These duties keep women from income generating works.

Introduction of kerosene ovens by the Project was highly welcomed by women and men. Released from time consuming works of fetching water and cutting fuel wood, women are encouraged to grow fruit trees and vegetables in small gardens or greenhouses, considerably improving the nutritional value of their families diet. Or they may raise chicken, distributed by the Project for production of eggs, famous for their superior taste. Also traditional carpet weaving is encouraged by the Project.

. According to the specific location and working ability, rural poorest are supported by similar measures as those of the women s affairs or the agricultural programs. The latter e.g. provides sheep folds in order to enable them to earn their living.

Abstract and Outlook

Economic evaluation of integrated farm systems is expected to reveal short and long term returns of investments, both on farm and governmental levels. Resulting figures of model farms are expected to provide a powerful tool for advising farmers on further investments according to their individual onset of natural sources.

INTEGRATED SOIL AND WATER IMPROVEMENT PROJECT

Objectives

The Integrated Soil and Water Improvement Project (ISAWIP) is sited in the Governorate of Daqahliya, where crop yields and soils are relatively good, but are deteriorating due to increasing soil salinity and waterlogging. The governorate is the largest in Egypt in agricultural output. It produces 25% of the country's rice and 18% of its cotton. Improving productivity of the old lands, such as those in the project area, may be considered more economical and sustainable development alternative than the high-cost of development of new lands. Additionally, the socio-economic cost of delaying implementation of improvements is enormous. It was in this context that the goal of the project was defined: "To increase agricultural output of the project area so that it contributes significantly and economically to national food security and agricultural production objectives".

To accomplish the project goal, an integrated program of inputs was designed to eliminate the constraints to agricultural productivity. The program objectives were set to reverse the deteriorating soil conditions, improve irrigation water management, and facilitate the adoption by farmers of improved agricultural practices.

Project Approach

ISAWIP was the first project in Egypt to tackle the interrelated problems in land and water management in an integrated manner. It was designed to bring together the Ministry of Agriculture and Land Reclamation and the Ministry of Public Works and Water Resources, with all of their subordinate authorities and agencies, the Governorate of Daqahliya, and representatives of the local community.

Although, pre-project data collection activities commenced in 1985, ISAWIP itself started in 1987 as a five-year project. Agreement was reached in May 1991 to extend the project to 1994. The project succeeded in meeting the outputs identified in the original ISAWIP Logical Framework Analysis (LFA) design document.

The concept of integrated resource management and development is receiving much emphasis, both in Egypt and elsewhere. Farming is, by nature, an integrated process wherein the farmer brings together various inputs of land, water, seed, fertilizer and labor and, subject to the weather, cultivates a crop. However, many farm inputs are still controlled and managed by various government sectors, many of which suffer from poor coordination and the absence of direct participation from the farmers.

Government planners and managers in Egypt are becoming increasingly aware that, to be effective, they must work in cooperation with other related sectors in agriculture, water management and distribution, land reclamation, economic reform and social development. Controls must be decentralized, bureaucracies simplified and coordinated, and the role of farmer participation expanded. In fact, all those involved must work toward a common goal of increasing agricultural output.

The project provided an opportunity to bring technological innovation in soil and water management activities together, so that farmers can take advantage of the synergetic effects and improve yields and farm incomes. It also acted as a catalyst to bring together over 500 specialists to work towards achieving the common project goal and objectives.

Successfully communicating the projects goal to all participants was an enormous task. Getting everyone to work together to achieve the goal was successful in some areas, and only partially successful in others. A large number of individual and groups with diverse backgrounds were brought and worked together on the project. This is certainly one of the project's major successes.

The project embraces many improvements, each of which can be considered as one of the pillars whose execution and success, nonetheless, was dependent upon the concurrent execution and success of the others.

- Irrigation: Irrigation improvements included canal and irrigation structure rehabilitation, mesqa or tertiary distribution improvements and participation by farmers in managing water user associations. The irrigation component improved overall irrigation efficiency and promoted water conservation from the main canal serving the project area through to the mesqa (tertiary) network managed by water user associations in a 6,800-feddan pilot area.
- Drainage: Work in this component dealt with surface, subsurface and drainage pump station improvements. Lower water tables and control of soil salinity were the goals. Over 200 km of surface drains were rehabilitated, and over 8 million meters of subsurface drain tubing was manufactured and installed.
- Soil improvements: This work included subsoiling, land leveling and gypsum applications. In conjunction with drainage, this component will improve the crop production ability of the soil. Additionally, monitoring the impact of project improvements on crop yield and soil conditions was assessed.

- Agricultural extension: Community participation was encouraged by conducting crop production and other demonstration work in the project area to show the impact of using recommended practices. Agricultural extension agents from the project area villages and staff of the Development Support Communications Center were trained to enable farmers, including rural women, to benefit from the projects findings and improvements.

Project interventions in all components were achieved through substantial support in project management, mapping and survey work. New technologies were successfully introduced, and the synergy accompanying the integrated efforts enhanced the benefits. However, ISAWIP should not be viewed as an end in itself, but rather as a new initiative in its approach to project design and implementation. The concept was conceived with a long-term vision extending beyond the final seven-year time frame of the project itself. If the project is to become a true success, the integrated approach must receive broad support on a national basis. That support will ensure sustainable land and water management of Egypt's limited land and water resource base, both in the project area, and elsewhere in the country.

During the course of execution, the project received a high level of international visibility. Visiting delegations to Egypt from the World Bank, Syria, China, Pakistan, Vietnam, Yemen and Sudan toured the project. Student groups from the International Irrigation Institute of the University of Southampton, UK., toured the project as part of their international studies. Representatives of several UN organization including UNICEF, UNDP, and FAO took interest in project initiatives.

Socio-economic Summary

The population of the study area in 1991 was estimated at 355,000 with an average population density of 1,000 capita/km. The project area makes up about 10% of the population of Daqahliya Governorate, the third most populated governorate in Egypt. A 1991 survey of the rural population, excluding the two major urban centers of Minyet El-Nasr (pop. 38,887) and Dikirnis (pop 48,667), showed that less than 37% of the households were farming households. Extrapolation to the entire project area suggests that less than 25% of the families are actively engaged in farming.

The average farm size in the area is 2.26 feddans, with 53% of the farms less than two feddans, and 75% less than three feddans. Most farmers (44%) have one parcel of land, but 31% have two and 20% have three parcels. Most farmers (73%) own land and 39% rent. Fifty percent of the farm households have outside income from non-agricultural sources.

Costs and Benefits

The incurred cost of the project is about 3000 L.E. per feddan. Expected benefits are of direct and indirect nature. Direct benefits include production increase of about 25% after 3 years of implementation of corrective measures. Indirect benefits include upgraded environmental awareness, better health conditions, and institutional capacity improvement.

SHROUK: A RURAL DEVELPOMENT PROJECT

Introduction

The Ministry of Rural Development is aware of its obligation towards developing the rural community. It is also aware that the rural development must be integrative, meaning that all working bodies must take part in such development. For nearly twenty years, the Organization for the Reconstruction and Development of the Egyptian Village (ORDEV), has tried to present a pattern for rural development. It's success varied in proportion to available political support as well as financial and technical resources.

The “Shrouk Project”, meaning sun rise in Arabic, is based on the concept of collaboration and integrative government efforts extended to the Egyptian rural community . It is also based on the concept of the popular participation in terms of initiating, planning, financing, implementing and evaluating local development. In fact, the organized popular and voluntary efforts are considered the core, whereas governmental assistance is considered supplement. This concept can be realized in an atmosphere where decentralized planning and implementation are strongly supported. It is also possible when the democratic popular participation is mobilized toward common objectives. Within the frame of this program, the concept of the integrated rural development includes a planned process of development of the local community to be carried out by people in a democratic manner. This concept is composed of several simultaneous interacting components.

- A process in a sequential series of activities undertaken throughout a certain period.
- A change to transfer the local community willingly from a condition to another.
- Upgrading the community to better life conditions.
- Planning in an organized and co-ordinated procedure.
- Comprehensive development; and Integrated development.

Objectives

The long term strategic objective of the integrated rural development includes the continuous upgrading of the quality of life for local community people, and sequential development of effective popular participation. The general objectives of the integrated rural development include: development of local material resources; development of local human resources; and development of local institutional resources. The specific local objectives include: maintaining environmental natural resources; rural housing; transportation; energy; health services; motherhood and childhood care services; family planning; and Popular participation.

Institutional Structure

National Committee of Rural Development (NCRD)

It is the integrated action mechanism for the program on the national level. The NCRD is formed by a decree of the H.E. Prime Minister, to be headed by a political leading figure, and members representing relevant ministries as well as NGO'S, and experts. The Organization for the Reconstruction and Development of the Egyptian Village (ORDEV) acts as the technical secretariat of this national committee.

The NCRD responsibilities include: forming the comprehensive strategy for rural development; setting national plans for development within the national socio-economic development; allocating shares to governorates from available national budget, and co-ordinating and integrating efforts of relevant bodies.

The ORDEV responsibilities include: technical preparation of the NCRD agenda; reviewing the implementation of; and implement studies, training, and communicative activities. The Local Rural Development Committee (LRDC) is the mechanism of the integrated work on the village level. Its responsibilities include formulating local area development plan; and distributing roles and responsibilities among governmental and non-governmental bodies. The Non-Governmental Organizations (NGO's) such as co-operatives, different types of voluntary societies which will be concerned with participating in mobolizing and organizing of popular participation; and field implementation of projects and activities.

Implementation Schedule

1995/1996: Extending implementation to 5% of the villages
1996/1997: Extending implementation to 20% of the villages
1997/1998: Extending implementation to 40% of the villages
1998/1999: Extending implementation to 60% of the villages
1999/2000: Extending implementation to 80% of the villages
2000/2001: Extending implementation to 100% of the villages

WATER AND SUSTAINABLE AGRICULTURAL DEVELOPMENT IN SIWA

Introduction

Siwa oasis is located on the northern edge of the great sand sea of the Western Desert of Egypt. It is rich in natural flowing springs and an extensive land area for a population of 10,000. Accumulated excess water causes rising water table, salinization, and thus land degradation.

Program Objectives

The Program objectives are: to strengthen the Egyptian capacities to plan and implement measures for the conservation and rehabilitation of natural and man-made environment. Strategies and ways to shelter and expand the available natural resource base, with the aim of leading to higher production, reduced migration, and improvement of the living condition in rural areas.

Program Component

The program includes several components, which emerged from project identification and preparation activities and from documents produced within the framework of NEAP's Core Program activities, carried out during the period 1993 and 1994. The project will focus on supporting local community to establish tenable strategies and replicable models for protecting areas threatened by adverse wind conditions and for developing and testing suitable land resource management schemes, agroforestry rehabilitation, practices, and better suited cropping patterns.

Among its activities the project foresees fixation of sand dune sheets by drainage water in priority locations and stabilization of mobile

sand threatening nearby agricultural land and infrastructure. Rehabilitation of alkaline affected lands on priority locations in order to improve productivity. Implementation of a series of village managed micro-nurseries, provision of training, and provision of financial support to the development or local small-scale agricultural leased industries and activities.

First Year Achievements

Up to now, the main output of the project has been the logistics and administrative tuning, and the consensus reached about the project objectives, contents, approach, and expected output. The achievements of the first year can be summarized as follows:

Assignment of the full time and part time staff as well as the selection and appointment of the key expatriate, and currently needed local consultant has been carried out.

Essentially required office equipment, computers, and vehicles were procured and augmented.

Administration and financial procedures and rules that should be followed by the project management unit have been established.

A consensus workshop was held to introduce the project and its objective to the different interested parties and stakeholders.

An introductory short-course was organized in Cairo to familiarize technical staff with up-to-date tools and methodologies used in the field of integrated water resources planning and management. Also few training activities took place to improve the staff computer and language skills.

The first and second annual work-plans in addition to the project overall work-plan were prepared.

The Final Technical Project Document has been produced as well as two reports on the survey of existing databases, GIS and models.

Other important activities were started which concerned i) the identification of development measures and scenarios, ii) the literature review of evaluation indicators and indices used in Egypt; iii) the formulation of evaluation indices to be used; iv) the identification of parameters, state variables and relationships; and v) the design of internal models.

Work in 1999

The formulation of evaluation indices to be used in the Discussion Support System (DSS) is an iterative process. It comprises the selection of suitable attributes, starting as a basis from those so far used, the specification of the relationships that link such attributes to the Egyptian Water Resources and related Socio-economic Environmental System (EWRSES) variables and their structure in terms of aggregation of information considering the relevant time, spatial and social scales. Also, the information needed to assess them is identified.

The approach pursued in the project stresses the need for not reducing water resources planning to a sole demand-resource matching, but adopting instead a more comprehensive perspective and consider, as ultimate goals, the sustained improvement of quality of life. The indices should therefore be capable of giving an idea about the quality of life components more strictly linked to water resources planning.

The following is a preliminary list of attributes which are considered to design indices based on quality-of-life. Only the attributes which do have a quite direct relationship with water resource planning are

considered. The items listed here belong to the category of ‘fundamental objectives’, i.e. a clear judgement of (un) satisfaction can be attached to them. Other more typical attributes play the role of ‘causal factors’ in the cause-effect network. For instance, the agricultural production is considered when assessing farmer relative income, or ‘food security’, and so on :

income of farmers (e.g. ‘relative’ with respect to average consumption level);

quality of entourage (surface water quality, landscape aesthetics);

employment status (linked, in particular, to development measures, like reclamation of new lands);

service: drinking water supply (reliability, quantity, quality, cost);

service: food supply (idem) service: waste disposal (idem);

health (water linked diseases);

community relationships (especially in newly reclaimed lands);

security (food, energy, foreign debt independence; coverage of the national territory); and

existence and option values for ecosystems.

As a second step, connected both to the formulation of indices and to ‘system description’, the analysis of what are the relevant relationships linking the development measures to the indices, i.e., through which cause-effect pathways the implementation of a given action will produce effects ‘measurable’ by indices (this is a typical task of Environmental Impact Assessment-EIA). Actually, as specified in the technical Project Document, one of the key ideas of the approach proposed is that of integrating the approaches deriving from different and still poorly-communicating disciplines, namely: EIA, Extended Cost-Benefit Analysis and Multicriteria Analysis. The main output from this activity is

a series of cause-effect graphs. The analysis proceeds, as usual, from the causes down to the effects (‘top-down’ approach), but is also integrated by a ‘bottom-up’ approach, because the modeling approach requires to structure and assess the indices on the basis of the opposite information: given an index, all the pieces of information which compose it must be identified, as well as the origin of the relationship, i.e. to what they are linked.

The analysis of the relevant relationships requires developing the identification of EWRSES parameters, state variables and relationships activity, i.e. a conceptualization of the (EWRSES) where the sought relationships are specified. This activity is planned to be completed by the end of February 1999, but as it is strictly related to the formulation of indices and also to the design of internal models, modifications are very likely to be required as the project goes on.

The activity is structured as follows :

getting a sufficient understanding of the physical EWRSES – particularly the Water Resources sub-system i.e. surface network layout, uses, aquifers and linking flows; system current actual management.

Identifying different possible schematizations of the physical system considering different desegregation scales and resolution.

Identifying what usable modeling tools are currently available in the Egyptian institution to model the components belonging to each schematization

Reaching a conceptualization of the overall system (water resources and environment, socio-economic, and macro-economic sub-systems) where the relevant system components, their state variables, input,

output and mutual relationships are specified in a block diagram representation. This conceptualization must include all the relevant cause-effect paths linking development measures to the evaluation indices.

It is worth noting that again the underlying idea is that of integrating the bottom-up approach with the top-down approach. The former is pursued because the DSS will contain an information structure capable of representing the detailed system description (bottom), from which different schematizations of 'reality' can be set up, from the crudest (zero-dimensional) to the more refined (three-dimensional). On the other hand, the DSS should allow to perform an analysis of the relationships linking the considered development measures (top) to the effects –evaluation indices, and check whether the system schematization is suitable.

In summary, the system conceptualization is defined once given the type of assessment-evaluation exercise that one wants to carry out for the particular problem at hand. The schematization of the physical system is then defined to model the conceptualized system (i.e. assess the relevant variables and relationships), according to the available modeling tools and available (or foreseeable) data.

SOUTH VALLEY DEVELOPMENT PROJECT

Introduction

The Egyptian Government has embarked on a grand scheme of integrated design to develop the southern portion of the country. The geographic location of the area to be developed stretches east and west from Aswan

Governorate in the extreme south of Egypt. The underlying strategy of the scheme is to redeploy present and future population over a wider spatial distribution such as to change demographic map of the country. It is estimated that the inhabited portion of the country would increase from 6% at present to 25% when the scheme is completed in the year of 2017.

The scheme comprises plans and programs that pertain to water engineering, agriculture, mining, industry, and tourism as well as human settlements, social, economic, and institutional activities.

At present, work has begun in the Toshka project which calls for the reclamation of 540,000 feddans to the west and northwest of Abu-Simbel area, about 300 km to the south of Aswan city. The annual water budget of the project is 5 billion cubic meters would be pumped from Lake Nasser through a canal under construction at present. The canal is named “El-Sheikh Zayed Canal” in appreciation of the friendly relations between Egypt and the United Emirates.

The water input of the canal would be secured by calculated changes in the cropping pattern of lands in the old Nile Valley of Egypt. Regulatory measures would be taken to encourage farmers to grow crops whose water requirements are rather limited.

Project Key Elements

The project starts with a giant major pumping station to be set up on the left bank of Lake Nasser 8 km north of Toshka to be constructed in about 4 years starting 1st Jan. 1998. The station has been designed to have a maximum static lifting of about 52.5 meters to guarantee its operation when the water level in Lake Nasser reaches its lowest level of storage, namely 147.5 meters, and the main canal water level is 200 meters.

Moreover, 24 pumps, each with a discharge capacity of 16.7 m3/sec, will be housed inside the pumping station, 20 pumps of which will be on duty while the rest will act as standby units.

The designed discharge of the pumping station was estimated to be about 300 m^3/sec (25 million m3/day) subject to rise to 37 million m3 /day if necessary while withdrawal would be from the intake through tunnels and discharge through pipelines. The energy necessary to operate the station is 375 M.W. during maximum lifting which occurs only at limited times when the water level in the Lake drops (during the past 15 years the Lake's water level dropped for a period of only 3 months). As for the average of the water level in the Lake throughout the years it is 165 meters, thus the quantity of the average lifting reaches about 35 meters.

The quantity of energy needed to operate the station ranges between 200-375 M.W. according to the fluctuation of the water levels in the Lake. The station would be fed with electricity through a transmission station, linked to the electric power line from Aswan with a length of 250 km and a power of 220 KV. No doubt this design will allow feeding the main canal which will continuously carry water regardless of the Lake's water level. Based on the results of the soil analyses and classification carried out by the Soil and Water Research Institute of the Agricultural Research Center, Ministry of Agriculture, it has been revealed that there are about 2 million feddans suitable for agriculture with different orders ranging in classification from the first to the fourth order in areas close to the main canal and surrounding the Toshka depression at Abu Simbel-Aswan road. The main canal carrying water has been designed to feed several branches as follows:

- The main canal with a length of 70 km;
- Four branch canals with a total area served of 540,000 feddans:

The cross section of the main canal was designed to be lined to prevent any water leakage with a bed of 30 meters width and water depth of 6 meters, in addition to one meter free board, with an upper width of 54 meters with platforms on the two sides 8 meters wide, and 20 meter-wide banks. The Hydraulics Research Institute of the National Water Research Center, carried out a study on the possibility of constructing the canal as an open channel or pipelines. The study took into consideration the discharges needed during peak times, the nature of the land through which the canal will flow, and the mechanical characteristics of the soil.

Detailed survey studies carried out by the Survey Authority and the Survey Research Institute helped in selecting the appropriate location and determined the canal course in the first stage as well as the road leading to the intake location. A network of land fixtures was designed, constructed and distributed appropriately and its contours determined using the most sophisticated survey equipment linked to the contours of the national network. Following the survey of the region maps were prepared with a scale of 1:2500, 1:5000, and 1:10000 to constitute a basis for operational work. This will be followed by a detailed survey and budget for the network in accordance with the topographic changes of the main canal route and its tributaries.

One of the most important technical studies needed for the construction of the canal is a geo-technical study to sound out the rocks on the canal course and determine their specifications, as well as a study

on the cracks, earthquake movement, and the movement of sand dunes, all of which are elements that affect the selection of the course.

The study aims at preparing geological maps with a scale of 1:100,000 through satellite data of an area of 600,000 km^2. In addition, field studies will be carried out to determine the lithological course of the canal, the geological age of the rocks, the thickness of the sedimentation cover, the depth of the base rocks, the mechanical, geochemical and the geophysical characteristics of the soil and rocks while determining the most appropriate locations suitable from the regional and geo-technical aspects for the establishment of urban communities in the area.

It is noteworthy that all project construction works will be based on the results of the soil mechanics studies in the project region. A fully equipped laboratory was set up by the Construction Research Institute close to the location in Abu-Simbel to carry out soil tests, material specifications and chemical analyses. Huge excavators that can go to the depth of 300 meters were transferred to the location and several indoscopes were carried out alongside the canal and in the location of the proposed pumping station. Samples of the soil taken from different depths are continuously being analysed.

Soil foundation and material studies will continue to include bank stability and the necessary soil installations under different operation conditions to evaluate the most suitable quarries for local material necessary to provide the construction material suited to the nature of every location. Concrete mixtures are to be designed and quality control tests are to be carried out to construct facilities, while also developing

programs and survey and follow-up systems to monitor the performance of water structures and banks during and after implementation.

The technical studies will further extend to include the requirements after construction of the main canal and its tributaries, as well as the requirements for the irrigation and drainage of agricultural land within the project area. Though Egyptian expertise in the field of modern irrigation is immense, yet the water requirements under the climate conditions of those areas require even more studies and more accuracy.

The characteristics of the land in the New Valley and South Egypt represented in a location far from the sea and the natural river necessitate resort to non-conventional drainage systems, largely different from what is practised in the Valley and Delta to limit drainage water and its negative impact on the environment. The following are proposals to dispose of drainage water:

- The rational and calculated reuse of agricultural drainage water in irrigation.
- Establishing artificial lakes suitable for reviving tourist and recreational activities surrounding them.
- Irrigating a belt of timber trees to help improve weather, block winds and make use of their timber economically
- Growing weed plants that are highly tolerable to salinity and of high economic value.
- Extracting solid salts that can be used economically.

Study of the use of the Toshka depression itself is considered in order to compile a drainage network for using it in seasonal cultivation's or through evaporation since the area comprises 1.5 million feddans.

IDENTIFICATION AND MONITORING OF SAND DUNES

Introduction

The African continent consists of extensive plateaus, intervening ridges and arches, and shallow depressions. It has more than one third of the world's arid lands represented mainly in the Sahara, Namibia, and Kalahari deserts. The Sahara representing about one quarter of the surface area of Africa, is the greatest tropical desert in the world (9.1 million km^2). Desert sand dunes are the most distinctive aeolian feature of the African arid lands. They cover one-fifth of the African deserts, being extensive in the shallow depressions, whereas coastal dunes and sand ridges are generally more limited in areas at the narrow coasts of Africa.

In Egypt, sand sheets and dunes cover about 16% of the land surface. They are extensive in the Western Desert as the Great Sand Sea (which constitutes about 80% of the Egyptian dunes) and different relatively small fields such as Qattara dunes, Small Sand Sea (southeast of Farafra depression), Abu Moharik, Dakhla, and West Nile dunes. Linear dunes are the dominant type on the surface of Western Desert Plateaus, whereas crescent (burchan) dunes are more common in the depressions. The dunes of the Western Desert trend in a clockwise pattern around a center near Kufra Oasis in Libya.

Coastal dunes and sand ridges cover small areas as compared to inland or desert dunes. One of the most typical examples of sand ridges in Africa are those extending along the Mediterranean coast of Egypt, west of Alexandria. They are represented by nine parallel calcareous ridges

alternating with depressions. The mode or their formation is controversial, but the recent studies support a marine origin, with additions of windblown sand after emergence. Clastic quartz dunes of the Northern part of the Nile Delta are diversified in size, shape and orientation and are characterized by rather high content of heavy minerals transported by the River Nile from the Ethiopian catchment.

On the other hand, and as well known, agriculture in Egypt is centered in the Nile Valley and Delta where more than 95 percent of the population live. This area constitutes about 4% of the total geographical surface of the country. Except for narrow Mediterranean semi-desert belt, the rest of the area is occupied by arid to hyper-arid desert terrain with rocky to sandy cover.

Sand Movement and Deposition

The following conditions allow wind erosion to take place: strong wind, loose, finely divided soil or weathered material, large area of open land, and rather smooth surface devoid of vegetation cover. The previous factors are greatly represented in the Western Desert (west of the Nile Valley), the northern parts of the Eastern Desert, and Sinai. In these regions, aeolian activity has its effect on the cultivated lands to different degrees. Climatic conditions affect greatly the formation of the sand landforms such as precipitation, rainfall variability and intensity, air and soil temperature, air humidity and wind. The most important climatic element for the formation of sand dunes and sand fields is the constant wind direction.

Wind speed at the ground has to be sufficiently high for sand transport: it must be stronger than 12-19 km/h. Also, consistency of wind

directions and wind duration are of great influence for sand movements. The lower limit of particle sizes that can be formed into aeolian bedforms is controlled by a number of factors. The primary control is through the settling velocities of particles in air. There are three ways by which sand grains reach their final resting-places in a sand deposit. On the Egyptian lands the three types of sedimentation: true sedimentation, acceleration, and encroachment

The Problem Addressed

Most of the sand accumulations in Egypt occur in the western part of the Western Desert. Dune fields that impinge on human activities and resources are known. Salient among which are:

- South Fayium-Wadi Rayan dune belt that fringes the western side of the cultivated land of the Nile valley between Minya and Assiut.
- West Aswan and West Abu Simbel dune belts that cause siltation of the northern and northwestern parts of Lake Nasser.
- Ghard Abu Muharik that threatens the farms and settlements of Kharga Oasis and consequently the human activities related to the on-going Toshka national development project.
- The Farafra Depression dune field that threatens farmland and settlements of the Farafra and Dakhla Oases as well as the recent agricultural development project along Darb El-Arbain.
- Northwest Sinai Dune field where large land reclamation and cultivation projects are undergoing depending on EI-Salam canal for irrigation.

National Needs/Goals

The country needs a design of appropriate methodologies for combating the adverse effects of dune accumulations and movement for protection of its national desert development projects. This may be gained through better understanding of the geometry and dynamics of dunes, and the controls.

Expected Situation at the End of the Project

The project activities, that include interpretation of space imagery, field work and laboratory analyses will lead to:

- Series of maps/photos showing the geometry of dune belts.
- Interpretation maps/illustrations of the dynamics of dune formations.
- Better understanding of the composition of the dunes regarding provenance.
- Better assessment of the seriousness of dune hazards.
- Training of young researchers.

Target Beneficiaries of the Project

- Decision-makers, planners, local administration, and municipalities.
- The scientific community at large.
- The ministries, national institutions, and the private sector.
- Local population and small investors/property-owners.
- Young trainees of different work affiliations.

NATIONAL LAND USE INFORMATION AND POLICY SYSTEM

Introduction

Egypt has experienced and overcome many problems in it's long

and illustrious history from the days of the Pharaohs to the present. Today, Egypt's problems are difficult, complex and often severe. Pollution, overpopulation, urbanization, employment, desertification are some of the intricate problems that the country must face daily and these are also problems where there is no fast or easy solution. However, one common factor in the analysis of these problems is that they are space or location oriented. Therefore spatial information is required to make decisions on resolutions.

There is often a deficiency of spatial information at the disposal of the decision makers within and outside the government. The existence of certain information may not be generally known. In addition, the data may not be accurate, up-to-date, and may have internal or external inconsistencies.

Objectives

The main objectives of this project is to support Egypt's efforts to improve, consolidate and integrate national land use information and policy. This is needed for environmental quality of land resources and effective land use and development to meet national needs. The purpose of the National Land Use Information and Policy System is as follows:

- Strengthen coordination of the various agencies producing land information, so as to improve the quality and availability of land information;
- Support mechanisms that will allow to make timely and sound land use decisions;
- Install and operate communications systems that would allow to share and exchange data and information;
- Strengthen the coordination of the various agencies using land

information;

- Perform organizational and institutional strengthening in the production and use of land related data and information;
- Develop a meta-database of land related spatial information;
- Train data producers and data users in the field of Geographic Information Systems; and
- Ensure the role of women and gender equity issues in data collection, analysis and information development.

Outputs and Results

- Consolidated National Land Use Information System; Specific land use data for regional, district and village level suitable for planning and development; Land environmental quality assessment; Strengthening of major data producing institutions; Training of Egyptian professionals in data collection, processing communications and operations of the national system;
- Operating national data communications system with proper clearance and security measures; and Creation and operation on national information network to facilitate and coordinate data and information sharing and exchange.
- Effective land management and optimized resource utilization with increased economic and social benefits at the national level;
- Improved land environmental quality and reduction of waste and deterioration rates (control of desertification, salinity and water logging);
- Reduction of capital investment for remedial actions related to land deterioration;
- Increased private sector investment in land conservation and efficient

land utilization with positive impact on employment generation; and

- Increased public awareness and level of public participation in land use decisions and management.

Project Concept

The development of the National Land Use Information and Policy System Project is based on the concept of a hierarchy of groups. The main function of the high level group, named the "National Steering Committee" is to develop land use strategies and policies. The next level group called the "Land Use Secretariat", is tasked with supporting the National Steering Committee and coordinating the various agencies concerned with land use issues. The third stage of the hierarchy are the selected participating agencies. Information producer agencies will be tasked with providing the land use information from their agency in a consistent and convenient fashion. Land use information user agencies will be expected to obtain, use and provide results of their analysis to other users.

The information needs of this network will include the following: Topographic and cadastral information; Agricultural capability information (old and new land); Geological information for soil and subsoil; Urbanization; Roads, railways and waterways; Land reclamation; and Irrigation and drainage networks.

Project Description

Project management

The development of the Project is based on the concept of a hierarchy of groups. consist of the "National Steering Committee", the "Land Use Secretariat", and the selected participating agencies. The

elaboration of the three elements of the conceptual structure of the project follows.

National steering committee

The National Steering Committee is responsible for the following: - addressing strategic land use issues; - developing land use policy; - setting national land use priorities; - making and reviewing land use decisions; and - resolving land use disputes.

The National Steering Committee will be provided with all the necessary data and information for its operation by the Land Use Secretariat. This will include the development of meeting agendas, correspondence and communications, logistical arrangements, and all background studies, reports and documents.

Land use secretariat

The Land Use Secretariat has a dual purpose. It is responsible for supporting the National Steering Committee and it also provides the necessary managerial and technical coordination with the participating agencies. In particular, the Land Use Secretariat is responsible for the following: performs organization for National Steering Committee meetings; acts on decisions of the National Steering Committee; performs coordination with managers in participating agencies; organizes monthly meetings of technical people from participating agencies; performs planning; and promotes and coordinates standards.

Participating agencies

Each participating agency will be responsible for creating and supporting a land use information service unit within their agency. The

purpose of this unit is to provide an access point for the land use information within the agency. In particular, the unit will make land use meta-data available for use on the network, it will provide land use information to authorized users, and it will operate and maintain the technology required for the land use network.

A land use information service support unit will be formed within each agency. The organizational arrangement for the creation and support will vary from agency to agency, but it will most likely be formed within the agencies information centre, computer centre or GIS centre. The Land Use Secretariat will be able to assist in the determination of the best location of the unit within the agencies structure.

Communicational system

The technology of the communication system is the heart of the project. This portion of the system is for the communication and exchange of the land information. It will require the implementation or installation of the following technology:

- Secure Wide Area Network (WAN)
- Network server at each node
- Network clients
- Network communications (TCPIIP)
- Client/Server operating system
- Investigations of system selection

Information management

The information management component will look after the data

and information collection, cleaning, and distribution component of the system. The technology required for the information management of the system is as follows:

- Data Base Management System
- Spatial Browser
- Federated GIS Database
- Geographic Information System
- information dissemination system

Capacity building

Each participating agency will be assisted in setting up a land use information support unit in each agency. This will require space, staff, funding and support. This unit will be the focal point of the land use project in each participating agency. Training and human resources development are required at most levels of the project. The following training will be required by staff at the participating agencies:

Project Management; Network management and operations; Geographic Information systems; Database management; Computer operations; MetaView and Delta-X; Gender equity; and Social communications.

Policy development

The project will assist institutions to develop appropriate policy and identify priorities for action. This will be based on the information system that is being developed by the project to meet national needs. Some of the issues that may be dealt with are: pollution; overpopulation; urbanization; irrigation; and Desertification.

NATIONAL ENVIRONMENTAL INDICATORS

Introduction

Indicators are always an essential element for decision making in any area. Economic indicators help assess the state of the economy and influence major decisions made by individuals, corporations, institutions and governments. However, these traditional indicators cannot be used for assessing the importance of the environment to individual and collective future. In order to move towards the goals of sustainable development, decision making has to be based on environmental factors as well as economic ones.

Objectives

State of the Environment (SOE) reporting describes, analyzes and presents scientifically based information on environmental conditions, trends, and their significance. It looks at the effects of human activities on the environment, as well as their implications for human health. economic well-being and the state of ecosystems.

SOE reporting is only as useful as the information on which it is based. Consequently, the measuring devices used to evaluate problems, their causes, and the steps taken to overcome them are fundamentally important part of the process. Although there are huge efforts in collecting data and monitoring parameters, there is a great need for producing environmental indicators, based on those parameters in-order to interpret their causes and effects

Importance of Measuring Environmental Indicators

Indicators are defined as "statistics or parameters that provide information on trends in the condition of a phenomenon and have significance extending beyond that associated with the properties of the statistics themselves"

Environmental indicators are selected key statistics which represent or summarize a significant aspect of the state of the environment, natural resource sustainability and related human activities. They focus on trends in environmental changes, stresses causing them, responses of ecosystem and its societal responses to prevent, reduce or improve these stresses

Categories and Types of Indicators

There are three categories or principal environmental goals for environmental indicators and sustainable development:

- State of the environment indicators to reflect the quality of the environment, the stresses on it, and the management responses to both the quality and stress;
- indicators of the impact on the environment and the environmental efficiency of such key sectors as agriculture, energy, transportation and industry and the degree to which environmental concerns are being integrated into the policies in these sectors
- indicators that integrate economic and environmental elements so that the value of natural resources and the costs of pollution are reflected in the national accounts.

These categories are measured in three types: condition, stresses. and management response. Thus, the goals for sustainable development are assuring ecosystem integrity; assuring human health and well-being, and assuring natural resource sustainability. Influencing the attainment of these three goals in a pervasive way are population, lifestyle and consumption patterns. Therefore, pervasive influencing factors can be

added to the above three categories, under which transportation, energy consumption, population growth, and others can be measured.

A number of steps are necessary for selecting and producing the national set for the environmental indicators:

- identify societal goals to which the indicators relate and fit them within the above framework to operate,
- identify selection criteria by which to judge the potential indicators,
- consult with data holders, experts and potential users; and
- verify that the indicators communicate the message effectively.

A main constraint in producing the national environmental indicators set is the availability of data and its quality. It is necessary to allocate the data holders and to assess the methods they use for measurement and updating the data.

Outputs

Output 1 - preliminary set

This is a short term deliverable for a quick production of environmental indicators bulletin with the existing data This bulletin is planned to be published quarterly on various media (INTERNET, hardcopies, ...etc). In order to produce such a list and to ensure its sustainability the following outputs are needed: Information System; website; distribution list; trained staff; and media coverage plan.

Output 2 - plan for comprehensive set

The project will produce a plan or a study for implementing a complete environmental indicators set. The study will complete the list of

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indicators, identify the sources of information, network the data-holders and develop a sustainable system for monitoring.

Work-plan

There is a need to execute the following tasks. Some of these tasks:

- Task 1- Needs assessment
- Task 2- Identify data sources
- Task 3- Identify presentation media Decide
- Task 4 - Indicators report design
- Task 5 - Project implementation
- Task 6 - Bulletin production
- Task 7- Plan for the comprehensive list