

## Agricultural land resources and the future of land reclamation and development in Egypt

Hanna F., Abdel-Ghani Osman M.

*in*

Abdel Hakim T. (ed.).  
Egyptian Agriculture Profile

Montpellier : CIHEAM

Options Méditerranéennes : Série B. Etudes et Recherches; n. 9

1995

pages 15-32

Article available on line / Article disponible en ligne à l'adresse :

<http://om.ciheam.org/article.php?IDPDF=C1950933>

To cite this article / Pour citer cet article

Hanna F., Abdel-Ghani Osman M. **Agricultural land resources and the future of land reclamation and development in Egypt**. In : Abdel Hakim T. (ed.). *Egyptian Agriculture Profile*. Montpellier : CIHEAM, 1995. p. 15-32 (Options Méditerranéennes : Série B. Etudes et Recherches; n. 9)



<http://www.ciheam.org/>  
<http://om.ciheam.org/>

# Agricultural Land Resources and the Future of Land Reclamation and Development in Egypt

**Fuad Hanna**

Faculty of Agriculture, Cairo University (Egypt)

**Moustapha Abdel Ghani Osman**

Ministry of Agriculture (Egypt)

**Abstract.** Egypt has a limited base of cultivable land resources. This chapter examines Egypt's land resources and the future of land reclamation and development. It includes four major sub-topics, the **first** of which deals mainly with the realities of Egypt's agricultural land area, with particular reference to the limitedness of land resources. The total area of agricultural land (old and new) has reached about 7.5 million feddans, representing only 3% of Egypt's total area, with a per capita share of 0.14 feddan.

The reclaimed land over the past period is proportional neither to the time dedicated to reclamation nor to the country's needs to resolve the problem of overpopulation.

The loss in land resource base justifies the resort to reclaiming new lands. The **second sub-topic**, therefore, covers the assessment of loss in the agricultural land in its various manifestations including loss to urban development and loss in land productivity due to misuse. This makes horizontal expansion inevitable for the provision of food, feed and fibers to Egypt's increasing population. It also covers the development of land reclamation prior to the year 1952 and the salient features and classification of the new lands into three regions: the northern coast, the western desert, the oases and the eastern desert, in addition to the area surrounding lake Nasser. Problems encountered in the latter area have been defined and need to be solved before being considered part of the agricultural land.

The **third sub-topic** deals with the development of land reclamation policies since 1952 and up to the third five-year plan (1992–96). It appears that these policies were subjected to change from time to time. This part also covers the development of investments in the field of land reclamation, execution of infrastructure works since 1952 and sources of finance for such projects.

The **fourth sub-topic** tackles the problems and obstacles that face land reclamation projects, namely the technical, economic and organizational problems.

In the new lands, water resources constitute the major determinant of reclamation and development. Therefore, the economic philosophy of using land and water resources to maximize the returns per feddan need to take into consideration water consumption in relation to returns. Other problems include the absence of clear objectives for reclamation, malselection of reclamation sites, lack of integrity of project implementation phases, inability to choose the best mode of the newly-reclaimed land use and other obstacles such as management, credit, energy, security, and labour. With regard to the future prospects of land reclamation in Egypt, emphasis was laid on the proper selection of reclamation sites. The total area of the potentially reclaimable land has been estimated at 3.4 million feddans out of which 1.6 million are to be given first priority. This should be accompanied by an outlook to the new lands different from that of the old lands inasmuch as the cropping patterns, technical packages, size of holding and type of farm management are concerned.

**Keywords.** Land resources – Land reclamation policies – Land reclamation projects – Agricultural land

**Résumé.** Les ressources en terre sont très limitées en Egypte. La surface agricole totale est de 7.5 millions de feddans, ce qui ne représente que 3% de la surface totale du pays et donne une surface agricole de 0.14 feddan par habitant. En outre, la perte des terres agricoles, sous des formes différentes, est un des problèmes majeurs que rencontre l'agriculture égyptienne. Dans ces conditions, "l'expansion horizontale", c'est-à-dire la mise en valeur des nouvelles terres désertiques afin d'augmenter la surface cultivable, devient une nécessité pour augmenter la production agricole et faire face à la pression croissante sur la terre agricole.

Les politiques de mise en valeur des terres ont évolué depuis 1952 en fonction des stratégies de développement adoptées et en fonction de l'orientation économique, surtout les politiques d'investissement public et privé.

Les projets de mise en valeur des nouvelles terres rencontrent de nombreuses difficultés de nature technique, économique et organisationnel. Le problème de l'eau et de la gestion de l'eau dans les nouvelles terres apparaît comme un déterminant principal pour l'avenir de la politique de mise en valeur.

Malgré les difficultés, le potentiel des terres disponibles pour la mise en valeur est important : il est estimé à environ 3.4 millions de feddans.

L'avenir de cette politique dépendra des problèmes techniques mais aussi de la capacité de mettre en place des nouveaux modes de gestion des nouvelles terres, radicalement différents des modèles dominants dans les anciennes terres.

## I – The Limitations of Egypt's Agricultural Land Base

Egypt is counted among the world's poor countries in cropland base. The presently cultivated area constitutes about 3% of the total area of Egypt (245 million feddans). Statistics from the Ministry of Agriculture and Land Reclamation (MOALR) indicate an increase in the agricultural land: from 5.67 million feddans in 1950 to about 6.62 million feddans in 1982. According to an estimation of the Ministry of Public Works and Water Resources (MPWWR), Egypt's cropland area is of about 7.3 million feddans, based on the annual quantities of irrigation water, in addition to an area of 0.2 million feddans outside the Nile basin in the Egyptian territory in 1991. These figures conform, to a great extent, with those of MOALR for the same year. Most of these croplands are classified under the second and third grades (45.5% and 38.5% respectively) representing good and fairly good lands. First grade lands constitute about 9.2% of the total area of cultivated lands while low quality lands (fourth grade) constitute about 9.6% (Arab League, Arab Organization for Agricultural Development 1992).

Due to the rapid population growth, the average per capita share in agricultural land decreased from 0.29 feddan in 1950 to 0.23 feddan in 1960, and to 0.14 feddan in 1990 (Suliman 1991). This figure is the world's lowest per capita share in agricultural land. It is annually decreasing as population growth rate greatly exceeds that of the expansion of agricultural land. Therefore, Egypt's land resource is one of the constraints that impede agricultural development efforts, let alone the fact that a large part of the Egyptian population is concentrated over about 5% of Egypt's total area.

### 1. Loss in the Agricultural Land Resources

The many legislations prohibiting transgression of the agricultural land for urban purposes could not stop the multifarious forms of losing agricultural land to urban development. A study conducted recently by the MPWWR (1984) estimates the annual loss between 10–75 thousand feddans, with an average of about 45 thousand feddans.

The same study indicated that the strict enforcement of laws can effectively reduce the rate of annual loss in the future to almost 22.5 thousand feddans annually (Amin 1990).

The Central Agency for Public Mobilization and Statistics (CAPMAS) estimated the area of old lands at about 6 million feddans from 1968 through 1984, which means that the reclaimed area over the same period is almost equal to the area lost to other purposes (912 thousand feddans) from the country's highly productive lands situated near the densely populated areas. To the contrary, the newly reclaimed lands require the application of modern irrigation techniques, such as drip and sprinkler irrigation systems, thus entailing further difficulties in investment, operation and maintenance. Most of these new systems have not so far reached productivity margins, except for 300 thousand feddans.

Hereafter is an explanation of the various types of loss in cropland, classified according to length of time (continuous – permanent – semi-permanent – provisional).

### 2. Permanent Loss in Crop Land

Loss in crop land for urban purposes is one of the most conspicuous forms of permanent loss. The transformation of crop land to non-agricultural purposes being more remunerative, houses or industries are built on highly productive soils, as a result of which heavy investment takes place for the reclamation of desert land. In addition, the new emerging families tend to live in the vicinity of the older families, thus leading to an increase in demand for croplands for urban purposes which encourages landlords to sell their lands at high prices. So long as the marginal returns of land unit are not equated with those of the other alternative land uses, the process of reallocating croplands to other purposes will continue until these margins reach a state of equation or until prohibitive legislations are enacted and enforced.

Urban expansion at the expense of croplands is also linked with the phenomenon of cropland idling, being the first step for construction thereon. Cropland idling does not mean the agronomic practice that aims at relieving the soil for a season or so in order to restore the soil its fertility. It means the indefinite

idling resulting in the deterioration of the soil characteristics and the concentration of salts in its profile due to the evaporation of surface water. This process is tantamount to sabotaging Egypt's cropland with malice intent which leads, with other adverse factors, to detrimental effects on the national agricultural production in the short and long terms.

It seems that the sharp competition over the almost constant supply of cropland between agricultural and urban uses is largely attributed to the existing contradiction between individual and community benefit, on the one hand, and individual and social cost on the other. This state of affairs has created negative consequences on the economic structure and a distortion in the use of Egypt's land base.

To limit loss in land resources, the only policy measure taken by the government was raising land rental value over the last few years through increasing agricultural land tax (Suliman 1991).

Inheritance is one of the obstacles that block the way for reducing that type of cropland loss. The Agrarian reform (Law no. 178) of 1952 has given special attention to preventing more fragmentation in land ownership which results in very small holdings incapable of providing suitable livelihood for small holders.

### **3. Provisional Loss in Cropland**

By provisional loss, we mean that type of loss that can be retrieved by simply removing the causal agents or providing factors that prohibit its occurrence. There are three types of provisional loss in cropland resources.

#### **A. Loss in Land Productivity through Misuse or Lack of Care**

It is a quantitative loss in land productivity resulting from the removal of the surface layer of the soil for the brick industry or an increase in the ground water level consequent upon extravagant use of irrigation water accompanied by an inefficient drainage system; all this lead to an increase in soil salinity or alkalinity.

It may also be the resultant of bad soil levelling and the subsequent maldistribution of irrigation water or the outcome of soil pollution by the residues of pesticides, chemical fertilizers, untreated sewage water and industrial residues.

Studies estimate the area that has been idled and misused for the brick industry at about 100 thousand feddans, out of which 9,000 were brought under this process during 1987-90; in addition to 4,000 feddans over which brick factories were erected. The same studies revealed that the productivity of almost 3 million feddans was reduced by 25% due to soil salinity or alkalinity. Land productivity of about 6 million feddans was reduced by 10% (The Arab Republic of Egypt, Shura Council).

This type of loss is almost equivalent to the productive capability of 1.35 million feddans of Egypt's fertile soil. It can be treated by improving modes of land use, developing better drainage systems and preventing soil alkalinity or salinity related to the high level of ground water.

#### **B. Loss in Land Potential Productivity**

This is a qualitative type of loss, represented by the difference between the potential production of a specific crop from the area unit of cropland and the actual production thereof. An example is the difference between the actual production and the potential production of a crop as referred to in the national campaign for the improvement of some strategic crops. The national campaign for improving maize production in 1988 indicates that the average production per feddan would reach 33.1 ardabs, while the national average production reached about 16 ardabs per feddan. This means that loss in land productivity is almost equal to the difference between its potential and actual productivity.

#### **C. Semi-permanent Loss in Cropland**

By this type of loss we mean loss that can hardly, if not impossibly, be reclaimed. It is largely linked with fragmentation and dispersal that characterize the Egyptian land holding pattern and imply the loss of

almost 10% of the cropland for demarcation lines among fragmented holdings, in addition to areas taken for the construction of irrigation canals and open drainage networks.

## **II – Inevitability of Horizontal Expansion (Content and Objectives)**

Imbalance between the rate of population increase and the cropland rate of increase is, in itself, an important indicator of the need to add new lands through horizontal expansion since vertical expansion has so far been characterized with a limited impact in Egypt. The major objective of horizontal expansion is to increase production to meet the need for food, feed and fibers for the increasing population. It also helps provide more work opportunities, alleviate population pressure on the old cities and reduce loss of croplands to urban development.

Moreover, it creates a new, developed social system in the new communities in a manner that enables them to establish a more effective agricultural sector capable of attracting investments and of restructuring agricultural production by introducing non-traditional crops to attain export objectives and encourage agricultural processing projects.

### **1. Development of Land Reclamation in Egypt**

In the 1930s, successful attempts at land reclamation in the northern Delta were made by individuals and companies.

The total reclamation area from 1932 to 1952 reached about 200 thousand feddans. Following the 1952 Revolution, greater achievement was realized in this field. Large areas were reclaimed in the Delta, the valley, the oases and Tahrir District. The annual rate of land reclamation varied according to the circumstances to which the country was exposed. The government has, from 1952 to 1970, invested heavily in land reclamation. The outcome of these state-run investments was the reclamation of about 912 thousand feddans in what is termed as the "New-Old lands". Most of that area (800 thousand feddans) was reclaimed from 1960 through 1970. During the five-year plan 1982–87, about 190 thousand feddans were reclaimed, while 450 thousand feddans were reclaimed during the second five-year plan (1987–92) in what is termed as the 'New-New lands'. About 30% of that area is still under marginal productivity. The highest rates of land reclamation were achieved during two periods (1960–64 and 1987–92) and the lowest rate was recorded over the period 1970–79 (only 33 thousand feddans were reclaimed during the 1970s).

#### **A. Before 1952**

The total area reclaimed from 1932 through 1952 reached about 400 thousand feddans: 75% of which were undertaken by the government. At the same time the private sector did not have a very active participation in land reclamation on account of the heavy investment and expertise required; to this can be added the irregularity of government efforts to provide infrastructure requirements at reclamation areas.

#### **B. 1953 to 1959**

The total reclaimed area reached about 78.8 thousand feddans representing 41% of the target area (193 thousand feddans), at an annual average of 11.3 thousand feddans. The task was jointly undertaken by the Egyptian Authority for Rural Reform, Tahrir District Establishment, Authority for Land Reclamation.

The Tripartite Aggression on Egypt in 1956 was behind the inability to reach the targeted area of reclaimed land.

#### **C. 1960 to 1964**

This period represents the first five-year plan during which almost 536.4 thousand feddans were reclaimed, representing 65% of the target area (825 feddans) at an annual average of 107.2 thousand feddans. The state-run authorities and national firms reclaimed about 500 thousand feddans representing about 93% of the total reclaimed area while the remaining 36 thousand feddans were reclaimed by an Italian company (ITAL CONSULT).

#### D. 1965 to 1969

This period marked the second five-year plan during which the target area of 257.8 thousand feddans was fully reclaimed at an annual average of 55.2 thousands. The public sector company reclaimed about 200 thousand feddans representing 73% of the total reclaimed lands while ITAL CONSULT and ANGRA (a Yugoslavian company) reclaimed about 27% of the total reclaimed land. Generally speaking, reclamation rate was lower than that of the first five-year plan due to the 1967 war and the subsequent economic problems.

#### E. 1970 and 1982

This stage was particularly characterized by cessation of land reclamation projects in view of the heavy economic burdens synchronized with the 1973 War. The total reclaimed area during this period did not exceed 145 thousand feddans. The state's role was confined to the completion of cultivation processes in the already reclaimed lands. Towards the end of that period, the state paid a relatively greater attention to reclamation projects. Almost 27 thousand feddans were reclaimed in 1980–81 and 97 thousand feddans in 1981–82; thus making the total area of reclaimed lands over three decades (1952–82) about 1,039 thousand feddans (Abul Nasr 1993).

#### F. 1982–83 to 1992–97

This period includes several reclamation programmes under the comprehensive planning for national development. Several considerations were observed in planning, such as the proper selection of reclamation regions on the basis of available studies, coordination with the ministries of Irrigation and Electricity over infrastructural projects, application of modern irrigation techniques, encouraging the private and cooperative sectors' participation in the reclamation programmes, implementing the Graduates project (whereby newly reclaimed lands are distributed among the willing graduates) and establishing experimental farms and training centers. This period includes three five-year plans which will be elaborated upon under policies of land reclamation in Egypt.

The first five-year plan (1982–83/1986–87) aimed at reclaiming about 636.7 thousand feddans but the actual achievement is about 190 thousand feddans, out of which 132 thousand feddans were reclaimed by the public sector and 58 thousand feddans by the private sector.

The second five-year plan (1987–88/1991–92) aimed at reclaiming 750 thousand feddans at the rate of 150 thousand feddans annually. The actual reclaimed area during that period reached 851 thousand feddans, thus making the total area of reclaimed lands over the period 1982–92 about 1,041 thousand feddans.

In view of the foregoing, it appears that the total reclaimed area over the last forty years (1952–92) is estimated at 2,080 thousand feddans. By adding the area reclaimed during 1982–92 to the cultivated area in 1982 (6.2 million feddans), the total area of Egypt's cultivated lands until 1992 reached about 7.2 million feddans.

*Table 1* shows both the total reclaimed area and those under reclamation by both the public and the private sectors during the second five-year plan. The reclaimed area allocated for distribution among graduates, over the five years of the plan, was about 170 thousand feddans.

The reclaimed area distributed among 2,183 graduates in 1987–88 reached about 12 thousand feddans at sugar beet cultivation areas, West Nubariyah and Al-Bustan regions. In 1988–89, about 30 thousand feddans were distributed among 5,463 graduates. In the third stage of distribution, about 51 thousand feddans were distributed among 9,891 graduates while in the fourth stage 78 thousand feddans were distributed among 15,471 graduates; thus making the total area distributed among almost 33 thousand graduates in the four stages about 171 thousand feddans.

With their limited resources and little experience, the graduates had to constitute resourceful cooperatives in order to provide them the needed production inputs, marketing services and recreational, social and health services.

### III – Salient Features and Classification of the New Lands

God has bestowed on Egypt felicity of the Nile water running through its territory, and carrying, over the years, alluvial materials that formed the Nile Valley and Delta. These lands have a deep profile and a homogenous texture. They are also rich in macro and micro-nutrients. Therefore, the Egyptian farmer encountered no difficulties in cultivating these lands and, after the introduction of crop intensification systems, he had to use nitrogenous and phosphorous fertilizers in addition to manure. This pattern continued to characterize Egyptian agriculture until the construction of the High Dam.

There exists a totally different pattern in the new lands. Many problems have to be solved before adding these lands to the Egyptian agricultural area.

#### List of the Major Problems Encountered in the New Lands

- . Lack of an appropriate texture and composition.
- . Difficulty of levelling the surface layers; and therefore, slope cultivation is commonly used.
- . Absence of organic matter.
- . Lack of macro- and micro-nutrients.
- . Shallowness.
- . Presence of soluble or less soluble salts such as calcium carbonates and gypsum.
- . Continual change in the surface layer as a result of wind movement.
- . The presence of certain harmful elements such as boron and selenium resulting from rock fragmentation.
- . Inability to maintain humidity and preserve nutrient elements (sandy soils) or bad drainage (clay soils).

#### 1. Climate and Water Resources

Climate in the desert lands is characterized by paucity of rainfall, high atmospheric temperature and low humidity. In the northern coast, the annual average of rainfall is almost 180 mm (in Alexandria). It decreases southward to reach 35 mm near Helwan. South of the latitude in which Cairo is situated, rainfall is almost nil. The second characteristic is the seasonality of precipitations which mostly occur during winter and spring. The third characteristic is irregularity, thus affecting land use in the desert areas. The fourth characteristic is that this low level of precipitation covers a limited area of land. The fifth characteristic is that precipitations may exceed in one day the annual average, causing great damage to the irrigation and drainage networks that were not designed to stand such circumstances, as was the case with the Nubariyah drainage facilities in 1991.

Water resources in the Egyptian desert land are made up of ground water, precipitations and atmospheric humidity. By ground water, we mean the water reservoir far below the soil surface which can only be reached and utilized by digging wells. It is classified according to its source into:

- ground water formed by local rains;
- ground water formed by external or ancient rains;
- ground water formed by the Nile water.

The first type of ground water is of special importance in the northern coastal regions. Rain falls on sand dunes and infiltrates the porous layers until it reaches an impermeable layer. It may also float over salty water infiltrating from the sea. If the well's depth went beyond the fresh water level, the salty water would spoil the water quality. The same applies to the over-used wells and to ground water in desert valleys having deep precipitates.

Ground water infiltrating from the Nile valley and Delta through the porous layers exists at Natroun Valley and near the Tahrir District, where ground water is used for irrigation. In Upper Egypt, on both banks of the river Nile, there exist areas of reclaimable highlands if wells are dug to draw fresh water for irrigation.

The old lands of the Nile Valley and Delta contain large quantities of water that accumulated over the years from the river's surface water, tributaries and canals. Deeper ground water exists in the Great Basin beneath the western desert (the New Valley and the oases) where agriculture largely depends on lifting the ground water up to surface. There is a controversy over the origin of this ground water. Some hold the opinion that it infiltrated from far remote areas in Chad through porous rocks. Others uphold that it originated from water reserved since time immemorial when the climate was totally different from that of the contemporary time, when rainfall had been abundant. Others say that it originated from the river Nile.

The other source of water, i.e., the scarce rainfall, can be depended upon in desert agriculture if it is carefully managed in the rain-fed areas. The ancient Egyptians had set an outstanding example in water conservation by engraving into rocks large rooms to store water and artificial waterfalls to pour water downward where vine and olive orchards were grown. They had also built reservoirs to store water for the irrigation desert lands.

## 2. Classification of the New Lands and their Geographic Distribution

The new desert lands are divided into three areas:

- the northern coast;
- the western desert and the oases;
- the eastern desert.

The first two regions are very important for horizontal expansion due to the availability of ground water and rains (as in Mariott) and the distant ground water (as in some regions in the western desert or the availability of the Nile water for some areas in the western desert). Horizontal expansion programmes are not directed to the northern region of the Sinai Peninsula.

### A. The Northern Coast

Being the only region with a reasonable precipitation rate, it depends on rainfall for agriculture. The quantity of rain varies along the coast and gradually decreases from north to south. It can be divided into two major areas:

#### a) *Mariott area*

It extends from Alexandria to Salloum and is characterized by a frequent appearance of soft oolitic limestone hills parallel to the coast. Actually, there are two chains of these hills, the first of which is very close to the coast and the second is parallel to the first and located at a distance of a few kilometers to the interior. In certain locations, there is a third chain situated between the second chain and the Libyan plateau. The area between the coastal chain and the first internal one contains small, scattered lakes and, in certain locations inside this area, there are some alluvial sediments. Between the second and the third chains, there exists a strip of alluvial soils which separates, in certain locations, between the second hill chain and the edge of the Libyan Plateau.

Sand movement by the wind is a major characteristic of this area, where land topography plays a significant role which is potentially good for agriculture.

#### Obstacles Facing Agricultural Development in the Mariott area

- . the high content of calcium carbonates;
- . casual saltiness as a result of infiltration of irrigation water from the adjacent areas;
- . the nutrient elements added to the soil turn into forms that cannot be utilized by the growing plants;
- . formation of a salinity crust on the surface layer;
- . lack of manpower.

These obstacles were overcome by:

- resorting to the use of nutrient elements in special forms and the application of sprinkler fertilization of micro-nutrients;

- mechanization of agronomic practices and the application of sub-soil ploughing;
- irrigation on close intervals to avoid hardness of the soil when it is dry;
- addition of organic materials and chemicals to ameliorate soil characteristics;
- growing alfalfa as a reclamative crop to improve soil texture and reduce its salinity.

As a result, grape and beet cultivations expanded, thus encouraging agro-industries. Other crops such as sunflower, melons, water melons, vegetables, grains and legumes are also grown.

Over the last thirty years, agricultural development of the northern coast, promoted by the government sector with the support of international donor agencies and, recently, with the involvement of the private and investment sectors, included:

- rangelands' development through the propagation of local and imported pasture plants and the improvement of local breeds of small animals;
- expanding fig cultivation on coastal sand dunes;
- expanding olive cultivation within the project of planting one million olive trees, initiated in 1987, with seedlings imported from Spain;
- providing the El-Alamain region with irrigation water through El-Nasr new artificial waterway;
- building dams on major valleys to ensure efficient distribution of rain water;
- expanding barley cultivation in the rain-fed areas;
- initiating settlement projects for bedouins (nomads).

#### **b) Northern Sinai Region**

This region covers almost one million feddans. It is a rain-fed area, with a reservoir of fresh ground water floating on saline ground water originating from the sea.

### **B. The Western Desert and the Oases**

The western desert constitutes almost two thirds of Egypt's total area. It represents a large potential for expansion. Between the grey land of Mariott and the western desert land, there exists three types of land:

- desert land formed of limestone;
- desert land formed of Nubian sandstone;
- desert land formed of ancient sediments.

The chain of oases in the western desert is known as El-Wadi El-Gadeed (The New Valley). These oases were formed as a result of erosion existing beneath and containing large quantities of ground water, the only source of water in that region.

The New Valley consists of a number of scattered oases in the low-lands of the western desert, namely El-Dakhelah, El-Khargah, El-Bahriyah, El-Farafrah and Siwa. In ancient times, these oases were flourishing with agriculture. Presently, the cultivated area does not exceed 36 thousand feddans, depending on ground water and the scarce rainfall. The major crops are date palms, citrus trees and grains.

We believe that the oases have not been tapped yet as a land resource for development. Studies indicate that there are about five million feddans of potentially reclaimable land. The only determinant factor is the availability of water which needs in-depth studies.

Most of the oases have clay soil with heavy texture known as "the ancient deposits" because they were formed during ancient geological areas, characterized by heavy rainfall. Although soil salinity is high, water drawn from wells is almost as fresh as the Nile water.

The Siwa oasis provides a good example of soil salinity, where salts form a very dry layer on soil surface.

### C. Eastern Desert Region

It is commonly known as the eastern Plateau, with little and irregular agricultural importance. The interference zone between the eastern plateau and the Nile Valley and Delta is characterized by a varying texture from soft to coarse. The content in calcium carbonates increases by moving towards the desert formations thus providing evidence that the eastern plateau is made up of a parent material. The total content of soluble salts is rather low except in the lower parts of the zone of interference where ground water level is high. The major characteristic of these dry valleys is the varying texture from coarse-sandy to silt-sandy.

### D. Nasser's Lake Region

The construction of the High Dam in 1968 has led to the formation of an artificial lake known as lake Nasser, extending for 500 km, with a width of 10 to 25 km. The area surrounding the lake provides another potential for land resource use. It consists of two types of deposits. The first resulted from fragmentation of limestone mixed with clay or fragments of the Nubian sandy stone. The second originated from the residuum of the river deposits of the ancient valleys that had been connecting eastern and western Egypt before the formation of the Nile Valley.

The potentially cultivable area around the lake is almost more than one million feddans. Generally speaking, most of the new lands are calcareous or sandy, or both.

## 3. Characteristics of the New Lands and How to Overcome Technical Problems

### A. Sandy Soil

Sandy lands constitute almost 95% of the Egyptian deserts. The characteristics of these lands vary according to their parent materials. The western desert lands are dominated by the presence of quartz that originated from the erosion of sandstones following the geological changes that led to the formation of the El-Kattara depression—with the exception of the northern coast of that desert where the sandy soil has a marine parent material with a high content of calcium carbonates (98%). In the eastern desert and northern Sinai region, quartz constitutes a major formation originating from deposits carried by the Nile water. This is evidenced by its high content in heavy metals similar to that of the Nile valley and Delta soils. On the contrary, the internal sands of the Sinai peninsula originated from geological formations which were the parent material of El-Tih (wilderness) Plateau.

However, it is to be noted that the various origins of the Egyptian sandy soils do not affect the multifarious problems encountered during the implementation of development programmes. These problems are:

- lack of nutrient elements;
- easy loss of fertilizers, especially nitrogenous fertilizers;
- inability to keep water due to its poor content in minute particles;
- as a result, plants grown in sandy soil have little access to water;
- exposure to water and wind erosion.

### B. Calcareous Soils

The area of calcareous soils is about 600 thousand feddans currently reclaimed and cultivated. They are mainly situated in the vicinity of the Mediterranean coast, with a high percentage of calcium carbonates (up to 90%) which causes numerous problems to arise during application of the agronomic practices.

The study of the soil profile in this region revealed a conspicuous presence of gypsum and calcium carbonates, the formation of which is largely attributed to the movement of ground water saturated with these salts. In addition, the structure of the calcareous soil profile is also affected by the parent material, climate and topography.

The evidence of this combined effect is the presence of calcium carbonates horizon at various depths due to water movement and land topography.

The formation of a salty, hard surfaced layer impede plant growth; but this difficulty can be overcome by increasing soil humidity at the early stage of soil preparation and amending the agronomic practices. While levelling the soil, that hard salty layer should be scrapped off to provide a better medium for seedlings to emerge and grow.

The major problem of these calcareous soils is the occasional salting, subsequent to the application of a permanent irrigation system. The reasons are:

- downward movement of irrigation water;
- formation of a hard layer of gypsum and calcium carbonates on the soil surface and a potentially high ground water level;
- formation of solid limestone layers at various depths;
- the absence of an appropriate drainage system and the high content of soluble salts in irrigation water.

## IV – Chronological Development of Land Reclamation and Use

### 1. Land Reclamation Policies

Policies of reclaimed land use was changing from time to time. From 1952 to 1960, the state was mainly oriented towards distribution of the reclaimed lands among the landless groups (5 feddans for each rural household) and maintaining certain reclaimed areas under its management (e.g., Tahrir District). Between 1960 and 1965, the state resorted to leasing the reclaimed lands to small farmers.

But this policy has proven to be a failure because it led to fragmenting the reclaimed lands into small, technologically backward units. Therefore, the government kept most of the reclaimed areas as state-run projects (El-Gabaley 1985).

During 1965 through 1975, the role of reclamation authorities was confined to the implementation of reclamation programmes while the reclaimed land use was the responsibility of the Egyptian Establishment for Land Development. On 27/8/1975, a decree was issued by the cabinet of Ministers whereby the ownership of leased lands was transferred to the tenants.

During the same period, about 45.5 thousand feddans were distributed among the Nubian immigrants and other categories of the population.

In 1976, the Egyptian Establishment for Land Development was dissolved and replaced by public agriculture companies such as South Tahrir Agro-Company (54,000 feddans), West Nubariyah Company (45,000 feddans), Mariott Agro-Company (36,000 feddans), and North Tahrir Agro-Company (35,000 feddans). The same year also witnessed a trend to enlarge land ownership base by allocating 33.5 thousand feddans for distribution among the new agricultural graduates. This went side by side with the policy of transferring ownership of the leased areas to the tenants on condition that the cooperatives supervise the use of these lands. The state also sold out certain areas that were not efficiently managed. The percentage of the agricultural lands allocated to public agro-companies reached 33.5%, while the percentage of lands transferred to tenants was about 25.7% and that of lands distributed among agricultural graduates was 5.6%. The percentage allocated to outstanding projects reached 11.4%.

During the eighties, the state's target was to reclaim about 150 thousand feddans annually and to encourage the private sector to participate in this field. Several measures were taken to facilitate transfer of deed to citizens laying their hands on desert lands. The price per feddan was fixed at L.E. 50–200 for desert and barren lands that lacked infrastructural services.

The first five-year plan (1982–83/1986–87) aimed at reclaiming about 636.7 thousand feddans. But the plan achieved only 283.8 thousand feddans, out of which 43.1 thousand feddans were reclaimed in the first year, 45.6 thousands in the second, 50.6 thousands in the third and 56.5 thousands in the fourth year. In the fifth year of the plan, about 88 thousand feddans were reclaimed.

Water resources and infrastructures were made available to almost 287 thousand feddans, out of which 129 thousand feddans (69%) were reclaimed by the public sector companies and about 58 thousand feddans (31%) by the private sector (individuals and cooperatives).

Geographically speaking, almost 52.3% of the reclaimed lands are located in the western Delta, 18.8% in Upper Egypt, 18.3% in the eastern Delta, 5.8% in the central Delta, 4% in the Sinai and eastern Suez Canal and about 0.8% in the New Valley.

The second five-year plan (1987–88/1991–92) aimed at reclaiming 750 thousand feddans at an annual rate of 150 thousand feddans. The public sectors companies executed infrastructure projects for 490.4 thousand feddans. The private and cooperative sectors reclaimed almost 400 thousand feddans thus bringing the total area of reclaimed lands to about 900 thousand feddans.

*Table 1* indicates the total reclaimed area distributed among the public and the private sectors during the second five-year plan. The area allocated for distribution among new graduates is estimated at 180 thousand feddans.

It is to be noted that the area handed over to new graduates in 1987–88 reached 12 thousand feddans (western Nubariyah, El-Bustan and sugar beet regions) distributed among 2,183 graduates each of them receiving 5–6 feddans. To enable these graduates to efficiently use the land, it was incumbent upon them to join the agricultural cooperatives that provide them with the necessary means for production and marketing. Health and social services were also provided, in addition to an initial loan of L.E. 500 to be refunded over a period of five years.

The beneficiary graduates were also given a monthly grant of L.E. 45 during the first year, in addition to a house valued at L.E. 8,000 to be refunded, as a long term loan, over a period of 30 years.

## 2. Land Reclamation's Current Strategy (1992–93/1996–97)

Land reclamation's strategy for the third five-year plan (1992–93/1996–97) includes:

- Completion of infrastructural projects and of the unaccomplished portion of the previous plan (1987–92)—which represented 578 thousand feddans for which an amount of L.E. 730 million has been allocated;
- Distribution of 250 thousand feddans among new graduates, at an investment cost of L.E. 1,759 million including reclamation and housing costs, with an average cost of L.E. 6,900 per feddan, with L.E. 2,500 for housing;
- Expansion and new projects. By expansion projects, we mean those implemented on lands adjacent to or along the already reclaimed areas or those for which infrastructural projects have been already initiated. The strategy of the third five-year plan includes the reclamation of 313 thousand feddans, at an investment cost of L.E. 1,061 million, with an average cost of L.E. 3,440 per feddan. The new projects are those for which no infrastructures have been laid out. The plan aims at reclaiming about 200 thousand feddans at an investment cost of L.E. 725 million with an average cost of L.E. 3,620 per feddan.
- The private sector projects. The strategy of the third five-year plan allows for a greater role to be played by the private sector in the field of land reclamation. Priority is now being given to the private sector projects to make up for 75% of the target areas in addition to its undertaking of 41% of the infrastructural projects in these areas.

## 3. Development of Investments Allocated to Land Reclamation

From 1952 to 1978, about 912 thousand feddans have been reclaimed at a total investment cost of L.E. 560 million out of which L.E. 154.5 million were invested during the first five-year plan (27.6% of total investments) which fulfilled almost 58.8% of the total reclaimed areas over this period. Investments increased to L.E. 176.1 million during the second five-year plan, despite the recorded decrease in the reclaimed areas (30.2% of the total reclaimed areas over the same period). Due to the pressing circumstance post-1967 war and to directing most of the state's revenues to the war effort until 1973, the reclai-

med area over the 1970s was meagre. However the total investments reached L.E. 143.2 million mainly directed to amelioration and cultivation of the already reclaimed areas so as to achieve marginal productivity. Over this period, the annual average of investment costs reached about L.E. 21.5 million.

From 1982–83 to 1986–87, the total investment costs reached about L.E. 993.3 million, with an annual average of L.E. 198.7 million. The reclamation cost per feddan increased from L.E. 613.6 in the first period to L.E. 1560 in the second.

In view of the fact that infrastructure projects constitute the corner stone of land reclamation programmes, special investments were singled out for them in each plan. The total investments in infrastructure lay-outs during 1982–83/1986–87 amounted to L.E. 664.5 million, out of which the public sector afforded 87.8% and the private sector afforded the rest (12.2%). The West Delta region alone received almost L.E. 316.3 million out of the total investment figure which gave much impetus to the reclamation programme, especially after irrigation water was made available from the El-Naser canal. The total investment costs were divided on the various uses, whereby L.E. 420 million were allocated for construction works (67%) and L.E. 104 million for machines and other equipments (17%). The annual investment figure increased from L.E. 68.6 millions in 1982–83 to 189 million in 1986–87.

During the second five-year plan (1978–88/1991–92), investments in the agricultural and irrigation sector amounted to L.E. 4.9 milliard, representing 10.8% of the total national investments. Priority was given to the development of the new lands and to the achievement of an annual rate of reclamation not less than 150 thousand feddans, especially in areas adjacent to the old lands. Emphasis was laid on the cultivation of the new lands for which infrastructure projects have been completed and irrigation water has been made available. Recycled drainage water was used for irrigation at a large scale.

The total investments dedicated to infrastructure projects during the second five-year plan amounted to L.E. 1,032 million.

#### **4. Sources of Financing Reclamation Projects**

Credit is an essential element for the success of land reclamation projects. In the past, commercial banks and lenders were the major credit sources. The state established specialized banks such as the Real Estate Bank whose lending to the agricultural sector decreased from 90.6% of its lending power in 1952 to only 30% in 1980 and 0.7% in 1981.

This is largely attributed to the increase of interest rates and the creation of specialized agricultural credit banks that rendered better services to farmers.

The Principal Bank for Development and Agricultural Credit (PBDAC) started granting long-term loans for land reclamation projects since 1979, at a rate of L.E. 100 per feddan. The total loans given for this purpose increased from L.E. 140 thousands in 1979 to about L.E. 10 million in 1984–85; which, in itself, reflected the state's keen interest to make credit available for land reclamation projects. However, these long term loans represented only 1% of the total loans given by the bank in 1989–90. The period from 1985–86 to 1988–89 witnessed a very little increase in the volume of loans for land reclamation which can be negligible. Though PBDAC's land reclamation loans reached L.E. 11.3 million, they still represented a small percentage of the total loans given by the Bank (not exceeding 1%).

In 1980, the National Investment Bank for Land Reclamation (NIBLR) was established to finance all projects of the plan, following the creation of an investment fund wherein surpluses of the public sector revenues were deposited to provide credit for national investments. NIBLR provided soft loans (L.E. 1,000–2,000 per feddan) to land reclamation companies. The total loans reached L.E. 74.3 million for the reclamation of 76.9 thousand feddans. The Arab Contractors Company also obtained soft loans from the NIBLR for the reclamation and cultivation of 36.6 thousand feddans. The public sector agro-companies established, under Law 43 of 1972, joint investment firms which granted cash and material loans to land reclamation companies.

Savings of the Egyptian expatriate work force can be used as a source of finance for all the economic activities in general and the agricultural projects in particular. In 1985, these savings amounted to L.E.

744.3 million, but the high interest rates on deposits encouraged the Egyptian expatriates to invest with the banking system, regarded as an easier and much safer way of investment.

Finally, the international agencies such as the International Monetary Fund (IMF) and donor countries (USA, Japan, Holland, and France) provide an important source of finance for land reclamation and food security programmes. They provide long term soft loans at low interest rates (3–4%) being largely utilized by the government and its public enterprise sector.

## V – Problems Encountered by Land Reclamation Projects

Land reclamation is faced by a number of problems that arise from the absence of carefully defined objectives for reclamation processes, malselection of reclamation areas and the lack of integration in the process of phased implementation. Other problems relate to inappropriate use of the reclaimed lands, availability of credit, land management, energy, security and labour. In certain reclaimed areas, high salinity and bad drainage led to the optimal use of these lands which, under these circumstances, needed prolonged treatments to reach marginal productivity. This state of affairs has led to a meagre share of reclaimed lands in the Agricultural National Product (ANP).

In 1982–1993, the reclaimed lands' share in the ANP represented 3.8%. In 1990–1991, it increased to 6.8% with a total value of about L.E. 944 million (The Egyptian Central Bank 1992).

The following is a review of problems that impede the success of land reclamation projects.

### Technical Problems

Water resources are the most important factor in land reclamation. Egypt's water resources are estimated at about 61.3 milliard m<sup>3</sup>. According to the set plan, an area of about 150 thousand feddans is to be reclaimed annually; i.e, about 1.350 million feddans from 1992 through the year 2000. Water requirements for this projected area to be productive are estimated at 8.8 milliard m<sup>3</sup> which are manageable from the various water resources available to Egypt (Radhi 1992).

However, this necessitates rationalization of the use of land and water resources in order to maximize land returns from each cubic meter of water. For Egypt, every water resource is a variable with an international dimension that remains the prime determinant factor in the agricultural horizontal and vertical expansion (El-Guaili 1992).

Rationalization of water use in the old lands and the application of modern irrigation techniques (drip irrigation) together with recycling of drainage and sewage water are, no doubt, conducive to increasing the country's water resources. This would enhance the national effort to achieve food security either through crop intensification in the old lands or horizontal expansion in the new lands. Many studies suggest that it is only through the efficient use of water that Egypt can attain sufficiency in water resources. Some studies proposed water pricing in the Economics of the Egyptian Agriculture. They argue that the structural changes occurring in society will affect the current performance of development programmes and the efficient use of water resources. The structural adjustment programmes (SAPs) currently applied to Egyptian agriculture allow the farmer to choose the cropping pattern that he deems more profitable and to apply market mechanisms. This would make water pricing without cost recovery from the beneficiaries of water projects impermissible (Radhi 1992).

## VI – Problems Relating to Marketing and Agricultural Processing

### 1. Economic problems

- i) Lack of sufficient investments in infrastructural projects. The problem was further aggravated by inadequacy of foreign currency, prolonged procedures of lending, devaluation of local currency.

- ii) Inability of the official investments to create integrated settled communities in the new lands to attract new settlers from the Nile Valley and Delta—which are already overpopulated and parts of their crop-lands are lost to urban uses.
- iii) Inaccessibility to credit by the new graduates thus impeding their ability to fully use their lands which consequently become less productive.

## 2. Institutional problems

- i) Lack of effective coordination among the authorities concerned with land and water management.
- ii) Lack of continuity in phases of implementation (e.g., irrigation and drainage) which leads to delay in the accomplishment of the entire project.
- iii) Lack of collective planning for project management by the real beneficiaries.
- iv) Limitedness of loan repayment programmes.
- v) Multiplicity of agencies supervising the reclamation companies (i.e., ministries of Agriculture, Public Works and Water Resources, Housing and New Communities and the municipal authorities). This may lead to contradiction of jurisdictions and impairment of execution.
- vi) Pre-emption of public lands and exposure of pre-emptors to state procedures of dispossession.
- vii) Absence of an accurate data base with the executive authorities, and a well-defined chronological programme for reclamation projects.

## 3. Future Expectations of Land Reclamation in Egypt

To provide food for Egypt's growing population and to meet the needs of other sectors of the Egyptian approach conducive to improving the agricultural production through the application of technological packages, horizontal expansion is a basic axis for enhancing the ability of the agricultural sector to realize food security, increase net revenues of agricultural exports and provide labour opportunities.

The area of reclaimed lands since 1952 is proportionate neither to time nor to the country's needs to meet the problem of overpopulation (while population increased by 300% over seventy years, for the same period). The future outlook for land reclamation requires proper selection and pre-testing of reclamation sites, including water sources (ground or otherwise) and water quality (fresh or drainage or mixed). Irrigation systems, cropping patterns and water requirements are also important points to be considered.

Under economic reform programmes currently applied by the state, priority should be given to maximization of returns from the new lands. The total area of reclaimed land is 1.9 million feddans, representing only 25% of Egypt's cropland. However, its share in the total agricultural production does not exceed 7% despite heavy investments. Maps of Egypt's land resources indicate that there are more than 2.88 million feddans potentially reclaimable by the Nile water (with a maximum pumping of about 150 m) and 0.55 million feddans potentially reclaimable by ground water in the New Valley. *Table 2* shows that the potentially reclaimable areas, whether by the use of the Nile or underground water, is estimated at 3.4 million feddans, out of which 1.6 million feddans will be given first priority in the implementation of reclamation projects in view of the available technical potentialities and financial allocations in the budget. Various studies have referred to 80 sites nationwide for future initiation of land reclamation projects, depending on the Nile or underground water.

These lands are classified according to their physical and chemical properties (soil texture, profile depth, salinity, alkalinity and ground water level) into:

The estimated cost of reclaiming one feddan in the new lands ranges from L.E. 3,000 to 7,000. Under the Egyptian land holding pattern and production systems, the average labour needed for the reclamation of one feddan is estimated at 1.3 labourer, whose housing and other utilities cost about L.E. 4,000, in addition to L.E. 2,000 for irrigation and drainage facilities; thus making the total cost of para-reclamation services of about L.E. 6,000 per feddan.

The annual economic return from reclaimed lands ranges from L.E. 300–700/feddans which is meagre even in proportion to the cost of reclamation, excluding para-reclamation services which is of no less importance due to its social dimension and role in the redistribution of population and new industries.

*Table 3* shows investments in reclaiming the targeted areas over the coming period, using the Nile water (2.88 million feddans) and the areas that have been given **first priority** (1.6 million feddans), in addition to the per-feddans-cost in both categories.

With regard to the cultivation of the new lands, it should be planned in a manner different from that of the old lands as far as cropping pattern, technical packages, size of holding and resource management are concerned. The following points should be considered:

- return of the new lands (sandy soil) are far less than those of the old lands (alluvial soil);
- labour scarcity and seasonality, which necessitates mechanization of agronomic practices, especially in view of the large size holding;
- high wages of the agricultural labourers compared with their productivity.

It can be generally said that the success of land reclamation policy depends on applying effective institutional approaches that fulfill the requirements of two interlocking stages: infrastructural projects and settlement programmes. Both are directly interrelated inasmuch as they fulfill the needs of the new settlers who should be selected according to certain cultural and social considerations. Social homogeneity is crucial for establishing new communities. To ensure success in the initial stage, the state should support the new settlers and lay down an intensification programme for the new lands, incorporating the following elements:

- relevance of the applied technological packages to local circumstances and linking them to an effective extension system;
- resorting to modern techniques of production and continued training of settlers by an efficient training apparatus;
- providing agricultural credit and production inputs which are still inadequate in the new lands compared with the old lands;
- providing the necessary utilities (e.g., electricity, roads, social services and education to encourage settlement and agricultural growth);
- continual updating of the Master Plan of the desert lands: their areas, sources of water and best ways of cultivation.

#### **A. Future of Land Reclamation under Structural Adjustment Programmes**

Of late, the government has encouraged the private sector and university graduates to reclaim and cultivate the new lands and be given title deeds of ownership.

The pivotal role of the official agricultural sector, under indicative planning policy, is to provide a suitable atmosphere for the private sector to actively participate in the agricultural growth within the framework of the state's economic reform policy. For this purpose, the agricultural institutions and legislations have to be rectified to meet investment needs.

Within this context, a strategy has been laid for Egyptian agriculture in the nineties, encouraging the private sector and university graduates to reclaim and cultivate the new lands, and confining the state's role to partaking in infrastructural projects, soil studies to identify the reclaimable areas and providing credit to the private sector.

MOA has reduced the size of the state-owned lands by encouraging private ownership through:

- disposing of the lands owned by the state-run agricultural companies, either by direct sale to investors or by giving title deeds to their staff members and to university graduates. The revenues are to be used for financing the reclamation of new lands and the distribution thereof among new graduates. Almost 384,000 feddans have been sold out and are now in the stage of economic production;

- selling out the reclaimed lands after the completion of infrastructures: Since 1983–1984, the policy tended to selling out areas of reclaimed lands ranging between 3–10 thousand feddans to the private and investment sectors;
- leasing and/or selling out unreclaimed lands to the private sector: Since 1987, the agricultural policy was more liberalized to encourage the private sector to play a greater role in land reclamation and acquisition.

The total area of privatized agricultural lands reached 808 thousand feddans. The private sector is currently investing more than L.E. 700 million in the Sinai peninsula to reclaim and develop 150 thousand feddans, sold out at the rate of L.E. 50–100 per feddan, thus making the total area of lands reclaimed by the private sector about one million feddans (Khedr 1992).

This provides clues to the importance of the private sector's participation in land reclamation which is expected to cover 100% of the target area to be reclaimed.

Following is a list showing areas of the new lands distributed among the various categories of the private sector until 1991.

The government introduced legislative changes on landlord–tenant relationship to achieve more liberalization throughout the agricultural sector and to enact a new law for agricultural cooperation wherein membership in cooperatives is optional.

Though relatively rich, the Egyptian experience in land reclamation needs to be reviewed so as to maximize the returns of the new lands in the fields of production, processing, marketing, in addition to the overall structure of the newly emerging communities. The following questions should be answered:

- i) What are the policies, mechanisms and potentialities needed for establishing comprehensive settlement communities to attract more settlers into the Egyptian deserts?
- ii) What is the role of the state and of the public and private sectors in the planning and implementation of these projects within a system of role-distribution according to the limitations and potentialities of each and for the purpose of maximizing the societal and individual returns from these projects?
- iii) What are the major characteristics of the peculiar changes in: land use, the cropping pattern, the institutional structure, agricultural processing and marketing systems?
- iv) What is the role of scientific research and technology in providing the technological package(s) that suit desert cultivation and conquest?

To realize the objectives of the conference on “A Strategy for the Egyptian Agriculture in the Nineties”, the following should be done:

- Reviewing the population policy and encouraging settlement and construction outside the valley (into the desert and coastal regions). This should be directly linked to a new policy relocating more investments to remote areas, building desert roads and an independent economic base. New legislations should be enacted and enforced to encourage investment in the new lands by removing impediments and providing all facilities such as agricultural extension and soil studies and encouraging the creation of rural organizations within the framework of a coordinating body: a local development commission representing the existing rural organizations. This proposed commission is a panel for discussing a local plan for integrated rural development which requires the active participation of all the existing organization in the locality. The commission should be a major component of the elected local council in order to ensure its organizational stability.
- Reclamation and cultivation of at least 100 thousand feddans annually, with all the utilities needed for sedentary life to receive the landless. It is worth noting here that land reclamation should absorb the surplus of agricultural labour force from among the landless after completion of these projects.

Such investments in infrastructures would attract the private sector to maximize the value added through such activities as agro-industries and non-traditional, export-oriented agriculture. Special effort should be exerted to prevent the transmission of the old land *maladies* to the new lands. The small size of land hol-

ding should not hinder the development of an export-oriented agriculture following the good example of successful experience (as in Cyprus) (Abou Mandour 1992).

## References

- **Abou Mandour, M.** (1992). "Future of the Egyptian Agriculture in the Nineties". In: *Two alternatives in View of the Local, Regional and International Changes*. Conference on A strategy for Egyptian Agriculture in the Nineties, MOALR, 16–18 February 1992, Cairo.
- **Abul Nasr, H.** (1993). The Policy of Land Reclamation. In: *The Egyptian Society of Agricultural Economists*, July. A paper presented at the seminar on the Future of the New Lands.
- **Amin, Y.S.** (1990). "The New Lands: Scarcity of Nile Water and the Challenges of the Nineties". CAES, Faculty of Agriculture, Cairo University.
- **Arab League, Arab Organization for Agricultural Development** (1992). *A Strategy for the Egyptian Agriculture in the Nineties: an Analytical Study*, Khartoum.
- **Arab Republic of Egypt (ARE). Shura (consultative) council** (n.d.). *Inflation in the National Economy*.
- **The Egyptian Central Bank** (1992). *Economic Magazine*, vol. 31, 2nd issue.
- **El-Gabaley, M.** (1985). "Evaluation of the Egyptian Experience in Land Reclamation", *Contemporary Egypt*, April.
- **El-Guaili, A.** (1992). "Egypt's Agricultural Policy and Food Problem". A lecture delivered at a Seminar held at the National Planning Institute, March 1992, Cairo.
- **Hadi Radhi, M.A.** (1992). "Water Resource in the Present and the Future". In: *Towards a Strategy for Egyptian Agriculture in the Nineties*. Conference on A strategy for Egyptian Agriculture in the Nineties, MOALR, 16–18 February 1992, Cairo.
- **Khedhr, H.** (1992). "Liberalization of the Agricultural Sector in Egypt: Objectives, Approach and Consequences". National Seminar on Agricultural Policies in Egypt, MOALR-FAO, January 1992, Cairo.
- **Suliman I., and M. Raga'** (1991). "An Economic Study of Cropland Market in the Egyptian village". *The Egyptian Society of Agricultural Economists*, vol.1, issue 1, March.
- **Suliman, M.K.** (1991). "Universities and Development of the Desert land in the ARE". The second annual University Conference, 2–5 November 1991, Cairo.



**Table 1. Areas Reclaimed during the Period 1987/1988–1991/1992 According to the Distribution between the Public and Private Sectors (in feddans)**

Year	Public Sector	Private Sector	Total Area
1987/1988	87 600	66 000	153 600
1988/1989	32 500	130 000	162 500
1989/1990	38 000	120 000	158 000
1990/1991	77 800	111 900	189 700
Total (of the 4 years)	235 900	427 900	663 800
<b>Grand Total</b>			<b>851 800</b>

Source: Abou Hadab, Land Reclamation and Horizontal Expansion, Conference on a Strategy for Egyptian Agriculture in the 1990s, MOALR, 16–18 Feb., 1992.

**Table 2. Potentially Reclaimable Lands (Throughout Egypt) Depending on the Nile or Ground Water**

(thousands of feddans)

Region	Targeted areas	Priority Areas
East Delta	799	612
West Delta	685	264
Central Delta	59	59
Total	1 543	935
Middle Egypt	224	184
Upper Egypt	782	195
Sinai	283	212
Lake Nasser' shores	50	-
<b>Total</b>	<b>1 339</b>	<b>591</b>
. Areas irrigated with Nile water	2 882	1526
. Areas irrigated with groundwater	546	82
<b>Grand Total</b>	<b>3 428</b>	<b>1 608</b>

Source: Master Plan of Egypt's Land Resources, 1986.

**Table 3. Classification by Regions**

(thousands of feddans)

- North Delta	471
- Alluvial calcareous (West Nubariyah)	184
- Fine sandy desert lands	945
- Coarse to very coarse desert lands	1 282
<b>Total</b>	<b>2 882</b>

**Table 4. Itemized Investments Allocated to the Reclamation of Targeted Areas in the Coming Stage**

Investment Item	Targeted Area (L.E. million)	Priority Area	Targeted Area (L.E. per feddan)	Priority Area
<b>Fixed Costs</b>				
Irrigation & Drainage(I&D)	4 449	1 955	1 545	1 281
Rural Services	7 345	2 820	2 550	1 848
Electricity	2 764	861	960	564
<b>Total</b>	<b>14 558</b>	<b>5 636</b>	<b>5 055</b>	<b>3 693</b>
<b>Recurrent Expenses</b>				
Maintenance of I&D networks			32	26
Energy			172	86
<b>Total</b>			<b>204</b>	<b>112</b>

Source: Master Plan of Egypt's Land Resources, 1986.

**Table 5. Distribution of Reclaimed Areas by Categories of the Private Sector**

Categories	Area (thousands of feddans)
Investment Companies	75.5
Cooperatives	64.3
Individuals	175.0
<b>Total</b>	<b>314.8</b>

Source: MOALR.