

## 4 Lands

### 4-a Introduction

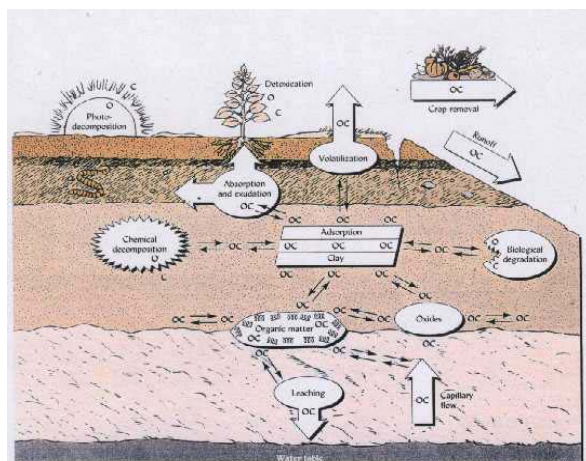
During the last years, international organizations as the United Nations Development Program (UNDP), the World Bank (WB) and the World Resources Institute (WRI) and other organizations have been adopting the ecosystem integrated assessment instead of evaluating the sectors' productive capacity and the state of environmental components in isolation. This new approach is significantly important as the integrated assessment of the environment production system enables the assessment of the capacity of such system on producing different products while studying its negative or positive impact on the environmental functions of each component. Thus, it makes it possible to assess the total resultant of productive activity impact, be it negative or positive. Negative impacts are represented in the degradation of environmental components functions under pro-

duction processes pressures.

Adopting such integrated formula enables the identification of the total outcome of productive activities (negative and positive), which forms a strong basis to select and determine the most positive development plans for present and future generations. It also enables studying the factors leading to improved positive outcome and to develop it always to the better. This approach leads to determining the best techniques and practices to manage natural resources available whether climate, soil, water, plants or animals with the objective of increasing production capacity while at the same time preserving the environmental functions of such natural resources and developing them whenever possible. Thus we will be able to pass available natural resources to future generations in their best productive and environmental state. This is the true meaning of sustainable develop-

ment. It is important to apply this approach on the environmental agricultural system in Egypt so that capacity to produce agricultural products and optimize such production may not compromise environmental characteristics and services that form the main pillars of the ecosystem such as climate, soil, water, plants and animals.

It is important to undertake a qualitative and quantitative assessment of any deterioration operations that might occur to such main production pillars and to translate such degradation in the form of economic and social quantitative and qualitative estimates whenever possible. Thus, this section of the report shall focus on the productive and environmental role of land resources in Egypt.



**Productive and Environmental Soil Functions After Brady and Weil (1996)**

### 4-b Pressures on Land Resources

Productive land in Egypt, though limited, is exposed to multiple pressures leading to soil degradation in the form of a partial or total loss of its productivity, even leading in some cases to the loss of soil components themselves. Soil degradation factors differ according to their types and usages, briefly described as follow:

## 1- Sedimentary Lands in the Nile Valley and Delta

It is one of the oldest agricultural systems in the world, distinguished by high soil fertility due to alluvial deposits brought by the Nile water over thousands of years. This area is also considered one of the most populated regions in the Middle East; population density is estimated to be 8 capita per feddan. Agricultural production of this region is variable in addition to its high production. This fertile region is exposed to the following deterioration factors (El Bagouri & Others 2002).

### a. Soil Salinity

Due to the wide use of flood irrigation and unaccounted-for water usage, water irrigation from the Nile is exaggerated leading to soil water logging and poor drainage of excessive water that exceeds the growing plants needs. Thus, soil salinity components reach a level causing damage to plant production and deterioration to some of the chemical and biological soil elements. Some lands become so rich in soda due to the increase in sodium element causing more degradation in physical elements. During the seventies, sedimentary soil area affected by salinity and soda was estimated to be 30 to 35% of the total Nile valley and Delta area (El Gabali 1972).

### b. Urban Encroachments

Urban encroachment occurred due to the expansion of cities and villages and the establishment of industrial facilities and infrastructure, in addition to soil surface stripping for manufacturing red bricks. Soil stripping has been nearly overcome as a result of the legislation issued in 1983 and amended in 1985. Other encroachments started during the fifties causing the loss of 15000 feddans annually. Rates of losing

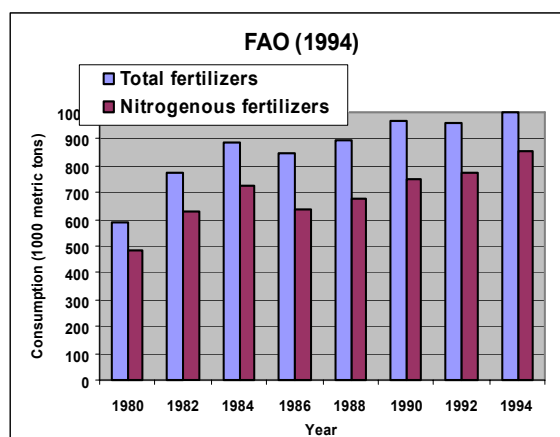
such fertile soil during the past decades till the last twentieth century decade have increased estimated at about 45,000 feddans annually (Land, Water and Environment Institute - 2000). A military order has then been issued to stop and eliminate such encroachments in 1996, significantly limiting such phenomena.

### c. Soil and Water Resource Pollution

With the beginning of the seventies, soil pollution impact started due to the excessive use of chemical fertilizers, namely nitrogenous, due to the farmers' wrong impressions after the construction of the High Dam (Science Research Academy -Impact of Reduced Nile Alluvial 1971-1975). Excessive use of chemical fertilizers persisted due to agriculture production intensification and attempts to reach the highest production possible/unit area. Usage rates of fertilizers have soared compared to international rates. This has led to increased concentration of nutritious elements in drainage water leading to the eutrophication of irrigation and drainage water and the pollution of Northern lakes. Soil and water pollution has also increased due to the irrationalized use of different pesticides. In addition, wastewater and industrial drainage leakage into watercourses has exacerbated soil and water resource pollution.

### d. The Impact of Sand Encroachment on the Nile Valley and Delta

Due to the active encroachment of sand and sand dune encroachment namely in the Western desert towards fertile sedimentary land, an area estimated of 16% of the old valley land has been influenced. Satellite images reveal the volume of this impact. The area influenced by this phenomenon is estimated to be 1.8 million feddans. Land productivity has diminished by about 25%



**Nitrogen Fertilizers Consumption in Egypt (1000 Ton)**

compared to its original productivity. (Regional Report on Desertification in the Arab World – Arab Center for Dry and Arid Area Studies - 2000).

### e. Erosion of Some Coastal Areas in the North of the Delta

The erosion has influenced some thousands of feddans in the North of the Delta giving way to erosion phenomenon in these coastal areas due to the reduction of alluvial sediments in Rosetta and Damietta branches. (Dr. Hassan Wahbi, 2002).

## 2- Reclaimed Desert Land

These desert lands have also been exposed to many pressures and degradation factors leading to their reduced productivity and increase in the duration required for reaching their acceptable productivity level and eventually to their ideal productivity, which caused the loss of effort, money and time. Among the most important deterioration factors of these desert lands are: (El Bagouri *et al*, 2002).

- a. The usage of organic fertilizer transported from the old valley lands without adopting scientific composting methods

to get rid of weed seeds bioactivity, disease vectors and soil pests. This led to the infection of new pristine lands with much harmful weeds, pests and illnesses adversely impacting, in disproportionate degrees, reclaimed land productivity.

- b. The adoption of irrational agricultural management techniques, particularly with respect to crop combinations and appropriate cropping systems due to soil fertility weakness, specially during the first phases of land reclamation, as well as the adoption of traditional ploughing methods to such fragile soil has led to reduced productivity and excessive usage of chemical fertilizers, pesticides and herbicides causing clear damages to the productivity and characteristics of such desert land that has such a weak environmental equilibrium to enable it to resist changes, whether positive or negative.
- c. The adoption of flood irrigation system in certain areas at the early years of reclamation as well as the implementation of some low-efficiency irrigation systems of low yield per water irrigation unit.
- d. Impact on desert land productivity and on growing plants due to sand winds, sand dispersion and sand dune transgressions in some areas at the boundaries of reclaimed lands. In addition, sand transgression on the infrastructure namely on roads that secure transportation and crop and agricultural products transport to such areas.
- e. Salinity of some areas due to excess irrigation, bad drainage and water clogging as a result of water leakage particularly in poorly lined canals.

### 3- Grazing Lands and Pluvial Agriculture

These areas are exposed to degradation factors, most important of which are periods of dryness, lower rains compared to their annual average, bad distribution of rains during rainy seasons, in addition to the damages caused by soil drifting by air, creating sand and dusty storms, as well as by water due to water agglomeration in valleys with major topographic slopes and the fall of extensive heavy torrents of thunderstorm rains causing the drifting of surface soil layers due to water and flowing load, carried out materials which sediment down the valleys or lost to the Mediterranean or the Red Sea gulfs (Aqaba and Suez).

Overgrazing leads is also considered one of the most soil degradation causes leading to the eradication of most plant cover, which augments soil drifting by wind and water in addition to the erosion and deterioration of natural grazing lands leaving undesired plants. Therefore, grazing lands plant cover degradation poses significant risk to biodiversity in Egypt.



Excessive overgrazing

Socioeconomic conditions of Bedouins living in these areas play an effective role in the area's land degradation, particularly in the lack of micro-credits that allow the funding of handicrafts and artisan industries based on animal and grazing land products.

## 4- Wetlands

Wetlands are exposed to some pressures due to drying some part for agricultural usages. Thus, their original area shrinks. The increase of organic and non-organic pollutants due to agricultural, human and industrial activities lead to the degradation of such wetlands of international significance and impact on its wild or transiting fauna during their life cycles, such as migratory birds, fishes and others, thus endangering the biodiversity of such creatures.

### 4-c Current Situation of Lands in Egypt

Egypt has a total area of about one million kilometer square. Egypt is situated in the arid and semi arid zones belt characterized by limited arable land resources, whether irrigated, pluvial agricultural land, natural grazing meadows or wetlands. Currently irrigated and cultivated land in Egypt is about 7.95 million feddans (2002), from which 5.3 million feddans are fertile sedimentary lands in the Delta and the Valley, while the remaining land is desert, reclaimed during the last five decades.

Old irrigated lands constitute one of the pillars and main resources for fulfilling daily life requirements of people, particularly under the current annual population increase reaching around 1.9% in addition to the continuous increase in individual consumption rates of different nutritive and agriculture products. Demographic growth in Egypt has had a clear impact on lowering percapita share of agricultural land, coming down from 0.5% feddan/capita in 1900, to 0.12% feddan/capita according to 2000 statistics.

According to latest Central Authority for Public Mobilization and Statistics

### Change in percapita share of Agricultural land during the past Century

Year	Popula- tion (Million)	Cultivable/Arable Lands	
		Total (million feddans)	Land area/capita (feddan)
1897	9.7	4.9	0.51
1907	11.2	5.4	0.42
1917	12.8	5.3	0.41
1927	14.2	5.2	0.39
1937	15.9	5.3	0.33
1947	19.0	5.8	0.31
1960	26.1	5.9	0.23
1970	53.2	6.0	0.18
1980	42.1	6.1	0.14
1990	55.0	7.2	0.13
1998	62.5	7.7	0.12

(CAPMAS) statistics (2002), Egypt's population has reached 67.5 million, while the total area cultivated is 7.95 million feddans. Thus, percapita share of cultivated land remains fixed at 0.12 feddan/capita.

In general, fertile sedimentary land area in the Delta and the Old valley, which is mainly irrigated by Nile water, was estimated at the beginning of the fifties to be around 6.25 million feddans. Due to different encroachments, e.g. urban expansion, leaving land uncultivated, stripping land surface or constructing industrial facilities and infrastructure, the total area of this land during the last few decades has diminished to be 5.35 million feddans at the beginning of the present century (Scientific and Technology Research Academy, 1995).

Most of the natural grassland is situated at the North coast of the western desert and in Sinai. The total area of these lands is estimated around 6.5 million feddans (Desert

Research Center, 2002). 3.75 million feddans are located in the western North coast and the remaining area in north Sinai. It is marginal lands depending on natural grassland and on sheep, goats and camels. The number of these animals differs according to the availability of rain water which differs in quantity from one season to the other (November- March), associated with some dry waves where rains annual rate drop, as well as pasture load from grazing animals, which is estimated at an average of one million and a half heads. Within the natural grassland abovementioned, limited cultivated areas for cultivating cereals, olives and figs exist.

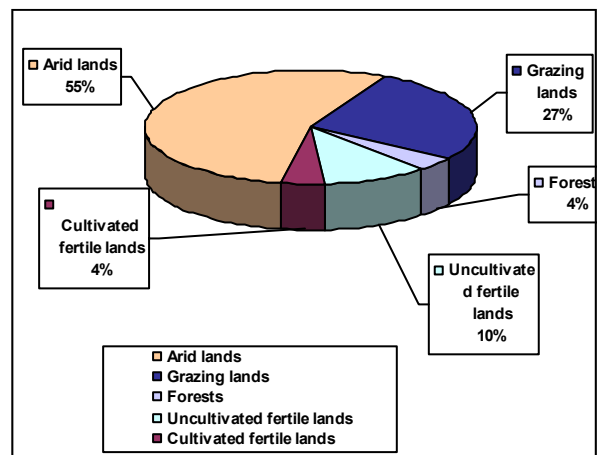
In Egypt, particularly in coastal Mediterranean areas, wetlands zones are found in Edco, Mariout, Borolous and Manzalah. Till very recently (in the eighties of last Century) these wetlands represented 25% of wetlands in the Mediterranean. Egypt has adhered to the International Convention for the preservation of wetlands of international importance, particularly where water birds live (RAMSAR). Egypt has registered Borolous and Bardawil Lakes at the North of Sinai on the list of wetland of this UNESCO convention.

These wetlands provide different products and services as well as a distinguished and unique environmental value. These products and services comprise wild life, birds, fish, leisure activities, organized fishing in addition to the preservation of coastal areas from erosion. Wetland areas obstruct polluted materials before reaching Sea Water. Thus, they could become a mechanism to treat such polluted materials, eliminate them and clean water resources.

### 4-d Land Resources Challenges in Egypt

Old agriculture lands, reclaimed desert and Nile irrigated areas, reach around 8 million feddans, which represents less than 3.4% from the total area of the Arab Republic of Egypt. This percentage almost corresponds to the percentage of cultivated land in the Arab region where a common market is being established among its countries. The figure below shows clearly that currently cultivated areas reach 4% of the total Arab region area.

The figure shows clearly the extent of limitation of exploitable and cultivable agricultural production lands, which emphasizes the importance of such lands as a main pillar of food security in this region.



Land Uses in the Arab Region  
Arab Organization for Agricultural Development (1998)

Undoubtedly, reclaiming desert land has become an urgent and complementary necessity. These lands will be added to the fertile Delta and old Valley areas enabling the State confront demographic growth and increasing food consumption rates. As well as to preserve the level of agriculture exportation and agriculture sector participa-

tion in Egypt's annual GDP. The agriculture sector participation reaches at present around 20% of the National income. The agriculture sector also provides employment opportunities to almost 40% of Egypt's labor force.

#### 4-e State Efforts in Combating Land Degradation in Egypt

Due to the continuous demographic growth and increase of per capita consumption rates of food and agricultural products during the last five decades, the State, following the establishment of the High Dam, and stabilization of Egypt's share of Nile water at 55.5 billion cubic meters, has decided to increase the cultivated area through reclamation of the desert at the boundaries of sedimentary areas in Upper Egypt.

Some limited expansions have taken place through cultivating some areas in Sinai and in the Eastern desert valleys by using various types of underground water. The area reclaimed and cultivated in desert lands reaches around 2.60 million feddans. These desert reclaimed lands are low in fertility and have chemical, physical and biological characteristics that need to be developed and reformed during a period of 3 to 10 years until reaching acceptable production level and beyond to reach the optimum production level for such lands.

#### 1- State Efforts for Combating Sedimentary Lands Degradation

The State has deployed great efforts, especially during the last two decades, to face fertile land degradation in the Nile valley and Delta, to preserve on their environment, and to restore their high productivity. Among these efforts are the following:

- a. Expanding, developing and completing

open canals and drains.

- b. Introducing tiled drainage, till 2001, in an area of 5.1 million feddans; of which 3.66 million feddans are situated in the Delta and 1.44 million feddans in Upper Egypt (Dr. Hassan Wahbi, 2002). Tiled drainage is to be continued in an area of 650 thousand feddans among a quinquennial plan from 2002 till 2007 (Ministry of Planning, 2002).
- c. Improving degraded lands by soil laser leveling and adding conditioners to treat and resist soil salinity.
- d. Producing highly productive species and varieties of field crops like rice, wheat, corn and some vegetables, and developing fruits varieties like grapes and bananas.
- e. Adapting Integrated Pest Control Systems using modern methods in order to resist pests and weeds in order to limit the excessive usage of soil and waterways polluting pesticides. This policy has led to a reduction in pesticide consumption.
- f. MSEA has exerted distinguished efforts for limiting pollution sources of Nile water used to irrigate agricultural lands.

#### Integrated Benefit of State Efforts in the Old Lands

These integrated efforts, particularly undertaken by the MALR, MWRI and MSEA, have led to the improvement of soil fertility, restoring its high fertility level. Production of some crops, such as rice and sesame, has increased reaching the highest production level in the world, in addition to some other field crops as wheat and corn, which have also registered highest records at the level of national production. The same applies to vegetables and fruits such as tomato, grapes and citrus. Added to these production and economic returns is the reduction of old agriculture land and

water resources pollution levels in order to improve the ecosystem and ensure food and agricultural products safety.

## 2- State Efforts in Reclaimed Desert Areas

- a. During the last few years, the state has exerted tremendous efforts to increase the rate of desert land reclamation via three mega projects, two of which were accomplished by using Nile water: El Salam Canal, reclaiming about 400 thousand feddans at the North part of Sinai, and Toushki project, reclaiming around 500 thousand feddans in the South of the Western desert. In addition, East El Ouyanat Project intends to reclaim about 100 thousand feddans by using fresh water from the Nubian sand stone Dam located in the southwest of the Western desert.



Desert Lands

- b. Completing and developing open drains, tight lining of irrigation canals and encouraging the use of modern irrigation systems.
- c. Distinguished forestation efforts, particularly the establishment of wind-breakers around desert land plots, protection of roads and infrastructure, especially irrigation canals, fighting against sand dispersion, stabilization of sand dunes, cultivating tree combinations by using treated wastewater and establishing parks and gardens for tour-

ism and leisure purposes.

- d. Intensive training courses shall be established to train fresh graduates, farmers and investors. These courses shall have scientific and modern basis to reclaim and manage resources in desert areas and in reclaimed lands. Also, extension agencies and techniques shall be developed.
- e. The ministry of Environment has given great importance to the National Waste Management Program. According to 2003 estimates issued by the Ministry of Local Development (MoLD), General Secretariat of Local Administration and MSEA, the quantity of municipal waste generated in all of Egypt is in the vicinity of around 60 million tons/year.



Pressing rice straw using MSEA press machines

The Ministry of Environment has also encouraged the establishment of waste recycling plants and the production of organic compost according to sound scientific and development bases. According to MSEA estimates and MoLD data, 63 plants have, until 2003, been established for recycling solid, agricultural and rice straw wastes.



Rice Straw

### **Integrated Benefit of State Efforts in Reclaimed Lands**

Integrated efforts had important impacts on the protection of reclaimed desert land, infrastructure and roads against damages resulting from reptant sand and sand dune movement, thus, providing environment protection for people living in these regions. In addition, agriculture and trees productivity have been increased. The production of organic compost on sound basis from cities and agriculture waste recycling provided high quality compost free from disease vectors in order to develop reclaimed desert lands and to raise its productivity.

Training and extension efforts as well as the improvement of irrigation and drain techniques have played a positive role in improving reclaimed land economics and attracting investors at different levels to work in desert land reclamation. During recent years, State efforts have been focused on supplying these regions with infrastructure significantly reducing the financial burden endured by the State during the second half of the last century.

### **3- State Efforts in Grazing Lands and Rain Areas**

- a. The state has established several projects since 1970 in order to improve

natural pastures and apply harvest and rain water distribution techniques. The rain water is stored in underground reservoirs which included rehabilitation of some old roman reservoirs or establishing new ones at the valley terminals. The objective is to exploit the land in these marginal regions by cultivating some adequate areas with vegetables and fruits and increasing their productivity through complementary irrigation following the end of the rain season.

- b. Applying several technologies and grazing techniques aiming at recovering the natural vegetation cover, its preservation and developing its productivity animal grazing capacity. The objective also is to limit soil drifting by wind and water.
- c. Improving socioeconomic conditions of Bedouins the residents in these areas, and providing them with financial assistance to limit their urban migration and raise their socioeconomic standard.

### **Integrated Benefit of State Efforts in Pasture and Rainfed Areas**

Improvement of the features and productivity of this marginal ecosystem has started through settling several Bedouin families and increasing range productivity, particularly with respect to sheep, a large number of which is exported during good rainy seasons to Libya and Saudi Arabia during the Haj (Islamic pilgrimage) season. It was noticed that Bedouin respond well to the application of modern and suitable techniques for harvesting and storing rain waters in an increasing number of cisterns and reservoirs. They also cultivate grazing shrubs and trees in order to develop land productivity and protect the soil against drifting by wind and water.

## 4- State Effort for Preserving Wetlands

In recent years, the state has been, and is still exerting joint efforts with some international organizations like Wetland Preservation Convention (RAMSAR), the Global Environmental Facility (GEF) and United Nations Development Program (UNDP) through EEAA to take measures for the preservation of wetlands against agriculture, urban and other transgressions, in addition to the initiation of some pollution prevention field technologies for combating pollutants and reducing their concentrations in order to preserve products and productive and environmental services provided by these wetlands.

### 4-f Future Vision

From the above review, it becomes obvious that the productive lands in the Arab Republic of Egypt are limited, making them a national wealth that should be preserved quantitatively and qualitatively in order to reinforce their several and diverse productive and environmental functions, as pointed out in above sections. Achieving this would require concerted efforts by the government, media and non-governmental organization (NGOs) as well as the support of the roles of women, youth and civil society institutions in an integrated work system to realize the following:

1. Participate in the development of media campaigns reaching out to the different community groups using appropriate means to clarify the hazards of degradation factors on the environmental productivity system of productive lands in Egypt.
2. Active participation in monitoring pollution sources, degradation and wrong practices leading to land degradation in Egypt and to work, each in their respec-

tive domains, in order to combat these practices.

3. Preserving new desert land sound environment against old environment pollution sources, to exploit its competitive advantage in implementing approved organic agriculture practices and to allocate their products for boosting agriculture exports.
4. Introducing modern agriculture systems in reclaimed desert lands such as:
  - a. Irrigated fodders system/ animal production.
  - b. Processed crops system namely in remote areas to reduce quantities of inputs and outputs.
  - c. Non conventional plants like halophytes, cultivating them in saline lands.
  - d. Cultivation of natural plants of high economic advantages.
5. Applying integrated management techniques that comply with the nature and profile of the four types of land above mentioned.
6. Use newly introduced GIS and remote sensing systems in order to monitor the progress in the four land types mentioned above and to take the right decision to preserve these gains.
7. To establish databases on land resources and their related activities such as crop areas and local and international marketing data to reinforce extension methods and develop relevant training programs.

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