

Arab Republic of Egypt

**SUSTAINABLE AGRICULTURAL DEVELOPMENT STRATEGY
TOWARDS 2030**

Cairo, 2009

Acronyms

ARC	Agricultural Research Center
ARDC	Agricultural Research and Development Council
ARE	Arab Republic of Egypt
CGIAR	Consultative Group on International Agricultural Research
EGP	Egyptian Pound
FAO	Food and Agriculture Organization
GFAR	Global Forum on Agricultural Research
IFAD	International Fund for Agricultural Development
IPCC	Intergovernmental Panel on Climate Change
MALR	Ministry of Agriculture and Land Reclamation
MLD	Ministry of Local Development
MOC	Ministry of Communication
MWRI	Ministry of Water Resources and Irrigation
SADS	Sustainable Agricultural Development Strategy
WB	World Bank

FISCAL YEAR

July 1 – June 30

CURRENCY EQUIVALENTS

(as of August 2009)

US \$1.00 = 5.5524 Egyptian Pounds (EGP)

EGP 1.00 = US \$0.1801

WEIGHTS AND MEASURES

1 centimeter (cm)	=	0.394 inches
1 meter (m)	=	39.370 inches
1 kilometer (k)	=	0.620 miles
1 square kilometer (km) ²	=	0.386 square miles
1 feddan (fed)	=	0.420 hectares, 1.037 acres
1 hectare (ha)	=	2.470 acres
1 cubic meter (m) ³	=	35.310 cubic feet
1 cubic meter per second (m ³ /s)	=	35.310 cubic feet per second
1 liter (l)	=	1.057 quarts
1 liter per second (l/s)	=	0.035 cubic feet per second
1 kilogram (kg)	=	2.205 pounds
1 metric ton (t)	=	2,205 pounds
1 kilowatt (kw)	=	1.360 horse power
Ne or Na	=	English count (= 1.7 millimeters)

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Foreword

The Egyptian MALR has adopted a strategic planning approach to identify ways and means to continue fostering development of the agricultural sector. The first agricultural development strategy was proposed during the 1980s, followed by two strategies to chart future directions and response to the change agenda. The need to address and incorporate socioeconomic considerations assumed high priority during the preparation of the 2030 strategy which is of paramount importance to improve farmers and rural household livelihood. By 2006, internal and external factors experienced dramatic shifts in food availability and increased prices that necessitated a revision of the strategy in order to enable the agricultural sector to keep abreast with these changes. Consequently, a decision was taken to develop a new Strategy for Sustainable Agricultural Development towards 2030 (SADS) to respond to recent global and domestic challenges facing Egyptian agriculture. The SADS is a live evolving document and will be reviewed periodically.

The new SADS has been based on five characteristics that can be summarized as follows:

- **Wider stakeholders' participation in preparing the strategy:** active participation of the rural sector formed the basis of identifying agricultural development issues and included farmers and interested parties in the private and public sectors and the civil society, stakeholders at the governorates level, including universities and agricultural research institutes. The directions presented in this document reflect issues identified the real means to resolve them and the actual implementation potentials;
- **Adopting a comprehensive approach in preparing the strategy:** in addition to the identification of agricultural development objectives and the ways and means of their achievement in the future, the strategy is based on a comprehensive approach to propel and foster the agricultural development process;
- **An objective analysis:** of the recent development experiences in order to learn from previous lessons, and to identify strengths and weaknesses to guide future directions;
- **Careful identification of implementation mechanisms:** based on sector assessment and future needs to achieve the strategy goals; and
- **Objective identification of the roles of both the public and the private sectors and civil society:** in order to provide a better environment for all concerned stakeholders in development activities and programs to promote and improve the agricultural sector performance.

The preparation of SADS towards 2030 is intended to take stock of agricultural achievements, identify lessons learned and develop a vision for the sector, and its mission. Concerted efforts should be exerted by all stakeholders in order to translate this strategy into executive plans of work in future; an essential element to which the MALR will give special attention during the next two decades.

I would like to express my thanks and appreciation to all those who participated in the preparation of this strategy, particularly the Agricultural Research and Development Council (ARDC) for supervising the preparation process in collaboration with distinguished teams of agricultural experts from the concerned ministries, as well as from the private sector and the civil society.

I would like also to thank the international organizations which collaborated in preparing parts of the strategy, particularly the Food and Agriculture Organization of the United Nations (FAO) and the International Fund for Agricultural Development (IFAD).

**Minister of Agriculture
and Land Reclamation**

A handwritten signature in black ink, appearing to read 'Abaza', written over a horizontal line.

Amin Abaza

Introduction

National strategies constitute a general framework of the guiding principles adopted by the state to achieve the developmental goals and objectives which require a relatively long term vision, identifying the policies and modalities to be adopted by all stakeholders to realize the envisaged strategic objectives. Three such strategies have been prepared since the 1980s, namely the 1980s Agricultural Development Strategy, the 1990s Agricultural Development Strategy, and the Agricultural Development Strategy towards 2017.

The three strategies differed in their objectives and programs based on prevailing international and national circumstances. The 1980s Agricultural Development Strategy dealt mainly with the liberalization of the agricultural sector, pricing policies and increasing the annual growth rate of agricultural production to 3.4%. The 1990s Agricultural Development Strategy concentrated on completing the economic reform program in the agricultural sector, increasing the value of agricultural exports to EGP 5 b, and achieving an annual agricultural growth rate to 3%. The Agricultural Development Strategy towards 2017 concentrated on achieving self-sufficiency in cereals, targeting an annual agricultural growth rate of 4.1%, and continuing the land reclamation program of 150,000 feddans annually.

Regarding policy and price reforms, the 1980s Agricultural Development Strategy primary focus was to adjust the pricing policies and mechanisms as a means to reallocate resources and provide incentives to the farmers to increase agricultural productivity. In addition, several socioeconomic benefits were realized due to liberalizing the agricultural sector from the central decision-making process. The 1990s Agricultural Development Strategy focused on total liberalization of cotton production, marketing and export, promoting agricultural research, reviewing the policies and standards used in selecting the beneficiaries for distributing newly reclaimed lands. The 2017 Strategy addressed the following points: i) decentralization of water management, ii) established a mechanism to recover part of the cost of irrigation services and the maintenance of irrigation facilities, iii) addressing the problem of village based urban sprawl and encroachment on the agricultural lands, and iv) increasing self-sufficiency in strategic crops.

As for improved utilization of agricultural resources, the 1980s Strategy highlighted the need to find solutions to combat soil salinity and alkalinity, and develop improved irrigation systems particularly in the newly reclaimed areas. The 1990s Strategy continues to find solutions for loss of agricultural land, improving returns for water use, and improving on-farm irrigation practices. The 2017 Strategy focused on water management aspects including activities used by water user associations and decreasing areas planted to rice and sugar cane.

The 1980s Strategy was the starting point to concentrate on formulating institutional and human resource development and water management aspects. To provide the basis needed to achieve the envisaged growth rates for the agricultural sector, the strategy concentrated on developing the agricultural extension services, research and credit systems. To provide continuity in strategies formulation and objectives, the 1990s Strategy focused on fostering complementarity between research and extension services. This was based on reducing staff in the Ministry of Agriculture and Land Reclamation (MALR), and rationalizing activities by the Principal Bank for Agricultural Development and Credit (PBDAC) in procurement and distribution of agricultural inputs.

Regarding achievements gained, several objectives of the three aforementioned strategies have been realized, while others lagged. Since launching the 2017 Strategy in 2003, the national economic situation in Egypt has experienced challenges some of which were due to

international and regional changes, while others were the result of local interactions. In the meantime, several other international developments have taken place, including the global food crisis which led to the convening of the “*High-Level Conference on World Food Security: the Challenges of Climate Change and Bio-energy*” held in Rome, June 2008, the launching by the World Bank (WB) of both the “*World Development Report 2008: Agriculture for Development*”, and the “*International Assessment of Agricultural Knowledge, Science and Technology for Development*” issued in 2008, as well as the “*Intergovernmental Panel on Climate Change: Fourth Assessment Report*” (AR4, IPCC 2007). In addition, several other reports addressed the assessment and reactivating the role of international institutions in agricultural development, some of these have been issued by the Food and Agriculture Organization of the United Nations (FAO), the International Fund for Agricultural Development (IFAD), the Consultative Group on International Agricultural Research (CGIAR), and the Global Forum on Agricultural Research (GFAR). The aforementioned developments have triggered several changes in assessing the agricultural sector needs, thus necessitating a comprehensive review of policies and the managing modalities of agricultural resources, and the revision of the agricultural development strategy and extending its horizon to the year 2030.

The most important factors behind the decision to prepare a new Strategy for the Sustainable Agricultural Development towards 2030 are:

- Accelerated scientific developments leading to wide possibilities for application of Information Technology (IT) in agricultural development, with implications on promoting knowledge base approaches to maximize efficiency of using agricultural resources, most important of which are remote sensing technology, applications of genetic engineering, and nanotechnology. Such technologies and their application would no doubt promote land and water productivity;
- In spite of the fact that all previous agricultural development strategies have stressed the importance of maximizing returns on water use, efforts exerted so far in this field are not enough to direct farmers towards applying water-saving measures and improved cropping patterns. Areas planted to rice have greatly increased in spite of the sharp deterioration of water resources *per capita* below the water poverty level;
- Changing the relation between agricultural land owners and tenants is of paramount importance is agricultural resources are to be efficiently used. This could be attained by adopting measures to rationalize rights and responsibilities of both owners and renters. Among these is the right to examine and review such relationships periodically to address changing circumstances. The role of market forces in determining the rental value of agricultural land instead of depending on the tax assessment in determining the rental value is one of the issues to be elaborated upon in SADS 2030;
- Exposure to external crises which negatively affect the agricultural productive capacity, as well as the farmers income, the most recent of which being *avian influenza*, necessitating the introduction of new systems for crisis management and alleviation;
- Although the changes in the structure of exchange rates improved the competitiveness of several agricultural products, the weaknesses of small farmers’ associations, as well as the weak agricultural marketing structure have reduced the potential to strengthen synergies between economic and production policies;
- The ongoing EU-Egyptian Association dialogue, the completion of the Greater Arab Free-Trade Area, and the Common Market of Eastern and Southern Africa (COMESA), as well as other regional trade agreements necessitated a redefinition of objectives and modalities affecting agricultural development;

- Enlarged membership of the European Union (EU) and its implications on the Egyptian agricultural trade, as the EU is the largest trading partner with Egypt;
- Food prices on the international markets experienced a sharp and unexpected rise due to changes in both the demand and supply of food products, known as “the world food crisis”, followed by a sharp decline in supplies after the financial crisis that has engulfed financial markets in September 2008. The aforementioned sudden shocks led to decreased growth rates and diminished the size of world trade. Food prices remained higher than their levels before the food crisis, with implications on Egyptian agriculture and trade on the world market, as well as on farmers’ income;
- A global trend towards the use of food crops in the production of biofuel, as a strategic objective in both the USA and the EU, has wide implications on the food supply to the world market, particularly developing countries;
- Global climate changes due to the greenhouse effect and its probable adverse effects on agricultural production, the lands of the Delta and the northern lakes of Egypt;
- The emergence of a new trend towards agricultural investments beyond the national borders of many countries, as it is the case of fast growing developing economies (Brazil, Russia, India and China), as well as the states of the Gulf Cooperation Council which are planning to increase their agricultural investments in Africa and Asia.

It is worth mentioning that the SADS document towards 2030 is not concerned only with the revision of development programs and their objectives, but also with special attention to the challenges facing agricultural development efforts, as well as execution modalities that would help achieve the greater part of its objectives. The SADS vision focuses primarily on improving livelihood of the rural poor through efficient and sustainable use of natural resources. Its main mission is to increase agricultural productivity and enhance socioeconomic aspects of stakeholders.

**Chairman,
Agricultural Research and Development Council**

Prof. Dr. Adel El-Beltagy

Methodology of Preparing the Strategy Document

The SADS document towards 2030 has been prepared as an Egyptian document that reflects national objectives and orientations, in coordination with the Agricultural Research and Development Council, the Food and Agriculture Organization of the United Nations (FAO), with inputs from the International Fund for Agricultural Development (IFAD) and the World Bank. This methodology may be summarized in the following:

1. Teams of experts were commissioned by the Agricultural Research and Development Council (ARDC) to review and analyze the three previous agricultural development strategies, as well as their execution modalities, i.e. the 1980 Strategy, the 1990 Strategy and the Agricultural Development Strategy towards 2017, in order to identify reasons for preparing a new agricultural development strategy;
2. The team reports of the aforementioned review were submitted to the ARDC which endorsed the need to prepare a new Strategy for Sustainable Agricultural Development towards 2030, incorporating the various changes experienced at the national, regional and international levels, with direct implications on agriculture in Egypt.
3. Additional teams of agricultural experts in the various ministries (Ministry of Water Resources and Irrigation, Ministry of Local Development, and Ministry of Communications) and concerned institutions and representatives of the private sector and the civil society were commissioned to prepare the strategy document. The team included nine working groups, each concerned with a sub sector or field;
4. Each team studied the actual performance in its sub sector and the development potential using available natural resources, especially water, land and human resources, taking into account the experiences gained of the last three decades use of newly developed techniques and modalities;
5. The main outline was presented and reviewed at several workshops by the Agricultural Research and Development Council.
6. Expanded workshops comprising a large number of stakeholders including experts concerned with agriculture in the Egyptian universities (Faculties of Agriculture and Veterinary Science), research centers (the Agricultural Research Center, The Desert Research Center, the Water Resources Research Center, and the National Research Center) business men, the private sector representatives and the civil society were organized, where the views and proposals of the participants were identified and taken into account in the final preparation of the strategy document;
7. In cooperation with stakeholders representatives and surveys conducted, the teams held five expanded workshops each concerned with one of the main agricultural regions (East Delta, Central Delta, West Delta, Middle Egypt and Upper Egypt) with representatives from all concerned parties, including farmers' associations, service institutions in each region, leading staff of the faculties of agriculture and veterinary science and research centers in the region. During these workshops, the main outline of the strategy and the potential development for each region were reviewed, based on the results of a questionnaire prepared for this purpose and collected from all governorates in order to identify the views of the participants on the submitted proposals. The problems of each region and its development potentialities, and priority areas for future action were identified;
8. A smaller working group was established to analyze collated information and views at the central and regional levels and the preparation of a draft strategy document;

9. The draft strategy document was reviewed by experts from FAO, the IFAD, and the World Bank, who agreed on introducing some important revisions; and
10. The document was submitted to an expanded meeting of the Agricultural Research and Development Council for review and adoption.

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- **Ministry of Higher Education;**
- **Ministry of Water Resources and Irrigation;**
- **Ministry of Local Development;**
- **Ministry of Local Government; and**
- **Ministry of Communications and Information Technology.**

Executive Summary

Lessons Learned from Previous Agricultural Development Strategies

Since the 1980s, Egyptian agriculture has benefitted from articulating and implementing three agricultural development strategies, namely the 1980s Agricultural Development Strategy, the 1990s Agricultural Development Strategy, and the Agricultural Development Strategy towards 2017. Meanwhile, agricultural development efforts have also experienced major changes in the different fields of plant production, due to synergized expansion of agricultural areas, and improving productivity. These efforts have led to the increase of the agricultural land from 5.87 m feddans¹ to approximately 8.44 m feddans in 2007, as well as increasing cropped area from some 11.1 m feddans in 1980 to 15.18 m feddans at present. This period has also experienced major changes in the cropping pattern. Agricultural productivity per land unit, and animal meat and milk productivity per head have also been significantly increased. The horizontal and vertical improvement in cultivated and crop productivity led to notable success in meeting increased population needs and achieving an average growth rate (in agriculture of 3-4% annually).

Several lessons were learned from the application of these strategies and were taken into consideration in preparing the Sustainable Agricultural Development Strategy towards 2030. Foremost among these lessons are:

- Maximizing the returns of the economic reform should be based on reforming the pricing policies - already achieved to an acceptable extent - as well as on the institutional reform, which needs further improvement;
- In spite of the limited water resources, applied policies have not led to the establishing an agricultural environment clearly leading to rationalizing water use;
- In spite of enacting a clear policy to protect agricultural land from over-encroachment, violations continue to take place;
- In spite of the fact that all stakeholders agree that the fragmentation of agricultural holdings constitutes a serious impediment to development, no policy has been so far instituted for protecting agricultural land against fragmentation;
- In spite of the successes achieved in the field of land reclamation, adding some 2.5 m feddans to the cultivated area, the distribution system failed to establish viable communities capable of settling in the newly-reclaimed areas;
- Skilled labor is scarce due to the lack of balance between human resource development policies, investments, and agricultural development policies, at a time during which rural communities exhibit high rates of unemployment and underemployment;

¹ A feddan is a unit of area used in Egypt and the Sudan. 1 feddan = 4200 square meters = 1.038 acres.

- In spite of the numerous research institutions and the availability of a great number of distinguished agricultural researchers, it has not so far been possible to make appropriate use of this human resource wealth;
- Contradictions in fisheries development policies have created several limitations that hinder further investments in this field;
- Applied policies have not succeeded in achieving the optimum utilization of Egypt's historical and geographical agricultural base, and its relations with the Arabic, African and European economic groupings, a situation that needs to be reviewed;
- The economic liberalization era has led to noticeable shortcomings in market management and organization, leading to more market distortions that harmed producers and consumers while benefitting middlemen thus leading to unfair distribution of development returns;
- Coordination between the different ministries and agriculture-related institutions is absolutely necessary;
- In spite of the great attention given by the MALR to the planning of the development efforts and achieving the objectives of the previous strategies, the achievement of some of the strategic objectives proved impossible to attain due to weak implementation and follow-up mechanisms;
- International and regional backgrounds have experienced many changes, most important of which is the international trend towards further liberalization of agricultural trade, at a time of when increase in food prices and supply disruption took place;
- The impending climate change due to the greenhouse effect with its probable negative effects on agricultural areas and the cropping pattern, in addition to other changes that would require a focused review of applied agricultural policies. Institutional mechanisms of the Kyoto Convention, as well as the European Trading Plan led to the establishment of a new market for carbon trade. It would be useful to commission a special study to assess implications on Egyptian agriculture development.

Within the framework of these considerations, the vision, message and objectives the Sustainable Agricultural Development Strategy towards 2030 have been articulated as follows:

The Vision

“To achieve a comprehensive economic and social development based on a dynamic agricultural sector capable of sustained and rapid growth, while paying a special attention to helping the underprivileged social groups and reducing rural poverty.”

The Mission

“Modernizing Egyptian agriculture based on achieving food security and improving the livelihood of the rural inhabitants, through the efficient use of development resources, the utilization of the geopolitical and environmental advantages, and the comparative advantages of the different agro-ecological regions”

Strategic Objectives

The aforementioned vision and mission are the building blocks of the main strategic objectives of the SADS towards 2030, and are as follows:

- Sustainable use of natural agricultural resources;
- Increasing the productivity of both the land and water units;
- Raising the degree of food security of the strategic food commodities;
- Increasing the competitiveness of agricultural products in local and international markets;
- Improving the climate for agricultural investment; and
- Improving the living standards of the rural inhabitants, and reducing poverty rates in the rural areas.

Detailed assessments of the main and sub objectives are summarized as follows:

I. Sustainable Use of Agricultural Natural Resources

1. Enhancing water-use efficiency in irrigated agriculture

In spite of water scarcity and the fact that Egypt's share in the Nile waters is predetermined, water-use efficiency is low, due to high water losses. Water conveyance efficiency is estimated at 70%, and the mean efficiency of field irrigation systems is estimated at only 50%. Hence, one of the main components of the agricultural development strategy is to achieve a gradual improvement of the efficiency of irrigation systems to reach 80% in an area of 8 m feddans, and to reduce the areas planted to rice from 1.673 m feddan (2007) to 1.3 m feddan by 2030 in order to save an estimated 12.4 billion cubic meters of water.

2. Sustainable expansion of reclaimed areas

Expanding reclaimed areas is one of the main pillars of the strategy. This can be achieved by using the water saved through improving field irrigation conveyance systems in reclaiming additional new areas estimated at 1.25 m feddans by 2017 and about 3.1 m feddans by 2030.

3. Sustainable development of land and water productivity

The strategy pays considerable attention to this component. It is expected that: i) the cropping area would be increased to 23 m feddans by 2030, with an estimated crop efficiency rate of 199%, and would increase the economic efficiency of the water unit by 119% by 2030, and ii) the economic efficiency of the land unit would be raised by 74% by the year 2030.

4. Maximizing the sustainable returns of rainfed agriculture

In spite of the low rates of rainfall in most of the regions, annual rainfall rates are 100 - 150 mm on the North Coast. Effective rainfall is lower due to evaporation. However, improved water harvesting techniques would be adapted to maximize rainfed water use and supplementary irrigation from ground water sources.

5. Maintaining and protecting agricultural land

Agricultural land in the Delta and the Nile valley regions suffers from two important problems, continued encroachment on agricultural land diverting it from agricultural to non-agricultural uses at an annual rate of 20,000 feddans, and continued degradation of soil fertility in so many agricultural areas. To assess these problems would require undertaking periodical soil surveys as a basis to establish fertilizer rates, continued restoration and maintenance of agricultural drainage systems, as well as for installing new drainage systems where needed.

6. Human resources' development and creation of job opportunities, particularly the youth

The strategy development programs and projects, are expected to create job opportunities particularly for the younger generation in agricultural and related activities, estimated at 4 m jobs by 2030, through: i) reclamation of new areas, ii) improvement of the irrigation system in the old areas, iii) adoption of labor-intensive technologies; and iv) expansion of agricultural-support activities in the fields of producing and marketing agricultural inputs and agro-industries. With an estimated family size of 5 members in the rural areas, the new labor force would provide for improved livelihood of some 20 m inhabitants, and) the strategy will emphasize human resource development to provide the needed skills for different development programs particularly in research and extension activities.

II. Improving Agricultural Productivity

In spite of the increased unit productivity achieved over the last 20 years, such increase does not reflect the potential of land or animal productivity. Productivity improvement of field and horticultural crops would be based on achieving the following objectives:

1. General objectives of field and horticultural crops development:

- Planting newly developed varieties with resistance to drought, salinity and pests;
- Planting early maturing crop varieties;
- Increasing clover productivity;
- Developing long-medium staple cotton varieties with high economic returns; and
- Paying greater attention to integrated farm management and improved cultural practices.

Based on aforementioned objectives, crop productivity assumptions planned research programs contained in the strategy, as well as the wide potentials of using bio-technology, the projected yield/feddan by 2030 would be as follows:

- **Cereal Crops:** 3.6 tons for wheat, 5.2 tons for rice and 5 tons for maize;
- **Sugar Crops:** 65.4 tons for sugar cane and 35 tons for sugar beet;
- **Fiber Crops:** 1.8 tons for cotton;
- **Fodder Crops:** 50 tons for perennial clover;
- **Fruit Crops:** 15 tons for citrus crops, 14 tons for grape and 10 tons for mango; and
- **Vegetable Crops:** 30 tons for tomatoes and 14 tons for potatoes.

2. General objectives of livestock development:

Increasing *per capita* animal protein consumption by 4 g/day by the year 2030 is one of the main objectives of developing animal, poultry and fisheries production, and reconstituting the animal food basket from the different sources in favor of the least-costly local sources. To achieve these goals, the strategy is based on achieving the following objectives:

For milk and red meat:

- Increasing cattle and buffalo milk productivity to achieve an annual *per capita* share of 63 kg, to be increased to 90 kg by the year 2030;
- It is expected that *per capita* red meat consumption will decline at a rate of 0.5 kg every five years. Red meat production rate is also expected to go down to 2% by the year 2030; and
- Reducing meat and milk imports to the minimum.

For poultry production:

- Continued improvement of feed conversion rates in the commercial poultry sector, for both poultry meat and eggs;
- Increasing the production of fattening broilers to 1.4 b birds, and increasing egg production to 9.3 b eggs by 2030; and
- Developing and modernizing rural poultry sector.

For fisheries:

- Sustainable development of lake fisheries production;
- Expanding fishing in the Mediterranean into the exclusive economic zone, extending to 200 nautical miles;
- Expanding aquaculture activities to increase production to 1.39 m tons by 2030; and
- Increasing sea fisheries production to 200,000 tons by 2030.

III. Increasing Competitiveness of the Agricultural Products in Local and Foreign Markets

- Improving quality of agricultural products to meet market requirements;
- Establishing and applying quality standards for agricultural products, and expanding application of sorting, grading and packaging processes;
- Applying information and telecommunications modern technologies;
- Improving marketing facilities and services;
- Improving pre- and post-harvest practices to improving product quality and marketing efficiency;
- Applying modern techniques and practices in monitoring, analyzing and the prediction of natural and marketing risks and developing risk mitigation measures;
- Rationalizing the regulatory role of the government in exercising control over agricultural inputs and outputs policies, as well as in consumer protection; and
- Improving the production to market chain linkages.

IV. Achieving Higher Rates of Food Security in Strategic Goods

The world has experienced a global food crisis in 2006. Food prices rose sharply. Available indicators show that this crisis is expected to continue possibly for a long period after the present financial crisis. Keeping this in mind; the SADS towards 2030 is based on achieving the following objectives:

1. Promoting self-sufficiency in strategic food commodities

To keep up with population increase from 80 m to 106 m by 2030, the strategy is based on development programs, institutional reform, and the introduction of new policies. In this context, Egypt would be capable of achieving near-self-sufficiency in some food commodities imported at present, particularly wheat, maize, sugar and fish. The rate of self-sufficiency is expected to rise from 54% to 81% for wheat, from 53% to 92% for maize, from 77% to 93% for sugar, from 67% to 93% for red meat, and from 97% for 99% for fish, by the year 2030.

2. Improving consumption patterns in order to improve nutritional standards and vital bodily functions

The strategy gives considerable attention to improving nutritional standards and dietary patterns. This will be attained through application of policies and programs to encourage the consumption of local high-value food products, including meat, milk, eggs, fish, as well as foods high in vitamins and minerals such as vegetables and fruits, while achieving a positive development in *per capita* consumption of the staple food.

3. Reducing pre- and post-harvest food losses

The strategy includes detailed policies and work programs to improve marketing efficiency, increase agro-industries and reduce pre- and post-harvest losses to half their present levels, through improving marketing policies and systems, and reviewing the presently applied policies of in-kind support. The introduction of more efficient and targeted support policies will play an important role in rational food policy implementation.

4. Improving food quality and safety

Achieving this goal would require updating of food standards of agricultural commodities and products, as well as enacting necessary laws and control arrangements to enforce standards and improve consumer safety measures.

5. Improving social safety nets

Egypt is one of the first states to establish a system for in-kind food support. However, resulting price distortions have been detrimental to the support policy. For this and other reasons, food support policies have to be reviewed in light of related international experiences. The strategy includes a specific proposal to discontinue present in-kind system and replace it with targeted financial or food coupons.

V. Improving Opportunities for Agricultural Investment

In spite of the positive steps taken to improve opportunities for agricultural investment, some restrictions and problems are still prevailing which reduce the positive impact of the newly-enacted laws. In order to increase agricultural investments, the SADS towards 2030 gives greater attention to the following factors:

- Establishing a single entity for the allocation of areas suitable for agricultural investments, with representatives from all concerned ministries;
- Reviewing laws and procedures applied in land allocation and issuing title deeds;
- Enabling farmers and agricultural investors to use the areas allocated to them as bank collaterals;
- Reviewing credit policies of agricultural projects, and streamlining lending procedures; and
- Preparing a clear map for investing in agriculture, defining areas assigned to the different types of investments.

VI. Improving Livelihood of Rural Inhabitants

Improving the living standard of rural inhabitants is the core of the strategy vision and mission. This would be achieved through introducing a number of policies and work programs, including:

- Expanding activities in both the production and marketing of agricultural inputs and outputs in rural areas;
- Developing a plan to expand newly-reclaimed areas, as well as to establish integrated agro-industrial communities supported by different social services;
- Encouraging and developing handicrafts and small rural industries, through improved marketing, thus contributing to increasing job opportunities;
- Maximizing farmers utilization of agricultural residues;
- Promoting and supporting small farmers' associations, particularly in the field of agricultural marketing; and
- Promoting the role of women in the different fields of rural development.

VII. Investments Needed to Achieve the Strategy Objectives

Based on estimated population and agricultural growth rates, total agricultural investments needed for the achievement of the strategy objectives have been estimated at about EGP 500 b, considering that the projected annual agricultural growth rate is 4% during 2009-2030. In case of a projected annual growth rate of 5%, this would require investments estimated at EGP 640 b until the year 2030. Consequently, investment expenditure for the year 2009 is estimated at approximately EGP 13.4 b, compared to EGP8.4b in 2008.

Proposed Implementation Mechanisms for Achieving the Strategic Objectives

I. Institutional Reform

1. Agricultural sector institutional reform

The institutional structure of the agricultural sector is highly complex and characterized by, duplicative, overlapping duties and responsibilities in some cases and the absence of an institutional structure in others. In addition, there are some institutional frameworks that lack the appropriate mechanisms for carrying out the assigned tasks, while some other entities carry out tasks incompatible with their structure and basic functions. The strategy has stressed the importance of the institutional reform of the MALR and its institutions, the cooperative sector, and civil society organizations active in the agricultural sector.

General objectives of institutional reform:

- Delineating the functions of the MALR and related institutions in the fields of research, extension, policy planning and follow-up, providing information and data, developing agricultural resources, planning and monitoring infrastructure development in the newly-reclaimed areas, and ensuring availability of agricultural inputs. The ministry would also phase out its role in commercial production.
- The PBDAC should relinquish its role in the procurement and distribution of agricultural inputs, and concentrate on its principal role of financing agricultural and banking activities;
- Merging institutional units with similar functions under one strong entity with defined terms of reference;
- Consolidating the agricultural law and related laws, in order to keep abreast with the socio-economic developments and international treaties;
- Restructuring the agricultural extension service to serve newly emerging functions;
- Merging and strengthening entities responsible for information technology, analysis and dissemination, as well as the entities responsible for human resource training and development;
- Assessing the need to establish a new institutional entity to be responsible for the elaboration of standards of agricultural inputs;
- Fostering cooperation between agricultural research centers and universities;
- Establishing mechanisms for safeguarding researchers' royalties, as well as safeguarding their Intellectual Property Rights;
- Reviewing the institutional structure of the different entities and units of the MALR, and defining their strengths, weaknesses and relations with other entities, as well as defining the tasks compatible with their functions.

2. Reforming and supporting civil society organizations active in the field of rural development

- Enacting a unified law to regulate the establishment of special-purpose associations, instead of enacting a special law for each special-purpose association to be established;

- The MALR should provide technical support to all institutions and organizations, and consider them as a principal partner with the agricultural extension service in implementing extension plans and programs; and
- Engaging all institutions and organizations in laying down research plans, their execution and follow-up, as well as in the application of research results.

The general objectives of the agricultural cooperatives' institutional reform:

- Amending Law 122/1982 in light of market economy requirements and international agreements;
- Reorient the role of the administrative machinery to serve interests of its members democratic management and internal monitoring;
- Eliminating duplicity of cooperatives to consolidate financial and human resource particularly at the village level;
- Merging small cooperatives in one economically viable entity;
- Training staff based on a professionally functional structure and a defined business plan;
- Allowing cooperatives to establish different funds (for saving, financing, insurance, etc);
- Considering cooperatives as centers of disseminating modern technology in their line of operation;
- Increasing awareness and administrative functions for training programs and material for the cooperative elected members; and
- Allowing the cooperatives to establish and/or participate in agricultural banks and companies active in the field of agricultural development.

II. Reviewing and Developing Different Agricultural Policies

Agricultural policies constitute the most important tools and mechanisms for improving the management of the agricultural sector for the general good of the society, without sacrificing farmers' interests. Generally, the mix of the proposed agricultural policies aims at meeting the aforementioned six strategic objectives based on the following criteria:

- Steering the agricultural sector to be in tandem with national objectives: improving growth rates, raising income levels, promoting exports and creating more job opportunities for reducing unemployment especially among the youth;
- Achieving the highest possible rates of self-sufficiency in strategic commodities, without sacrificing the principle of agricultural resources' efficiency, especially land and water;
- Improving agricultural sector growth rates, through achieving substantial progress in land reclamation and development, combined with application of improved agricultural technologies;
- Improving the performance of the wide base of small farmers, and encouraging them to interact with the requirements of local and foreign markets;
- Encouraging the private sector to participate actively in the agricultural development effort, through direct agricultural activities and/or other related and complementary activities; and
- Strengthening the efficiency of agricultural research institutions and technology dissemination.

As indicated, the list of proposed policies is grouped in six groups related by common objectives of the strategy. The elements and components of these policies are as follows:

A. Policies Related to Sustainable Use of Natural Agricultural Resources

1. Rationalization of water resources' use policy. This includes:

- Reviewing tax policies related to agricultural land, with a view to amending them so that tax assessment should be based on the area under cultivation, the cropping pattern and the applied irrigation method;
- Introducing new concessional credit lines to encourage farmers to improve field irrigation systems;
- Improving the performance of government institutions responsible for the assessment and collection of agricultural taxes; and
- Granting tax exemption to farmers adopting improved irrigation systems and the proposed cropping pattern.

2. Protection of agricultural land policy. This includes:

- Undertaking a comprehensive review of all applied laws and procedures to protect agricultural land based on stakeholders participatory approach;
- Consolidating entities with similar functions;
- Establishing integrated housing plans for the Egyptian villages, with a view to developing a rural housing environment meeting farmers needs;
- Providing village leaders with the opportunity to participate in formulating conditions and standards included in these plans, so that such plans would meet the requirements and expectations of the rural inhabitants, and facilitate implementation procedures;
- Periodical monitoring of law enforcement, including use of aerial photography; and
- Introducing machinery for linking the non-encroachment on agricultural land and benefitting from the ownership of newly-reclaimed areas.

3. Agricultural land maintenance policy. This includes:

- Periodically updating soil surveys and analyses;
- Classifying agricultural land in accordance with updated soil surveys;
- Determining fertilizer rates for the different crops, according to soil profile fertility level, at the different stages of crop growth;
- Preparing packages of extension information and recommendation for different agricultural regions; and
- Planning and executing soil improvement programs.

4. Developing captured fisheries and aquaculture policy. This includes:

- Reviewing Fisheries Law 142/1983 and introducing needed changes;
- Developing and restructuring the General Authority for Fisheries to enable it to carry out its responsibilities in monitoring law enforcement, developing and executing extension programs and projects;

- Supporting and developing the Aquatic Resources' Cooperative Association in order to assume an active role in the improvement of fisheries products, opening new marketing channels, and modernizing fishing vessels;
- Laying down an integrated system for the compilation and dissemination of information. Such a system should be an integral part of the agricultural technology information system;
- Establishing an effective coordination mechanism for the integrated management of captured fisheries; and
- Supporting the private sector role in the production to marketing chain to streamline efficiency and decrease losses.

5. Agricultural land expansion and settlement policy. This includes:

- Land reclamation maps should include all necessary elements for the development and settlement of new communities;
- Small farmers in the newly-reclaimed areas should form voluntary institutions, with the state providing needed support to enable such institutions to carry out their role;
- Preparing a framework for investment opportunities in agricultural projects and other related and complementary projects; and, if needed,
- Introducing new concessional credit lines for reclaiming and developing new areas.

B. Policies to Increase Land and Water Productivity

1. Scientific research and agricultural technology development policy. This includes:

- The ARDC to prepare and execute a national business plan for agricultural research. Such plan should identify required research programs and projects, necessary budgets and execution procedures;
- Reviewing the salary structures of researchers, ARDC and cooperating institutes and universities;
- Preparing cooperation protocols and agreements between the ARDC and the universities in executing the planned research projects. Such protocols and agreements should be periodically reviewed and evaluated; and
- Exploring possible sources of finance for supporting research budgets including competitive grant funding.

2. Agricultural extension system development policy. This includes:

- Restructuring the agricultural extension system and laying down a detailed business plan for its reform;
- Preparing and executing intensive programs for the training of extension workers in the different specializations needed;
- Reviewing working procedures with a view to their development and for exercising coordination within the extension system, as well as with research;
- Introducing a transparent mechanism for monitoring and evaluating extension activities, with the participation of concerned stakeholders;
- Integrating private sector participation in extension activities; and
- Incentives to extension workers should be based on their achievements.

3. Role of communication and information technology in agricultural development.

This includes:

- Allocating a special TV channel to agricultural communication and information, or expanding agricultural programs broadcasted over the present TV channels;
- Strengthening the agricultural communication and information entity in the Ministry of Agriculture and Land Reclamation, through providing adequate human and financial resources; and
- Paying special attention to village IT level with continued updating of networks.

4. Voluntary farmer associations' development policy. This includes:

- Enacting a law to regulate activities of the non-governmental organizations active in the agricultural sector, to ensure flexibility relevance of their activities to agricultural development efforts;
- Providing appropriate support to encourage cooperative organizations and promote the concept of integrated action; and
- Implementing intensive training programs on the modalities of establishing and managing collective organizations.

C. Policies to increase the Competitiveness of Agricultural Products in Local and Foreign Markets

1. Contract farming policy. This includes:

- Introducing a neutral entity for arbitration, as well as penalizing parties responsible for breaching marketing contracts;
- Establishing specialized economic courts for resolving disputes (this system has been recently introduced);
- Establishing a system to register agricultural marketing contracts; and
- Introducing credit lines for providing suitable and timely loans to farmers, using contractual farming contracts as collaterals.

2. Agricultural commodity marketing policy. This includes:

- Reopening the Alexandria Commodity Exchange and Cotton Spot Exchange, as a start, and establishing other commodities' exchanges for other crops, such as cereals at a later stage. A clearing house should also be established to streamline future markets role;
- Establishing an insurance fund for brokers and members, for guaranteeing their loans from the clearing house; and
- Establishing a system for settling the differences in financial positions at the closure of each trading session, at the rates decided by the prices committee.

3. Agricultural commodities electronic marketing and trade policy. This includes:

- Establishing national rules and regulations for regulating electronic trade;
- Applying a central registration system for dealers data and documents;
- Designing and updating marketing web sites on the World Wide Web;
- Encoding and protecting E-trade operations inside the marketing sites; and
- Supporting the e-marketing system, through updating cost and price changes, as well as exchange rates.

4. **Regional agricultural organizations policy.** This includes:
 - Establishing joint boards for agricultural cooperation with states with suitable investment opportunities in agriculture and food security projects. Such boards should be responsible for proposing cooperation and joint investments projects, as well as the coordination of common positions in the international fora; and
 - Establishing secretariat at the MALR to monitor implementation decisions of the joint boards, preparing studies, executing projects for sustaining joint cooperation, and supporting regional cooperation.
 5. **Inter-state cooperation with international organizations and agreements policy.** This includes:
 - Activating and supporting modalities for monitoring other countries implementation of agriculture- related aspects in the international agreements, in line with national interests;
 - Paying greater attention to the registration and documentation of all brands and trademarks and national products, with a view to protecting Intellectual Property Rights;
 - Upgrading national Sanitary and Phytosanitary Standards (SPS), as well as animal and fisheries health standards; and
 - Improving and upgrading staff skills in the field of monitoring international agriculture-related issues.
 6. **Agricultural information system development policy.** This includes:
 - Establishing a special unit for the administration of the agricultural information network;
 - Developing and implementing a program for supporting information infrastructure at the MALR;
 - Establishing data bases for supporting the strategic objectives and facilitating monitoring and evaluation activities; and
 - Designing and implementing an integrated program for upgrading human resources needs and skills to manage the information system.
- D. Policies to achieve Food Security of Primary Food Commodities**
1. **Food safety policy.** This includes:
 - Establishing an Egyptian food and feed safety code of practice;
 - Establishing Egyptian standards for maximum residues; and
 - Establishing Egyptian standards for food additives, preservatives, colors and flavor-enhancers; and
 2. **Rationalization of consumption support policy.** This includes:
 - Discontinuing in-kind food support and switching to a direct financial support system or financial support through food coupons;
 - Applying a practical system to identify beneficiaries in accordance with objective uncontestable standards; and
 - Developing and executing a media campaign to promote the proposed policy, and clarifying its relevance and impact on the poor and low-income groups.

3. Improving agricultural investment opportunities

- Reviewing agricultural investment laws and administrative procedures, particularly as related to land allocation and ownership for agriculture-related or complementary activities;
- Merging the entities responsible for servicing agricultural investors in one entity (i.e. one stop or one window approach); and
- Establishing a data base for appropriate agricultural investments, to be periodically updated.

E. Policies to Improve the Livelihood of Rural Inhabitants

1. Agricultural financial assistance policy. This includes:

- Enacting a law to regulate agricultural financial assistance procedures. Participation in such a system should be voluntary;
- The government should cover part of the installments due on small farmers. Such a procedure should be applied to small farmers who cultivate strategic crops, and comply with achieving the national purposes of agricultural development;
- Identifying a recognized arbitration entity for resolving contract agriculture disputes; and
- Requesting insurance companies to develop implementation procedures.

2. Strengthening the role of women in agricultural development. This includes:

- Introducing continued and focused media campaigns to highlight role of women in the rural development process;
- Merging all entities active in the field of rural women in one entity;
- Providing educational, institutional and financial support to this entity to be able it to play its role in the implementation of the proposed policy; and
- Introducing new concessional credit lines compatible with the economic conditions of rural women, and facilitating group lending procedures, through women's associations active in economic projects.

III. Development Programs and Projects

The set of the strategic national programs and sub-programs proposed in this document constitutes a general reference framework for the detailed major programs and sub-programs to be included in the successive execution plans during the time span of the SADS towards 2030. The general framework of the major programs and sub-programs to be implemented is as follows:

1. National program to rationalize and upgrade efficiency of water use in agriculture

This national program includes six sub-programs to achieve the following goals:

- Raising on-farm water use efficiency to 80%;
- Saving water quantities by modernizing the on-farm water use to reclaim about 3.1 m feddans;
- Increasing the efficiency of rainfed agriculture, and reducing rainfall water losses;
- Maximizing the utilization of ground water to supplement rainfed agriculture; and
- Establishing a modern and integrated national network for monitoring climate change affecting agriculture.

2. National program to maintain and upgrade the productive capacity of agricultural land

This national program includes five sub-programs, to achieve the following goals:

- Protecting the productive capacity of agricultural land resources against deterioration;
- Making use of the land classification information system in analyzing negative changes and identifying factors and problems requiring remedial actions;
- Positively addressing the main problems related to the dwindling productive capacity of agricultural land and providing implementable economically feasible solutions;
- Protecting agricultural land, rangeland and biodiversity against quantitative and qualitative deterioration;
- Maximizing the use of soil microorganisms and improved cultural practices in increasing soil fertility, and
- Developing and expanding the economic use of agricultural mechanization in the different regions and crops.

3. National program to develop field crops

This national program includes eleven sub-programs, to achieve the following goals:

- Increasing the areas planted to wheat to 4.2 m feddans, and increasing productivity to 3.7 tons/feddan, in order to raise the percentage of self-sufficiency to 81% by the year 2030;
- Reducing the areas planted to rice from approximately 1.6 m to around 1.35 m feddans, and increasing productivity to 5.2 tons/feddan;
- Expanding the areas planted to maize to reach 3.7 m feddans, and increasing productivity to 5 tons/feddan;
- Increasing the production and productivity of the cereal crops, particularly sorghum and barley (expanding planted areas from 773,000 feddans at preset to one million feddans);
- Increasing the productive capacity of sugar from 1.4 m tons to 3.5 m tons, through increasing sugar cane production to 65 tons/feddan, and expanding the areas planted to sugar beet and increasing production to 800,000 tons;
- Increasing the productivity of feed crops to reach 50 tons for perennial clover, 15 tons for the one-cut clover, and 50 tons for alfalfa;
- Expanding the areas planted to oil seed crops to reach 525,000 feddans, increasing productivity, introducing new oil seed crops and expanding their cultivation in the newly-reclaimed areas; and
- Reducing pesticide use to the minimum levels required for combating agricultural pests based on Integrated Pest Management practices.

4. National program to develop of horticultural crops

This national program includes five sub-programs, to achieve the following goals:

- Quantitative and qualitative development of vegetable crops to cover local consumption and realize increased quantities for export;
- Increasing production and productivity of the different fruit crops, particularly citrus, grapes, olive, pomegranate and mango, as well as improving their quality with a view to improve water use and selection of drought and saline tolerant varieties;

- Expanding the areas of growing olive trees to reach 300,000 feddans, and increasing productivity to 8 tons/feddans;
- Expanding the areas of growing medicinal and essential oil plants to reach 200,000 feddans;
- Expanding the areas of growing cut flowers and ornamental plants, as well as increasing productivity and improving quality; and
- Expanding green belts in the new reclaimed areas utilized drainage water.

5. National program to develop of animal production

This national program includes eight sub-programs, to achieve the following goals:

- Increasing average *per capita* consumption of locally-produced milk to 90 kg;
- Increasing red meat production from 670,000 tons to around one million tons;
- Increasing animal protein *per capita* by 4 g by the year 2030;
- Developing the rural sector poultry and encouraging poultry industry;
- Raising *per capita* consumption of locally produced fish to approximately 18.5 kg;
- Protecting livestock, poultry and fisheries against veterinary endemic and trans-boundary diseases; and
- Protecting consumers against common diseases transmitted from animals to humans (e.g. avian influenza).

6. National program for the socio-economic development of rural areas

This national program includes three sub-programs, to achieve the following goals:

- Improving the living conditions of rural women and enabling them to participate positively and actively in the different activities;
- Diversifying income-generating rural agricultural activities and other off-farm and complementary activities;
- Reviving rural industries and handicrafts and applying modern production and marketing systems, and
- Creating value added activities favoring small farmers, particularly the economic utilization of agricultural residues.

7. National program to develop and modernize marketing and agro-industries

This national program includes four sub-programs, to achieve the following goals:

- Reducing pre- and post-harvest losses;
- Improving the quality and competitiveness agricultural products to suit local and foreign markets needs;
- Enhancing vertical integration linkages between production and marketing, as well as keeping farmers informed of market conditions and variables;
- Increasing farmers' abilities to participate in the processing and exportation of their products;
- Providing a good information base and a level playing field environment for all interested parties;
- Promoting and supporting agricultural small- and medium-size processing industries; and
- Banning unsafe processing practices.

8. National program for agricultural research, extension and technology transfer

This national program includes six sub-programs, to achieve the following goals:

- Maximizing the sustainable levels of human resources and the productivity of both land and water;
- Protecting the qualitative and quantitative characteristics of agricultural natural resources;
- Applying modern technology to the development of disease- and pest-resistant crop varieties, and climatic and environmental adverse conditions tolerant varieties, as well as reducing the period needed to develop new varieties using modern approved biotechnology tools;
- Promoting the productive efficiency of livestock, poultry and fisheries;
- Positively responding to the probable adverse effects of the climate change on agricultural production;
- Keeping abreast of global scientific research developments in the field of nanotechnology;
- Evaluating generated technology packages based on their economic reform; and
- Developing agricultural extension modalities and approaches, through technology transfer.

9. National program for settlement and encouraging investments in agriculture and agriculture-related projects

This national program includes two sub-programs, to achieve the following goals:

- Establishing the physical foundations necessary for settlement areas and agricultural investment, including infrastructures and services; and
- Promoting complementarity between infrastructures, services and supporting facilities to ensure success of settlement projects in the newly developed areas; and
- Popularizing investment opportunities and advantages, providing data and information, and carrying out needed studies that would help investors and businessmen in decision-taking.

10. National program to increase the competitiveness of the Egyptian agricultural products in local and foreign markets

This national program includes three sub-programs, to achieve the following goals:

- Increasing competitiveness, through upgrading national Sanitary and Phytosanitary Standards (SPS);
- Mitigating the risks of negative effects related to changing global and international markets; and
- Promoting the presence of Egyptian agricultural products, with identified brands, and exporters in international events (marketing events and fairs, etc...) in order to increase exports.

11. National program for capacity building of agricultural human resources

This national program includes four sub-programs, to achieve the following goals:

- Upgrading the scientific and technical skills of research, extension and technology transfer staff;

- Upgrading the scientific and technical skills and expertise, as well as the scientific practices of staff working in the fields of agricultural policies' designing, analysis, monitoring and evaluation; and
- Strengthening linkages between agricultural education programs and graduates, and the requirements of the labor market.

12. National program to promote the role of communications and information technology in agricultural development

This national program includes three sub-programs, to achieve the following goals:

- Establishing and developing modern networks linking the different sectors as well as individuals at all levels;
- Modernizing and developing equipment and hardware needed for raising the efficiency of agricultural information and communications systems particularly at the village level, and
- Ensuring the overflow of information and making information available to all the parties concerned with agricultural development.

Capitalizing on agro-ecological advantage

Previous agricultural development strategies did not pay specific attention to the endowment of Egypt's agro-climatic regions. Such strategies adopted a generic approach primarily linked to the Central National Plan. This strategy adopts a bottom-up approach based on participatory methods (through surveys and meetings) at local levels. This approach stems from the concern to improve national resources use particularly water for irrigation (on-farm use) and increase in reclaimed land. To address this situation, it would be necessary to know the attributes of the different regions, as well as the problems and constraints facing future development opportunities in the five geographical regions of Egypt:

1. Future agricultural development opportunities in Upper Egypt

- Expanding the application of modern technologies in the production of sugar cane;
- Expanding the cultivation of high-value leguminous tree species suitable for the region's climate;
- Promoting the production of dry and semi-dry date varieties, introducing the cultivation of sugar beet, as well as establishing sugar factories in Al'Wadi El'Jadeed (the New Valley) and Asyut governorates;
- Paying greater attention to the establishment of infrastructure needed to link areas under horizontal expansion and other communities;
- Encouraging farmers to establish voluntary associations for collective action, and providing technical support to such associations;
- Promoting organic agriculture to meet export requirements, as well as producing early maturing vegetable and fruit varieties, as in the case of green beans, grapes and pomegranate; and
- Expanding the areas planted to olive trees, and increasing olive production, especially in the New Valley.

2. Future agricultural development opportunities in Middle Egypt

- Increasing the productivity of long-medium staple cotton varieties;
- Promoting contract farming of vegetables, oil seed crops and aromatic pastes, for processing purposes;
- Increasing the productivity of the main crops, especially wheat and maize;
- Establishing infrastructure and institutional frameworks to enable the region to specialize in the production of medicinal and aromatic plants, as well as protected agriculture;
- Promoting small agricultural projects and income-generating projects for the poorer families; and
- Promoting livestock production.

3. Future agricultural development opportunities in Eastern Delta

- Assigning high priority to agricultural development in Eastern Delta area and Sinai;
- Establishing infrastructure and institutional frameworks to enable the region to specialize in production for export including protected agriculture and the cultivation of organic products;

- Promoting the production of the main crops (wheat, rice, groundnut and clover), as well as expanding the cultivation of sugar, and fodder beet, especially in Al-Husainiya and the El-Tina plains;
- Developing the production of horticultural crops such as (mango, peach, olive and citrus); and
- Promoting captured fisheries, as well as sea aquaculture off the shores of Sinai.

4. Future agricultural development opportunities in Western Delta

- Promoting the cultivation of horticultural crops, for processing and export purposes, and establishing an institutional framework for contractual cultivation;
- Developing a program to conserve the excellent animal breeding stocks of the region, and encouraging small farmers to develop such stocks;
- Establishing the necessary infrastructure for expanding the cultivation of olive trees;
- Developing and executing a national program for demining the North Coast region;
- Promoting inland as well as off-shore aquaculture;
- Increasing the productivity of the main crops cultivated in this region (wheat, cotton, clover, rice and potatoes), to reach maximum levels;
- Developing suitable policies to establish agro-industrial communities in the region;
- Developing rainfed agriculture based on sustainable supplementary irrigation systems for water use;
- Establishing milk-collection centers for small farmers, and
- Developing a program for range development in the North Coast areas.

5. Future agricultural development opportunities in Middle Delta

- Increasing the productivity of the main crops (wheat, clover, maize, cotton and citrus);
- Making available suitable technologies for the development of aquaculture and developing a marketing system for aquaculture products,
- Establishing the infrastructure and the institutional frameworks necessary to promote specialization in producing milk, poultry and fisheries products;
- Establishing mechanical poultry slaughterhouses, and providing linkages between them and poultry farms;
- Establishing milk collection centers, as well as an institutional framework for their administration for the benefit of small farmers;
- Improving nurseries for producing fruit trees and ornamental plants;
- Expanding artificial insemination and veterinary services;
- Paying greater attention to crop intensification and the introduction of the cultivation of the multi-foliolate clover (Fahl cultivar) in rotation with rice;
- Promoting rural women development projects, as well as income-generating projects, and
- Developing and promoting rural and environmentally sound industries.

Monitoring and Evaluation Systems

To implement the proposed strategy, priorities have to be established with identified phasing schedules in the short, medium and long term. Laws and policies have to be reviewed and revised in line with strategy objectives. Impacts at the regional and national levels should be prepared to measure inputs, outputs and outcomes. The following three salient aspects deserve closer attention;

- There is an institutional linkage and overlapping between implementation mechanisms;
- There is a great need to prioritize proposed implementation schedules; and
- There is a need to measure implementation progress compared to 2009 baseline surveys.

In conformity with the afore-mentioned implementation mechanisms, the proposed monitoring and evaluation framework should:

- Provide an institutional mechanism capable of coordinating the performance of all institutions active in the agricultural sector, whether they are part of the MALR, other ministries and public and private sector entities; and
- Include stakeholders' representatives from the private sector and the civil society, in addition to representatives from government entities and institutions active in agriculture.

To administer M&E systems, it is proposed that the steering committees which prepared the strategy would continue to flesh out the proposed strategy and develop implementation mechanisms based on:

- Commissioning the Agricultural Research and Development Center to undertake periodical monitoring and evaluation of the agricultural development strategy, in collaboration with all concerned ministries, as well as other concerned governmental and non-governmental entities;
- The Agricultural Research and Development Center should establish a technical committee or committees to prepare detailed studies on the proposed implementation mechanisms, in collaboration with concerned ministries and institutions, and include the results of the work done by these committees in the execution plans to be prepared for this purpose.
- Establishing three technical units, under consultative boards with members of distinguished merits in their field of specialization:
 - Monitoring and Evaluation Unit: to be responsible for the follow-up of execution activities and projects;
 - Agricultural Policies Unit: to be responsible for the analysis and development of agricultural policies, in collaboration with the concerned ministries and other related institutions; and
 - Risk Management and Mitigation: to be responsible for monitoring changes in the international and regional arenas and taking necessary actions for addressing the probable dangers.

Part I

AGRICULTURAL SECTOR PERFORMANCE ANALYSIS

1.1 EVOLUTION OF AGRICULTURAL DEVELOPMENT AND GROWTH RATES

Agriculture in Egypt has witnessed significant developments over the last two decades with direct effects on the role of the agricultural sector in national income formation and promoting exports. Such developments have also affected farmers' delivery as related to the cropping structure, applied technology, levels of income, and farmers' response to market changes. Following is a review of the significant changes affecting Egyptian agriculture during this period:

1.1.1 Agricultural sector growth rates

Agricultural sector growth rates have widely differed from one period to another due to the effect of general economic conditions, and development and investment efforts. The 1981/1982 – 1986/1987 period witnessed higher growth rate, estimated at an annual rate of 3% during this period, while the 1987/1988 – 1991/1992 period was at the low side, at an annual rate of 2%. During the last three year, growth rates improved, reaching 3.3% in 2006/2007. It is clear that the many structural changes experienced by the agricultural sector during the 1990s have positively affected growth rates during the first decade of the twenty first century. At the beginning of the sixth development plan, 2007/2008 – 2011/2012, the projected rate of growth was estimated at 3.6%. Some of the most important reasons having direct and significant effect on the aforementioned development rates may be summarized as follows:

- **Developments in the field of agricultural investments:** Figures show a clear linkage between government expenditure and achieved development rates, thus indicating that public investment expenditure for the development of the infrastructure of this sector constitutes the starting point to achieve significant developmental advances. This fact is confirmed by the statistics related to the noticeable decline of land reclamation rates under limited public investments during 2002/2003 – 2006/2007. Such investments declined, at the current prices, from EGP18b in 1997/1998 – 2001/2002, to approximately EGP15.2b during the flowing five years (2002/2003 – 2006/2007):
- **Increased capacity to absorb and develop new technologies:** This period has witnessed significant improvement in establishing infrastructure for technological research and development, through supporting the Agricultural Research and Development Center, as well as other agricultural scientific research institutions, developing their human resources and widening the scope of their activities. The state has been able to attract foreign sources of finance in the form of specialized development projects in some cases, and general development projects in others. Examples of the several projects aiming at human resources' and agricultural technology development: projects for the development of plant and animal production through Egypt-California Project, Egyptian Major Cereals Improvement Project (EMCIP), the National Agricultural Research Project (NARP), Agricultural Technology Utilization and Transfer (ATUT), Agricultural Policy Reform Program (APRP), as well as financed by the World Bank, particularly the Agricultural Drainage Development Projects. These and other projects have achieved unprecedented increase in agricultural productivity of several crops, most importantly wheat, rice, maize, and several horticultural crops such as grape, green peas, etc., in addition to the accelerated development of aquaculture during this period;
- **Agricultural sector liberalization:** The 1990s witnessed a dramatic change of the state responsibilities and roles in agricultural sector development. Agricultural production activities have been restructured through enacting a law regulating the relationship between land owners and tenants. The mandatory agricultural rotation has been cancelled and farmers' marketing decisions have been liberalized. Agricultural support prices have been gradually reduced in return. In addition other significant

developments leading to noticeable shifts in the cropping pattern to grow crops with high financial return, and consequently several previously-unknown crops and crop varieties have been introduced;

- **Land Tenure Reform:** Among the main features of the Agricultural Reform law were determining the rental value of land at seven times the tax assessment, the inheritance of rental contracts, and the complete cancellation of market mechanisms in determining agricultural land rental value and prices. In addition, the government had frozen the tax assessment on agricultural land and consequently its rental value for more than 40 years. These issues have caused several distortions and imbalance in the socio-economic relations in rural areas, some of which can be listed as follows:
 - Lack of confidence and cooperation between land owners and tenants, with resulting limited attention to land maintenance and increased land deterioration;
 - A severe imbalance in land markets. Rented land prices dwindled to half the price of unrented land;
 - In collaboration with tenants, many land owners tended to leave their lands as waste land and offer them for housing use, thus large areas of the best agricultural land have been switched to other non-agricultural uses; and
 - Dwindling investment flow, and consequently dwindling capital formation in the agricultural sector, a fact that has severely affected the potential of developing agriculture-related and complimentary projects.

The aforementioned led to the review of the land owner-tenant relationship law, and enacting a new law with the purpose of activating market forces in determining land rental and market values that constitute the main elements of production, thus improving the efficiency of land distribution among the various agricultural activities. The state has exerted tremendous efforts in applying the new law without endangering the social dimensions of the rural areas. This was achieved through:

- Gradual change of rental rates in order to reflect the real market value of land;
- Allowing a relatively long transition period for the adjustment of owner-tenant relationship;
- Compensating affected land tenants by trading with land in reclaimed areas at concessional terms, while providing these areas with the infrastructure needed for settling; and
- Widening the scope of agricultural mechanization. The last few years have witnessed a noticeable development in mechanizing several agricultural operations, particularly land preparation and leveling, irrigation, and harvesting/threshing most of the agricultural crops. This has led to liberating animals from farm work, which improved animal productivity, and increased the efficiency of performing agricultural operations, and reducing the time and effort of performing these operations. Consequently, crop productivity and the agricultural intensification rate increased. This period has also witnessed the introduction of mechanizing of several other agricultural activities such as meat and egg poultry production and aquaculture.

1.1.2 Increasing competitiveness of agricultural products in international markets

For a long period of time, Egyptian exports were primarily confined to cotton, rice, onion and citrus. Since mid-1970s, exports have witnessed a dramatic change: exports diversified, export market expanded, and export returns increased. Total annual export earnings amounted to approximately USD1230m during the last three years (2005 – 2007), with the aforementioned four crops constituting some 50% of total export earnings, while other crops such as vegetables,

fruit and medicinal and aromatic plants constituting 50%. On the other hand, export markets have not been confined to Arab and European markets but have expanded to include other international markets (e.g. African and south eastern Asian markets).

1.1.3 Increased role of Agro-industries:

Agro-industries growth rates are still below expectations; however, the last two decades have witnessed a significant increase. Many agro-industrial units adopting the latest techniques have been established, meeting world quality standards and capable of accessing several foreign markets. Examples: juices, jams, frozen and dried vegetables. It is noteworthy that processing industry has not been only limited to the direct processing of agricultural products but has also expanded to include several inputs such as packaging material, fertilizers, pesticides, and irrigation supplies. These achievements have led to a significant increase of processed agricultural products.

1.1.4 Improving Rural Livelihood

Agricultural activities' income levels have remarkably increased during the last two decades. Net returns per feddan, at the constant prices have increased from an average of EGP684 during 1980 – 1985 to about EGP1046 in 2007, at an annual rate of increase of about 1.7%. However, a decisive factor that has detracted from achieving higher rates of income is the sharp decline of agricultural holdings during this period. Fragmented holdings of less than one feddan increased to 43.5% of total agricultural holdings, against a far less percentage in the first five years of the 1980s.

1.2 DEVELOPMENT OF AGRICULTURAL RESOURCES

1.2.1 Land and water resources

The last two decades have witnessed important achievements in developing natural agricultural resources, particularly land and water. Following is a brief summary of these developments:

1. Water resources are limited. Egypt's share of Nile waters remained fixed at 55.5b cubic meters per annum. Therefore, agricultural drainage water has to be reused to supplement available fresh water resources, in order to meet increased demand on irrigation water. This has been done through mixing agricultural drainage water with irrigation water in some main irrigation canals, thus increasing water available for irrigation during this period supplemental irrigation using ground water resources have increased without adequate planning based on sound hydrology studies;
2. The adoption of several water treatment projects, increased water supply by about 1.2b cubic meters in 2007. For this purpose, substantial quantities of agricultural drainage water have been treated and reused;
3. State authorities have applied several procedures and executed several projects for reducing Nile water contamination rates in order to improve the quality of available water for agriculture. Contamination rates have reached unacceptable levels in some agricultural areas and have had negative effects on the ability of these areas to produce safe food acceptable to local inhabitants and suitable to export. In spite of these projects, water contamination levels are still high in some areas, particularly at the tail ends of canals, thus needing further efforts to improve water quality in these areas;
4. New land distribution policies applied by the government as of 1980 have led to expanding agricultural areas through the use of ground water in these areas, such as the areas bordering the Cairo-Alexandria desert road, east Owainat area and several

other newly developed areas. Although this policy has helped increase the green areas, the risk of the non-sustainability of ground water in some of these areas might threaten the large investments spent in the development. Hence, concerned authorities are examining ways and means to supply these areas with needed water resources. It is worth mentioning here that total agricultural areas irrigated with ground water have increased at a fast rate reaching 542,000 feddans in 2005 (Sample Agricultural Census 2004/2005);

5. Government policies have succeeded in reclaiming wide areas during 1980 – 2007. Public sector land reclamation companies; desert land reclamation authority and development cooperatives have implemented land reclamation projects which resulted in significant increase in agricultural areas. Present total agricultural land is estimated at 8.4m feddans, equal to about 143% of its area in 1980. Total reclaimed areas amount to more than 2m feddans, in addition to compensating the areas that have been diverted to non-agricultural uses, such as housing and industrial uses, estimated at some 20,000 feddans annually;
6. In spite of agricultural land expansion, land productivity has declined as no agricultural rotation was applied before liberalizing agriculture from government controlled central economy and non-compatibility of fertilization regimes applied for the different crops. Results of land classification based on productivity have shown that areas of the first grade lands have declined from about 3m feddans on average in 1996 – 2000 to some 978m feddans only in 2001 – 2005, i.e. to less than one third.² The percentage of the second grade lands has increased from 33.6% to 41.8% during the same period. Areas of the third grade lands have also increased from some 1.25m feddans to some 2.12m feddans, while the areas of the fourth grade lands increased from some 205,000 feddans to some 816,000 feddans. This phenomenon underlines the importance of reviewing government policies in the field of land maintenance and putting land improvement programs and projects as a top priority;
7. The Ministry of Water Resources and Irrigation (MWRI) have exerted great efforts development of irrigation infrastructure and facilities in the newly reclaimed areas, such as the agricultural projects such in the Nubaria and Bustan areas, Toshka, and the east Owainat project. New agricultural areas in Sinai have also been supplied with Nile water. MWRI is also endeavoring to improve water conveyance and distribution efficiency through lining the main irrigation canals;
8. The last two decades have witnessed increased fragmentation and scattering of agricultural holdings. Published statistics show that the percentage of holdings of less than 3 feddans has increased from about 2.29m feddans in 1980 to about 3m feddans in 2000, according to the latest agricultural census. The burden of this phenomena and its negative effect on agriculture and the possibilities of agricultural development and modernization in future, would be further aggravated by fragmentation and scattering of agricultural holdings; and
- 9 - The government has executed several agricultural drainage projects which helped maintain large areas of the cultivated land, and limit their deterioration.

² Agricultural Research and Development Center, Agricultural Economics Institute, the Periodic Classification of Agricultural Land in terms of Productivity in 1996 – 2000, and the Periodic Classification of Agricultural Land in terms of Productivity in 2000 – 2005.

1.2.2 Fisheries

Egypt enjoys vast water bodies totaling some 14m feddans, with different salinity levels, including fresh, brackish and saline water where numerous and different fish varieties thriving in the different environments. Captured fisheries exist in all sea water bodies (the Mediterranean Sea, the Red Sea, the Gulf of Suez and the Gulf of Aqaba) and in internal water bodies, including the northern lakes, inland lakes and the river Nile and its branches.

The productivity of the Mediterranean is biologically poor, and thus it is poor in fish stocks. Due to the non-utilization of fisheries resources in the Exclusive Economic Zone, the fishing effort has been confined to limits of the continental shelf, resulting in the decline of fish stocks.

Illegal and unregulated fishing of fingerlings (for meeting the needs of aquaculture) instead of relying on the production of nurseries is one of the factors that negatively affect fishing in the Mediterranean. Loss rates of fingerlings amount to more than 90% during fishing and handling, consequently aquaculture benefits from about 10% of the fingerlings caught.

As for the Red Sea, its eastern coast (bordering Saudi Arabia and Yemen) is much more fertile than the western coast (bordering Egypt and the Sudan). Over-fishing is a problem affecting stocks availability. In addition, Red Sea fisheries suffer from several problems, most important of which is the relaxed application of fishing laws in addressing illegal fishing methods and gear, in addition to unregulated, recreational and tourist fishing. The situation is further aggravated through the use of vast areas for touristic activities, unregulated sewage treatment and the lack of strict controls over the drainage of the tourist villages and over the contamination resulting from oil wells and commercial vessels.

The northern lakes (Bardawil, Manzala, Brulles, Edko and Maruit lakes), are depressions of between 1.5 – 3m below sea level. Large parts of these lakes have been drained of their water and used for cultivation, housing and industrial purposes. The area of Lake Manzala has been reduced from 750,000 feddan in 1850 to about 100,000 feddans at present. In addition to continued encroachment on these lakes, they are used for the disposal of agricultural and industrial drainage water carrying harmful pesticide residues and other contaminants. Lake Bardawil is the only lake that has not been contaminated. On the other hand, the spread of aquatic plants, particularly reed, has reduced the water surface area of these lakes to about 40% of their total area.

In spite of all these problems facing captured fisheries, the aforementioned areas still produce 350 – 450 thousand tons of fish per annum. Sea fisheries contribute about 30% of the fish catch, while northern lakes and inland lakes contribute 35%, and the river Nile and its branches and lake Nasser contribute about 25% of the total catch.

1.2.3 Human resources

Human resources constitute the most important agricultural resource in Egypt. With their wide experiences gained over thousands of years of settled agriculture, in addition to dynamism and vitality of rural inhabitants and evolving new knowledge and techniques acquired over the years, human resources have been able to achieve great strides in agricultural development. Egypt now occupies an advanced position in the production of several crops such as sugar cane and wheat. It might be useful to highlight some of the traits of human resources working in agriculture in the following points:

- Rural population increased from about 22.7m in 1980 to about 41.9m people in 2007 (85%). Agriculture and agricultural-related and complementary activities constitute the main source of income for the great majority of rural inhabitants;
- Parallel with this great increase in rural inhabitants during the last two decades, the working force in agriculture increased from 4.15m in 1980 to around 6.89m persons in

2007. This means that agricultural development programs have been able to create about 2.74m job opportunities over the last 27 years, at a rate of 100,000 jobs per annum. This has been possible due to the expansion of agricultural areas, and the development of many agricultural-related activities and reclamation projects;

- The last two decades have witnessed a significant development in the structure of agricultural human resources, due to knowledge diversification, increased confidence and the application of scientific knowledge in addressing agricultural development issues. This has helped increase the numbers of qualified personnel and the diversification of their knowledge and specializations. Some statistics are helpful in evaluating agricultural human resources and are as follows:
 - The numbers of qualified personnel (graduates of the Faculties of Agriculture and Veterinary Science) has greatly increased during this period. However, agriculture and veterinary educational institutions of all levels are unable to prepare graduates and provide them with adequate levels of pertinent, practical knowledge and applied skills necessary for the job market needs. This is primarily due to the lack of educational resources and the limited budget;
 - The period has witnessed a steady increase of the number of graduates who acquired specialized higher degrees (M.Sc. and Ph.D. degrees). Consequently, the cumulative number of Ph.D. and M.Sc. degrees holders reached 10,257 and 2,150 persons, respectively, in 2007;
 - As to secondary agricultural education, there are 185 schools distributed in all governates, with about 302,000 students in different specializations: animal production, land reclamation, mechanization and agro-industries. Under the Mubarak-Kohl program, five schools for technical agricultural education have been established. These schools represent a replicable advanced vocational educational system;
 - The MALR has adopted intensive programs for the development of human resources in the different technical fields. Thousands of persons have been trained in the different agriculture-related fields, such as protected agriculture, improved irrigation systems, organic agriculture, biological pest control, agricultural mechanization and other technical fields which helped in achieving high crop yields, increase exports of agricultural products and their access to international markets. In spite of this qualitative improvement, human resources working in agriculture still need intensive training programs for acquiring skills in the relatively new fields and activities; and
 - Available information indicates that the pyramidal structure of human resources working in the field of agricultural research, extension and education lacks coordination. The percentage of older staff at the top of the pyramid is high, while the base of the pyramid is shrinking, a fact that means that the coming period would witness a sharp reduction in research and specialized scientific staff, negatively affecting the performance of universities and agricultural research institutions, unless necessary measures are taken to address this situation. Introducing new information technology application in all levels starting at the village is a must if agricultural development efforts are to materialize.

1.3 STATUS AND GROWTH TRENDS IN PRODUCTION AND PRODUCTIVITY

1.3.1 Plant Production

1.3.1.1 Trends of change in the cropping pattern

Agricultural development efforts during the 1980s, the 1990s and the first years of the twenty first century had achieved great successes in plant production with all its components, due to expanding agricultural areas and improving land productivity. Agricultural areas have increased from around 5.87m feddans in 1980 to around 8.44m feddans in 2007, an increase of 44% during this period. The cropping area has also increased from 11.1m feddans in 1980 to 15.4m feddans in 2007. This period has also witnessed significant changes in the cropping pattern, as indicated in Table 1.1. In spite of increase in areas planted to field crops from around 9.75m feddans in 1980 to around 12m feddans in 2007, the percentage of areas planted to field crops diminished from around 87.6% to 78.3% of the cropped areas, while the areas planted to fruit trees have steadily increased from 3.1% in 1980 to around 8.5% of the cropped area in 2007. It is also noteworthy that the area planted to wheat has greatly increased during this period, from 11.9% in 1980 to 17.7% of the cropped area in 2007. As to rice, planted areas increased from around one million feddans in 1980, representing 8.7% of the cropped area, to 1.7m feddans in 2007, representing around 11% of the cropped area. Most recommendations to save irrigation water include reducing rice areas. However, this would not be attainable unless yields are increased and growing period and crop water requirements are decreased.

Areas planted to maize have not changed significantly. However, there has been a shift in planting dates, with increased areas planted in the summer season at the expense of those planted in the Nile flood season. Areas planted to cotton have drastically decreased from 11.2% in mid-1990s, to 3.8% of the cropped area in 2007. The sugar beet crop was introduced in the cropping pattern in mid-1980s. Areas planted to sugar beet increased sharply by the end of the twentieth century and the beginning of the twenty first century. Planted areas amounted to around 250,000 feddans in 2007, representing about 1.6% of the cropped area, and are expected to increase with the expansion in establishing sugar factories.

Table 1.1 - The cropped areas and cropping pattern of main crops

Crop	1980		1990		2007	
	1,000 feddans	%	1,000 feddans	%	1,000 feddans	%
Wheat	1326	11.9	1955	16.1	2716	17.7
Maize	1906	17.1	1975	16.2	1848	12.1
Rice	970	8.7	1036	8.5	1673	10.9
Cotton	1245	11.2	993	8.5	575	3.8
Sugar beet	-	-	34	0.3	248	1.6
Total field crops	9745	87.6	1091	83.7	12022	78.3
Total vegetable crops	1035	9.3	1123	9.2	2014	13.1
Total fruit crops	350	3.1	866	7.1	1310	8.5
Total cropped area	11130		12181		15346	

Source: Compiled and computed from summer and winter crops' statistics bulletins, Economic Affairs Department, MALR.

1.3.1.2 Land productivity of the main crops

For a long time, agriculture in Egypt has relied on breeding new varieties in increasing the

Box 1
Examples of disparity of productivity increase

In spite of the substantial increases achieved in the productivity of many crops, some crops have not achieved increases proportionate to their importance as related to the cultivated areas, and their importance in agricultural exports, such as clover, cotton and oil seed crops. Although occupying some 2m feddans, representing about 25% of the total agricultural land, clover has not enjoyed enough attention. In 2007, clover productivity amounted to 30 ton/ feddan, compared to 25 ton/ feddan in 1980, i.e. an increase of only 17% over twenty seven years. As to cotton, which is the primary export crop, productivity has been almost stagnant at 1.1 ton/ feddan during this period, a situation which has led to: Egypt losing its competitiveness in the world market, farmers reducing the areas planted to cotton, and Egypt importing cotton to meet the needs of local spinners. On the other hand, leguminous crops and oil seed crops have not enjoyed enough attention, and their productivity remained below their potential.

productivity of the main crops, particularly cereal, sugar, fiber, vegetable and fruit crops, through the development of new high-yielding and disease- and pest-resistant varieties. Cereal crops have witnessed the highest increase in land productivity. Wheat yields have doubled from around 1.36 tons/ feddan in 1980 to 2.72 tons/ feddan in 2007. Rice productivity rose by around 67% during the same period, from 2.46 tons/ feddan in 1980 to 4.11 tons/feddan in 2007. New early-maturing rice varieties with short growth duration of 120 days have

been developed, thus reducing water consumptive use by 25%. Trihybrid and monohybrid rice varieties have also been developed, leading to increasing productivity by around 90% during 1980 - 2007.

Productivity of sugar crops has also been increased by around 44% for sugar cane, 80% for sugar beet. Sugar cane productivity reached the highest level internationally, with 50.8 tons/ feddan, while sugar beet productivity reached 22 tons/ feddan in 2007.

As to vegetable crops, the introduction of new varieties, expansion of protected agriculture, modernizing irrigation systems and improved fertilizer recommendations have led to significant increases in the productivity of many vegetable crops. Tomato yields rose from 7.4 ton/feddan in 1980 to 16 ton/feddan in 2007, an increase of 116%; Strawberry productivity increased from 1.5 ton/feddan to around 11.6 ton/feddan, an increase of 673%. Potato yields increased by 50% during 1980 – 2007, from 7.3 ton/ feddan to 10.7 ton/ feddan and cantaloupe productivity increased by 75% during the same period.

The development of fruit crops has been remarkable. Productivity increased to unprecedented levels, quality traits of several varieties has improved, such as grape where seedless high-yielding varieties have been introduced gradually replacing seeded varieties. The new varieties include early- and late-maturing lines, resulting in prolonging the supply period. As a result of these efforts, grape productivity increased from 5.2 tons/ feddan in 1980 to 9.9 tons/ feddan in 2007. The banana crop has also achieved quantitative and qualitative improvements due to the introduction of drip irrigation and new varieties that helped double productivity during 1980 – 2007. As for olives, productivity achieved record gains reaching 475% during the same period. Although productivity increases of apple, pear, plume and peach varied, they have all achieved increases of over 100% during 1980 – 2007. It is noteworthy that the present productivity is below the productive potential of existing varieties, and that there are great possibilities for its increase, at rates between 25 – 50%, through improving agricultural practices and farm management. Table 1.2 below shows productivity increases and potentials of the main crops.

Table 1.2 - Productivity increases and potentials of the main crops

Crops	Productivity (ton/feddan)		Productivity potential (ton/feddan)	Present productivity compared to potential (%)
	1980	2007		
Wheat	1.5	2.7	3.6	75
Rice	2.5	4.1	5.2	79
Maize	1.8	3.5	4.2	83
Cotton	1.1	1.4	1.8	78
Sugar beet	12.3	22.0	40.0	55
Sugar cane	34.0	50.0	65.0	77
Groundnut	0.9	1.4	2.0	70
Perennial clover	25.0	30.0	60.0	50
Beans	0.9	1.4	1.8	79
Tomato	7.4	16.0	30.0	53
Potatoes	7.3	10.7	14.0	76
Grape	5.2	9.7	16.0	61
Citrus	5.4	10.1	18.0	56
Banana	8.9	18.0	24.0	75
Olive	–	4.6	8.0	58

Source: Statistical annexes tables.

1.3.2 Animal, poultry and fish production

1.3.2.1 Animal production

Animal production in Egypt is highly dependent on cattle and buffaloes as milk-producing

Box 2
Relationship between land holdings and livestock numbers
<p>Small farmers who do not own agricultural land or control agricultural holdings are the main source of animal production. The main characteristics of the animal production sector are:</p> <ul style="list-style-type: none"> • 17.3% of the cattle population and 6% of the buffalo population are owned by people who do not own agricultural land; • 89% of the cattle population and about 75% of the buffalo population are in agricultural holdings of less than 5 feddans; • 93% of the cattle population and about 86% of the buffalo population are in herds of less than ten animals; • 25% of the sheep and goat populations are owned by people who do not own agricultural land; • 83% of the sheep population and about 87% of the goat population are in agricultural holdings of less than 5 feddans; • 51% of the sheep population and about 55% of the goat population are in herds of less than ten animals.

animals, in addition male animals and un-reproductive females are fattened for meat. Sheep and goats are also used for meat production. The value of produced red meat and milk rose from EGP957m in 1980, representing around 22.5% of the agricultural gross domestic product, to around EGP33.6b in 2007, representing about 24.4% of the agricultural gross domestic product. By adding the value of poultry and fish production, the contribution of the agricultural sector rose to 42.9% of the agricultural gross domestic product in 2007. (Table 1.3). This clearly shows the importance of the animal sector in Egyptian agriculture, contributing to food security,

agricultural income-generation, agro-industries, and animal products' and animal production trade.

Available statistics show a significant increase in the numbers of livestock of different kinds. In 2007, cattle population totaled 4.6m heads, representing 241% of their number in 1980, while buffalo population reached 3.9m heads, representing 167% of their number in 2007. As to small ruminants, sheep population numbered 5.4m heads in 2007, representing 338% of their number in 1980, while the goat population numbered 3.9m heads, representing 267% of their number in 1980.

Around 26.2% of the cattle population is concentrated in the Middle Egypt region, compared to 24% in Middle Delta, while 32.2% of the buffalo population is in Middle Delta region, against 22.4% in the Middle Egypt region. In contrast, 31% of the sheep population is concentrated in Upper Egypt, compared with 22.38% in Western Delta region. The Upper Egypt region has 36% of the goat population, and 23.5% in Middle Egypt.

Indigenous cattle represent around 60% of the total cattle population, compared to 37% for mixed-breed cattle and around 3% for imported cattle. It is worth mentioning that 65% of the cattle population in the Western Delta region is mixed-breed. This percentage goes down to about 18.5% in Middle Egypt.

Meat and milk productivity of both cattle and buffalo experienced significant increases during 1980 - 2007. Average cow milk production increased from around 675kg/head/season in 1980 to around 1.3 ton/head/season in 2007, due to increased number of indigenous cows mixed with foreign cows. As to buffaloes, milk production increased from around 1.15 ton/head/season in 1980 to about 1.4 ton/head/season in 2007, as a result of increased mechanization of farm operations.

Regarding meat production, average weigh of the cow carcass increased from around 132kg/head in 1980 to around 200kg in 2007, due to establishing fattening farms, as well as improving animal feeding practices. The average weight of the buffalo carcass increased from around 129kg/head in 1980 to around 176kg in 2007, as a result of expanding the first and second stages of the young male animals fattening project (for producing veal). However, with termination of the project, average weight of the carcass decreased to 131kg/head in 2007.

Table 1.3 – Evolution of the value of animal products, 1980 – 2007 (EGP 1m)

Products	1980		1990		2007	
	value	%	Value	%	Value	%
Red meat	549	40.6	2674	33.8	20129	34.1
Milk	408	30.2	216	27.4	13423	22.8
Poultry meat	166	12.3	961	12.1	7182	12.2
Eggs	95	7.0	932	11.8	278	4.7
Fish	122	9.0	1104	14.0	930	15.8
Other products*	10	0.7	77	1.0	6170	10.5
Total Agricultural products	4249	–	23738	–	137419	–
Total animal products	1351	31.5	7913	33.3	58994	42.9

Source: Compiled and computed from income and agricultural production value estimates bulletins, Economic Affairs Department, MALR.

* Rabbit, duck, ostrich meats, etc.

1.3.2.2 Poultry production

Poultry is the second main source of animal protein. It includes two main sectors: the conventional sector, known as the rural poultry sector, and the commercial sector. The origin of the commercial sector goes back to 1964, when the government established the General Authority for Poultry Production, which has been totally privatized. The rural sector contributes about 27% of poultry meat production and about 29% of egg production.

The rural sector is the main source of ducks, geese, pigeons, turkeys and rabbits, as well as the indigenous breed of chickens, all of which enjoy marketing and price advantages among a wide section of the consumers. Studies indicate that between 30 – 40% of the production of the rural sector sold commercially while about 60 – 70% is for household consumption. Therefore, this sector contributes to rural people food security, in addition to being an additional source of income for rural households.

Available data indicate that the production of broilers increased from about 141m birds in 1990 to around 362m birds in 2007, an increase of 256%, while egg production during the same period increased from 141,000 tons to 244,000 tons, an increase of 173%, during this period.

There are around 17.5 thousand broilers farms, comprising about 29,000 batteries. Utilized capacity of these units is around 72%, which means that around one quarter of the productive capacity is idle. This is due to the fact that a great number of broilers fattening farms have been established at a time when the poultry industry used to enjoy substantial support. Diminishing support led to the closure of batteries that could not meet economic efficiency conditions. Around 50% of broiler production is concentrated in the Middle Delta region. It is noteworthy that farms with an annual productive capacity of less than 20,000 birds contribute 3% only of total broiler production, indicating that production is concentrated in large farms.

Farms specialized in producing eggs are around 1460 farms, comprising around 3393 batteries, including 978 unused batteries, representing 29% of total productive capacity. Governorates located in the Middle Delta region contribute around 38% of eggs, compared with 25% for the Eastern Delta region, around 17% for the Western Delta and Middle Egypt regions, and around 3% for Upper Egypt. Egg production is concentrated in battery farms contributing around 96% of total egg production, while small family rearing farms contribute around 4% of total production. Therefore, it is clear that the bulk of egg production is undertaken by technologically advanced specialized farms.

Production of parent fattening hens has increased from 3m birds in 1990 to around 7.3m birds in 2007, while the production of parent laying hens decreased sharply from 454,000 birds in 1990 to 279,000 birds in 2000, to rise again to around 502,000 birds in 2007. Production of grandparent stock depends totally on importation. There is a high degree of interdependence between the different stages in poultry industry. This industry has been able to ensure local consumption needs, in addition to exports to the Gulf States, especially day-old chicks.

Shortage of mechanical slaughterhouses is one of the constraints facing the development of the poultry industry. In addition, ensuring feed components depends totally on importation. As such, production costs are seriously affected by the sharp increase of prices of maize and soya beans in the world market.

1.3.2.3 Fish production

Fish is the cheapest source of animal protein. Egypt has several sources for fish production, with total areas of 14m feddans of water bodies. Local fish production meets most of local consumption needs. Imports are estimated at 215,000 tons, representing around 18% of total consumption, estimated at approximately 1175 thousand tons in 2007, including processed fish. Fish production in Egypt depends on capture fisheries (seas, lakes, the river Nile and its

branches) as well as on aquaculture. Fish production has greatly increased from approximately 243,000 tons in 1980 to some 970,000 tons in 2007.

Box 3

Some contradictory aspects in aquaculture development policies

In spite of fact that aquaculture represents the cheapest and the most efficient alternative for ensuring consumer needs of animal protein, applied policies do not help achieve development at the required rate. This field suffers from the following contradictions:

- Areas used for cultivation purposes are owned, while areas used for aquaculture are rented for a maximum of 10 years, in spite of the fact that infrastructure investments for this activity cannot be retrieved within ten years;
- Local government authorities remove and destroy aquaculture facilities to use land for crop production;
- The Ministry of Irrigation and Water Resources removes fish culture cages from so many locations, because of their contaminating the Nile water;

In spite of the importance of sea aquaculture, and the identification of 26 locations suitable for fish culture in the Red Sea, with an estimated total area of 83,000 feddans, no serious efforts have been devoted to the promotion of this kind on investment.

Sea fisheries contribute around 12.3% of total fish production, while inland fisheries – lakes and the river Nile – contribute around 26.4%, and aquaculture contributes the greater part, with 61.3% of total production. Fisheries production has decreased during recent years, from around 428,000 tons in 2001 to around 349,000 tons in 2005, due to overfishing. This is compounded by the increase in the number

of fishing vessels, use of fishing nets and gear that are illegal and destructive to fish stocks, as well as increased water contamination resulting from the disposal of agricultural and industrial drainage water in the northern lakes and the Mediterranean.

Fish farming has increased during the last few years from 343,000 tons in 2001 to around 595,000 tons in 2007. This is due to the expansion of establishing farms, the development of fingerlings' production from fish hatcheries owned by the government and the private sector and the technological development of rearing and feeding. However, in spite of the fast development of fish culture, there are some problems the most important of which is the contradictions in policies of the concerned ministries (Box 3), as well as the competition for land use for fish culture or for cultivating crops.

1.4 AGRICULTURAL MARKETING, PROCESSING AND FOREIGN TRADE

1.4.1 Developments and main features

Agricultural marketing - including marketing policies, facilities, services, institutions, systems and modalities - continue to enjoy appropriate attention from planners, policy makers and decision makers over the years. However, attention has been primarily concentrated on agricultural production development projects and programs, neglecting the primary and vital role of investments in marketing systems.

Since the 1990s, attention has been given to modernization and development of some of the marketing services of agricultural and food products. Modernization and development of marketing agricultural and food products include:

- Developing export marketing systems leading to increased agricultural exports, the value of which has increased over the last few years to four times what it was in mid-1990s;
- There has been a relative expansion in processing agricultural food products, particularly vegetables, fruits, meat and milk. New modern technologies have also been introduced line production, to marketing chains;
- Establishing new marketing channels coupled with greater attention to sorting, grading and packaging processes;
- There have been increased facilities and capacities in some marketing services, particularly related to processing and exportation; and
- Several non-governmental organizations for small and large agricultural producers which have achieved remarkable successes in adopting modern techniques, as well as developed production and marketing practices leading to achieved remarkable export successes.

In spite of these developmental successes, marketing is still characterized with conventional practices leading to poor levels of marketing performance. Examples: i) *avian influenza* has uncovered discrepancies particularly as related to investment in establishing enough mechanical slaughterhouses, ii) in developing marketing channels and points of sale; iii) bread distribution crisis has also uncovered a sharp imbalance between state efforts and attention to secure national needs of wheat, whether through local production or importation, iv) limited capacities of distribution systems and policies on the other – a situation that led to inefficient bread production systems; and v) the present milk distribution system also represents a time bomb that might explode at any time, leading to economic and health risks.

1.4.2 Domestic agricultural marketing

In light of the above, the present agricultural marketing system can generally be described as conventional and has not enjoyed enough attention for its development and modernization. Problems and limitations that need to be addressed are:

- Limited attention to pre- and post-harvest practices;
- The dominance of conventional practices and inherited systems in agricultural marketing, as well as the presence of numerous dealers and middlemen, without adding significant additional marketing services or value added benefits;
- Poor marketing information systems with limited benefits to the farmers;
- The absence of quality standards for the majority of agricultural products;
- Poor and diminishing role of farmers' marketing associations;
- Poor physical and organizational conditions and marketing services of most of the wholesale and retail markets of agricultural products;
- Weak government role in regulating agricultural input and output markets, particularly to quality considerations, the prevention of adulteration and monopolistic practices; and
- The absence of an institution responsible for addressing marketing issues, studying and analyzing marketing problems, developing and modernizing marketing systems, under which all concerned and related entities can be grouped, instead of the presence of many entities operating on a piece meal approach to of agricultural marketing at present.

The above characteristics and problems have led to negative results that represent chronic defects in the structure of the agricultural sector, most important of which are:

- High percentages of losses and spoilage ranging between 10 – 15% of total shortcoming agricultural products, according the estimates of agricultural output in recent years;
- Reduced producers' share in value paid by consumers for their products, with traders and middlemen getting the greater share without any additions to the value chain (Table 1.4);
- Instability of agricultural products' markets which suffer from sharp shocks and imbalances, leading to improper production decisions due to the effects of confused marketing conditions and incorrect market signals; and
- Decreased quality standards of a significant portion of agricultural products, and the prevalence of adulteration and decrepit in marketing practices.

Table 1.4 - Producers and marketers share in each EGP paid by the consumers

Products	Farmer's share (%)	(EGP)
Tomatoes	41	59
Green peas and beans	38	62
Marrow	34	66
Carrot	28	72
Cabbage, cauliflower and leafy vegetables	18 – 20	80 – 82

Source: Agricultural products' prices bulletin, Economic Affairs Department, MALR (2007).

1.4.3 Agro-industries

The agro-industries subsector is characterized by the following shortcomings:

- The low percentage of agricultural products that undergo processing, preservation, preparation and industrialization, and decreased attention given to rural industries (Table 1.5);
- The limited capacity of the traditional agro-industries subsector compared to the commercial brand names, multinational and large farms, thus leading to haphazard and unsystematic practices in agro-industries in what is known as informal sector that is not subjected to official supervision and control;
- The prevalence of low-quality goods and adulterated products, leading to serious health risks. These kinds of products are estimated at 70% of processed agricultural products;
- Inadequate attention is given to the processing and recycling of agricultural residues that represent under the prevailing conditions a wasted economic asset, in addition to being an environmental hazard;
- Poor enforcement of applicable quality standards, laws and regulations of processed products;
- Weak complementary contractual relations between producers and traders, with the latter depending on what is actually produced and not on the kinds and varieties suitable for processing; and
- Limited application of the idea of establishing integrated agro-industrial communities for small farmers under the new agricultural projects and the newly-reclaimed areas.

Table 1.5 - Percentages of products that undergo different forms of processing (2007)

Products	Production (million tons)	Processed %	Products	Production (million tons)	Processed %
Tomatoes	8.6	0.7	Legumes	1.4	0.3
Potatoes	2.3	7.8	Meat and poultry	1.5	0.3
Onion and garlic	1.6	1.1	Fish	0.9	0.5
Other vegetables	9.4	1.8	Milk	5	25
Fruit (including dry dates)	9.8	0.9			

Source: MALR, Food Technology Research Institute (unpublished reports).

1.4.4 Agricultural exports

One of the primary objectives of the present agricultural development strategy is to foster agricultural exports. Several successes have been achieved in this connection. However, the situation would be different from the perspective of comparing the present situation with available potential. The main features that represent problems as well as opportunities under the present conditions related to the development of agricultural exports can be summarized as follows:

- The very limited percentage of exported agricultural products compared to the great productive potential of these products;
- Agricultural exports are mainly of traditional export goods, particularly raw cotton, rice, citrus and potatoes. The contribution of the non-traditional products which enjoy competitive export potential is limited. New crops of vegetables and fruits, medicinal and aromatic plants, organic agricultural products, cut flowers and ornamental plants, have export potential;
- Weak participation by small farmers in the export system which relies mainly on large producers and large export farms, as well as the weaknesses of complementary and adherence to contractual relations between producers and exporters;
- With its present conditions and conventional characteristics, the domestic marketing sector would not be able to support the export subsector. Each constitutes an almost independent chain from the other;
- Marketing information and studies related to export markets are limited. Monitoring, follow-up and analysis of market variables affecting Egyptian exports and imports are also weak; and
- In spite of Egypt's participation in several regional groupings and agreements, such arrangements have not been fully exploited in promoting agricultural exports to the markets of the member countries of these groupings and agreements.

1.5 AGRICULTURAL SECTOR INSTITUTIONS

The enacting of the Land Reform Law and the application of central planning in Egypt, the institutional frameworks regulating agricultural activities the economic channeled surplus generated by the agricultural sector to serve the industrial and urban development activities. Consequently, the state has designed the institutional framework of the MALR and its institutions to administer the following activities through promulgation:

1. Mandatory allocation of land use's;

2. Centralized procurement and distribution of agricultural inputs;
3. Limiting available finance sources for agricultural activities approved by Government;
4. Establishing public sector marketing and the marketing channels for the main products; and
5. Controlling the necessary services for practicing agricultural activities and for safeguarding agricultural resources, as well as their maintenance and development.

Accordingly, responsibilities of the institutional structure have been designed in a way that maximizes the role of the government and marginalizes the role of cooperatives, private sector and civil society institutions active in the field of agriculture. However, the liberalization of market and with the government relinquishing many of its roles, led to an imbalance between the responsibilities emerging private sector and of government agencies, represented by the MALR. The following three principal institutions are presently active in administration and management of agriculture:

- MALR, and related institutions;
- Agricultural cooperative organizations; and
- Civil society organizations.

The institutional structure of the MALR is highly complex and duplicative. It comprises entities for: planning, production, services and research functions. It is only natural that undertaking all these functions by the ministry impedes the private sector and the civil society from carrying out some of these functions. For example, the Central Seed Department produces seeds at the commercial level, a situation that limits the growth of this industry to the capacities of the ministry. The General Department for Veterinary Services still provides artificial insemination services, at a time when it can be provided by the private sector. The MALR should direct its efforts to other fields that cannot be addressed by other entities, such as the prevention and control of endemic and trans-boundary diseases, a situation that has negatively affected livestock genetic improvement programs. Another example regards the negative effects of this institutional structure on agricultural development is that is mechanical cultivation units which provide, at subsidized prices, the services of deep sub-soil ploughing, adding agricultural gypsum, laser leveling, and the use of drillers. This arrangement has reduced the services of the private and the cooperative sectors, and consequently restricted the level of mechanical cultivation to the main crops and the ordinary ploughing and land leveling operations. This is taking place at a time when the results of pilot programs and experiments have proven that it would be possible to increase the productivity of the wheat crop by no less than 20% should this service is made available or a large scale.

Pervasive interference by the ministry, represented by the Central Department for Cooperation, in the functioning of the cooperatives, as well as the encroachment by the Principal Bank for Agricultural Development and Credit, has reduced cooperatives to entities incapable of active participation in agricultural development.

The institutional structure under which the Principal Bank for Agricultural Development and Credit works is a manifestation of incompatibility between the purpose for which the bank has been established as a banking entity for financing agricultural activities and its actual activities in marketing production inputs, and receiving some of the produce on behalf of the General Authority for Supply Commodities, as in the case of wheat. As a result, commercial activities have permeated banking services have achieved very good results in pooling the efforts of small farmers.

As to agricultural-related civil society organizations, which there are the Horticultural Crops Producers and Exporters Association, the Poultry Producers Association, the Horticultural Crops' Development Association, and some local community development societies established under

Law 84/2002 regularizing the establishment of non-governmental organizations and societies not related to the MALR.

Another dimension that is propelling agricultural development during the last decade is the use of information technology. This technology has become one of the main components in

managing any institution. The MALR has been capitalizing in the use of this technology. All agricultural research and laboratories, central departments are connected though the internet. The Central Laboratory of Expert Agricultural Systems undertakes applied computer research related to agriculture and veterinary medicine.

So many information systems, data bases and expert systems have been introduced under the Rural and Agriculture development Communication Network (RADCON) which aims at making available suitable agricultural information, through electronic liaison offices in villages that contribute to the provision of solutions to farmers' problems and to improving the standard of living of the rural families. Qualified staff has been trained in the fields of information and communication in the agencies applying this technology.

Box 4

Examples of successful endeavors by the civil society in promoting agricultural development

Al-shmas societies, established in 2002 in both middle and higher Egypt, are the most recent civil society organizations active in agriculture, with the purpose of pooling small farmers' efforts, on a voluntary basis, to provide technical, administrative and marketing expertise in the production, marketing and processing of non-traditional crops. Some 109 societies have so far been established, according to the law regulating the establishment of non-governmental organizations. To ensure their success, these societies concentrate on the following:

- Supporting institutional capacity through training;
- Establishing linkages between societies and exporters of non-traditional crops;
- Promoting women's participation in the activities undertaken by the societies and in their management;
- Training members for the establishment of a technical cadre capable of undertaking marketing activities and bargaining for getting better prices; and
- Promoting the practice of contract farming between producers, exporters and agro-industries companies.

Al-shmas societies have been able to achieve unprecedented successes compared to other small farmers' associations. It has been originally planned that these societies would generate an income estimated at EGP 120m for their members over a period of four years. They have actually generated EGP 160m, an increase of 30%. Total value of exports amounted to EGP 75m. As a result of their activities in non-traditional crops, demand on agricultural labor, particularly women, has increased. Furthermore, Al-shmas societies have been able to establish more than 860 contracts with exporters and agro-industries companies. Their present membership now stands at approximately 12.5 thousand members compared to a targeted figure of 10 thousand members, an increase of 2.5 thousand members.

However, more efforts are needed to tap the IT potential to maximize its benefits in the areas of:

- Investment financing;
- Training and retention of experts and skilled staff necessary for the development, maintenance and operation of information and communication systems and the introduction of new systems; and
- Ensuring continued support of upper management to foster use of evolving new technology and communication.

1.6 IMPLEMENTATION AGRICULTURAL POLICIES

In spite of the great successes achieved during the last two decades in redesigning agricultural policies, and the successful application of the newly introduced policies resulting in increased production and productivity, agricultural exports and farmers' incomes, past experiences underline the existence of several contradictions in agricultural policies, implementing this has reduced the developmental impact of these policies. Some of these contradictions that need to be addressed in future are summarized as follows:

1.6.1 The role of the state managing the agricultural sector and market forces

Economic reform policies concentrated on reducing the role of the state in so many agriculture-related activities, including the procurement and distribution of agricultural inputs, especially fertilizers, pesticides and seeds, as well as marketing activities of the strategic agricultural crops. Although this shift towards the liberalization of agriculture from government restrictions is welcomed, government withdrawal from these activities has not been accompanied by adequate preparations to provide alternative institutional structures capable of performing the roles relinquished by the state. The result has created confusion in agricultural inputs and outputs markets, a situation that has had a severe effect, particularly on small farmers, and has led to increased commercial adulteration of products.

1.6.2 Contradictions in land reclamation policies

The state has given complete freedom to the private sector to operate in reclaiming of desert land and contracted; land reclamation companies to implement land reclamation projects under the state supervision. In spite of the successes achieved in this field, shortcomings and contradictions of such policies can be summarized as follows:

- The existence of many agencies responsible for the allocation of reclaimed areas, with weak coordination, which has negatively affected the freedom given by the state to reclaim additional areas;
- The concept of land reclamation has been restricted to the provision of infrastructure, irrigation facilities, roads and energy needs, without giving much attention to the provision of agricultural and social services necessary to establish settled agricultural communities. This has delayed or impeded the utilization of investments spent on establishing the infrastructure in these areas. One example is the Toshka project;
- Reclaimed land allocation has been restricted to their distribution to the new users, without enabling them to use land as bank collaterals to obtain medium- and long-term loans for the reclamation and development of such areas;
- Expansion objectives of reclaimed areas have been identified without paying greater attention to water-use rationalization policies and procedures, to save irrigation water needed for areas to be reclaimed; and
- Allowing the use of ground water in areas for which adequate studies have not been made for ensuring the sustainability of ground water resources, this may lead to high investments' risks.

1.6.3 Strategic food crops pricing policies

The government has been keen on applying pricing policies to encourage farmers to cultivate strategic crops such as cotton, sugar cane and wheat. Under these policies, the government is committed to buy agricultural produce at guaranteed prices. However, the actual application of these policies has not been successful in many years, either due the delay in declaring the guaranteed prices before the start of the growing season, or because such declared prices have been very low, which produced the opposite effects of these policies. Such contradictions led farmers to make wrong planting decisions.

1.6.4 Contradictions in fisheries and aquaculture policies

There is a great need for Egypt to develop its fisheries resources, whether through captured fisheries or fish culture, due to the fact that the availability of fish protein would reduce the pressure on agricultural land and water resources. In spite of this, policies applied whether in the maintenance and development of capture fisheries, or expanding fish culture are contradictory, and thus reduce the possibilities of developing this important sector. Procedures to establish fish farming projects are complex, and the development of lake captured fisheries encounters so many problems, including lack of maintenance, increased contamination, in addition to other problems that negatively affect the fishing potential.

1.6.5 Policies and arrangements for meeting international and regional state commitments

Egypt is a member in a number of economic groupings and several international agreements, and is consequently bound by certain commitments affecting the agricultural sector. These commitments are contained in the World Trade Organization (WTO) agreements, such as the agreement on Intellectually Property Rights (IPRs), and the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS), and other similar agreements. It is only natural, even crucial that Egypt should take measures for meeting these commitments in order to reduce their implications on agriculture, and safeguarding Egypt's rights under these international and regional agreements. In this connection, facts indicate that the efforts exerted for this purpose are very limited, due to the weak performance of the concerned institutions and the limited activities aimed at informing the growers and attracting their attention to the important topics that are due to have implications on their production and living standards in future.

1.6.6 The absence of institutional arrangements related to agricultural policies

Recent years have witnessed dramatic changes in the world trade system, particularly as related to the application of WTO agreements, and the EU-Egypt Association Agreement, the completion of the Greater Arab Free-Trade Area, and the Common Market of Eastern and Southern Africa (COMESA), as well as other bilateral trade agreements. This period has also witnessed important economic developments at the national level most important of which is the liberalization of the agricultural sector from government restrictions, and allowing the private sector to participate actively in agricultural activities. It is only natural that the MALR would be keen on introducing and establishing institutional entities capable of redesigning agricultural policies and monitor their implementation in collaboration with concerned institutions, in order to boost the sector's ability to adapt to international and regional changes on the one hand, and manage agricultural-related international and regional negotiations and take an active part in such negotiations, on the other. However, present conditions are characterized with institutional weaknesses in both fields, in spite of their implications on the agricultural sector in future.

1.7 CHALLENGES FACING AGRICULTURAL DEVELOPMENT

Agricultural development efforts during the last three decades have shown that agriculture faces several challenges, which should be addressed and are as follows:

1.7.1 The main challenges facing agricultural development

1.7.1.1 Increasing water use efficiency in irrigation

Judging by the population increase (estimated to be 106 m by 2030) and the food requirements, water resources available in Egypt fall short of requirements to the extent that Egypt is classified among the countries suffering from water poverty. Annual water per capita is only 800 cubic meters annually. In spite of this water poverty which is increasing, water use in Egypt is not efficient. Water conveyance and distribution efficiency is presently estimated at 70% and at 50% at the field level. Although this problem intensifying, water use rationalization policies are still under discussion, a fact that makes societal consensus on this problem and the adoption of an effective policy one of the fundamental challenges facing development. Without achieving significant progress in this direction the ability to meet the objectives of land reclamation would be in doubt. Consequently the ability to increase food production, create new job opportunities and achieve other developmental objectives would also be in doubt.

1.7.1.2 Addressing the problem of holdings' fragmentation

Available statistics show that agricultural holdings are seriously fragmented, particularly in the old lands of the Delta and the Nile valley. The average area of holding decreased from 6.3 feddans in 1950 to 3.2 feddans in 1960 and to 2.1 feddans according to results of the recent agricultural census in 1999/2000. The percentage of small holdings (less than one feddan) increased to 43% of total agricultural holdings, from 21.4% in 1950 and 26.4% in 1960. Because of this fragmentation, an estimated area of 12% of the most fertile agricultural lands is lost as boundaries and partitions between holdings, a situation that weakens the ability to modernize agricultural activities and increase productivity. Under the applied inheritance laws and conventions, the problem calls for a drastic change in the concept of farm management in order to strike a balance between the economic size of agricultural holdings and respecting inheritance laws. Shifting to cooperative management under institutional small farmers' arrangements might be a viable solution to this problem e.g. voluntary crop and land consolidation schemes.

1.7.1.3 Reducing encroachment on agricultural land

Egypt has applied a law to protect agricultural land during the last 20 years. There is a general agreement that this law should be applied strictly. However, loss of agricultural land taken out of cultivation continues at an annual rate of 20,000 feddans of the most fertile areas in the Delta and the Nile valley. This shows that addressing this problem through prohibition and incrimination would not save agricultural land. The problem calls for comprehensive housing planning for Egyptian villages, and linking the policy for protecting agricultural land with the policy for the distribution of newly reclaimed areas.

1.7.1.4 Promoting agricultural production through establishing small farmers' organization

Farmers' associations and organizations play a decidedly important role in agricultural systems all over the world. Due to the fragmentation of agricultural holdings, conventional applications in most of production activities, and challenges facing the marketing of agricultural products, such farmers' associations and organizations should be established to help alleviate these problems, although their effects might only be marginal after the deterioration of the agricultural cooperatives and the loss of most of their roles, and the farmers' loss of confidence in such cooperatives. Therefore, reforming cooperatives and rebuilding farmers' confidence, or encouraging farmers to establish voluntary associations is one of the very serious challenges facing the agricultural sector during the forthcoming period particularly for the proposed on farm irrigation improvement proposed projects. Unless a noteworthy progress is achieved in carrying out this difficult task, it would not be possible to achieve progress in several other fields, as farmers' associations constitute the basis through which it would be possible to overcome so many obstacles and achieve so many goals.

1.7.1.5 Increasing the efficiency of agricultural research and extension institutions to support agricultural development efforts

During the last three decades, Egypt has been able to establish agricultural research and extension systems that have been able to support agricultural performance to such a level that helped double the production of several crops, improve product quality, and increase product market competitiveness. In spite of this, all indications emphasize that the utilization rate of these systems is not reaching their potential. This is due to reducing their annual budgets which are barely enough to cover wages and salaries, leaving negligible appropriations for funding research programs and activities. The budgets of research and extension barely exceed 0.01% of the share of agricultural GDP. Such budgets cannot be compared to the budgets of research and extension institutions in the developed countries, or even in some developing countries, ranging between 2.5 – 3.0% of the annual share of agriculture in the national income. However, in spite of the limited financial resources allocated to research and development, such resources are grossly misused. In spite of achievements in high crop yields, prudent management of available human and financial resources is needed. Additional funding for operational and maintenance research is needed. There is also lack of coordination between the roles played by the different research institutions due to the lack of a national research plan linking all agricultural research institutions to collaborate and exchange experiences and establish research priorities.

1.7.1.6 Fostering development of information and communication technologies

The information and communications revolution has created new opportunities and means that can be of great benefit to agricultural development at the national level. It also constitutes challenges related to institutions and staff in order to benefit from these opportunities.

There are several national institutions that are ready and willing to cooperate in order to support the use of information and communications technology in agriculture, including: the Ministry of Communications and Information Technology, the Ministry of State for Administrative Development, and the National Authority for Remote Sensing and Space Sciences. The agricultural sector has vast information and accumulated experiences that cannot be utilized under the application of traditional methods, such as land and water maps, and agricultural census data. Use of available infrastructure already established is suboptimal.

1.7.1.7 Reducing agricultural production losses

Agriculture in Egypt suffers from high pre- and post-harvest losses and the low level of agricultural industrialization, compared to other countries. This is due to the inflexibility of the applied traditional marketing systems, scarcity of contract farming and the limited attention to pre- and post-harvest practices. Estimates show that pre- and post-harvest losses exceed 30% in vegetables and fruit, 20% in legumes and tubers, and 10% in cereals. On the other hand, quality deterioration leads to reduced prices and increases farmers' losses. In the final analysis, agricultural losses constitute 10 – 15% of agricultural income. Therefore, reducing losses constitutes a serious challenge facing agricultural development and necessitates deploying efforts on three levels. At the technical level, efforts should be exerted to develop plant varieties capable of enduring marketing, transportation and storage operations, as well as for the development and dissemination of improved pre- and post-harvest practices. At the investment front, marketing systems and facilities should be developed. And at the institutional and legal level, legislation and regulations should be enacted to establish an appropriate environment for the expansion and success of contract farming.

1.7.1.8 Preparing the agricultural sector to adapting to climate change

Climate change is worldwide phenomena with implications of local agriculture, due to the differences and sensitiveness of regional environmental conditions. Therefore, it is necessary to estimate the probable effects of climate change on Egypt, its coastal areas and natural resources.

Agriculture in Egypt is very sensitive to climate change because Egypt is situated in an arid and fragile zone that totally depends on the Nile waters and is exposed to the expected climate change through:

- The expected rise in temperature and change of its seasonal pattern would lead to decreasing the productivity of some crops and livestock, as well as a change in environmental agricultural zones;
- Marginal agricultural areas would be negatively affected, and desertification rates would increase;
- High temperatures would increase water evaporation and water consumption;
- Socio-economic effects such as labor migration from marginal and coastal areas; and
- The probable rise in sea water level, and its negative effects on coastal areas, tourism and agricultural land in the Delta area.

Upon analyzing the data taken from coastal areas in Egypt during 1930 – 1980, it has been found that sea levels rose by about 11.35cm in Rosetta (Rasheed) and Damietta (Dumyat). Studies have also confirmed that the coastal line has receded compared to what it was in the nineteenth century. Estimates indicate an increase of 1 - 2 meters in the sea level would destroy one fourth of the agricultural land in the Delta area, a development that would compel some eight million inhabitants to migrate to other areas.

Upon studying the expected effects of climate change on cereals, it is estimated that this would reduce wheat productivity by 18%, barley and maize by 19% and rice by 17%. Some researchers have studied the causing factors of the diseases that might affect crops due to global warming. The pest-host plants interaction which is evolving may become difficult to predict with climate change. Special models and scenarios have to be developed in order to assess mitigation measures and implement sound recommendations. The changing level of carbon dioxide may provide an example of change in the physiological functions of pests, thus leading to important changes in insect behavior as a result of rising temperature and other climatic changes that might lead to shortening the life cycle of the insects and speeding up their numbers

and virulence. Institutional mechanisms of the Kyoto Convention, as well as the European Trading Plan led to the establishment of a new market for carbon trade particularly for industrial purposes. For agriculture, it would be useful to study this trend and activate this mechanism as a tool of development especially for Egypt where desert reclamation promotes agricultural crops as sinks for carbon dioxide sequestration.

1.7.2 Agricultural development constraints

In addition to the severe challenges facing agriculture with their implications on agricultural development performance, there are also constraints that limit the efficiency of developmental efforts, and decrease the socio-economic returns of investments in the agricultural sector. These constraints can be classified in the following three categories:

1.7.2.1 Agricultural policy constraints

Agriculture in Egypt is negatively affected by impediments related to either the weaknesses or the inconsistencies of applied policies, or the absence or the inflexibility of some other policies and their inability to develop in accordance with the requirements for agricultural modernization. Examples:

- Limited agricultural investments: Since 1990, allocations for agricultural investments have been estimated at 9% of agricultural national income, a share that is not proportionate with the importance of the agricultural sector and its contribution to the national income, or the creation of job opportunities or in establishing an environment appropriate to achieve growth in the different economic sectors; and
- Inflexibility of credit policies: Credit policies are limited to conventional types of credit, neglecting the introduction of new credit policies and lines compatible with the requirements of agricultural development and modernization.

1.7.2.2 Agricultural institutions' reform

In spite of the successes achieved in price policies and economic reform, the reform of institutions and the improvement of their performance are still questionable, and constitute a serious obstacle to agricultural development. Institutional weaknesses lead to several problems, some of which are related to the weak control over market performance, leading to increased commercial adulteration, and decreased product quality. This problem is observed in agricultural education institutions of all kinds, institutions responsible for agricultural information generation and dissemination, and the provision of veterinary services. Generally, these institutional weaknesses are manifested in the following areas:

- Coordination between the MALR and other agriculture-related ministries and institutions;
- Control over agricultural inputs, particularly fertilizers, seeds and agricultural chemicals;
- Performance of veterinary services;
- Agricultural extension system;
- Agricultural information systems, hence inaccurate and contradictory information;
- Conventional seed and seedling production systems;
- Agricultural education system at all levels, and its incompatibility with the requirements of the labor market;
- Conventional agricultural financing systems;

- Coordination between the institutions active in the field of information and communication technology, leading to many problems, such as repeated and inaccurate information; and
- The limited number of villages connected to the agricultural and rural development network (only 5% of the villages), as well as the limited number of computer terminals and the unavailability of Local Area Networks.

1.7.2.3 Constraints of production to marketing chain

The imbalance between the agricultural development efforts in production and marketing leads to weakness in the production to marketing chain. These linkages become complex in small farming operations. Special attention should be devoted to increase small farmers net return from production e.g. through formation of producers and agro-processing associations. Conventional agricultural marketing systems are still dominated by traders and middlemen, thus resulting in high rates of pre- and post-harvest losses and spoilage.

Part II

SUSTAINABLE AGRICULTURAL DEVELOPMENT STRATEGY TOWARDS 2030

2.1 LESSONS LEARNED FROM PREVIOUS STRATEGIES

Agricultural development efforts during the last two decades have achieved several positive results, the most important of which are:

- Raising the productivity of several crops, and doubling the productivity of some basic crops;
- Increasing agricultural areas through the reclamation of around 2.5m feddans;
- Increasing export capabilities of agricultural products and increasing supply throughout the year;
- Reducing the food gap in some crops, in spite of the population increase; and
- Reforming land tenure between land owners and tenants, without causing social or political problems.

Several lessons should be drawn from these experiences and be taken into consideration in the preparation of the SADS towards 2003, foremost among them are:

- Maximizing returns of the economic reform should be based on two parts:
 - Pricing policies' reform, which has already achieved significant success, although it has not removed market distortions; and
 - Institutional reform, which still needs further efforts, particularly in relation to improving state agricultural institutions' performance and establishing an appropriate environment for strengthening the role of the private sector and civil society organization, and encouraging agricultural producers to establish their own organizations and associations to be able to work in accordance with market forces;
- In spite of the limited water resources, applied policies have not led to the establishment of an agricultural environment clearly leading to the rationalization of water use, a situation that calls for a serious review of the applied policies and regulations and programs executed in this field;
- In spite of applying a clear policy for protecting agricultural land from over-encroachment for such a long period, violations still take place. This underlines the importance of an integrated mix of development policies and programs capable of achieving equilibrium between national land protection goals and meeting the housing needs of the rural population;
- In spite of consensus that fragmentation of agricultural holdings constitutes a serious impediment to development, no policy has been so far instituted for protecting agricultural land against fragmentation how it related to inheritance laws;
- In spite of the successes achieved in the field of land reclamation, adding some 2.5 m feddans to the cultivated area, the distribution system failed in establishing viable communities capable of settling in the newly-reclaimed areas;
- Skilled labor is scarce due to the lack of balance between human resource development policies, investment and agricultural development policies, high rates of unemployment and underemployment prevailing in rural communities;
- In spite of the numerous research institutions and the availability of a great number of distinguished agricultural researchers, it has not so far been possible to make maximize benefits and optimal use of this wealth of minds. Considerable achievements have been possible;

- Contradictions in fisheries development policies have created several limitations that hinder further investments in this field;
- Applied policies have not succeeded in achieving the optimum utilization of Egypt's historical and geographical background, and its relations with the Arabic, African and European economic groupings, a situation that needs to be reviewed;
- The economic liberalization era has led to noticeable shortcomings in market management and organization, leading to marketing constraints and market distortions that harmed producers and consumers while benefitting middlemen and monopolists, leading to unfair distribution of development returns;
- Coordination between the different ministries and agriculture-related institutions is absolutely necessary to achieve the goals of development;
- In spite of the great attention given by the MALR to the planning of the development efforts under a number of development strategies since 1980, the achievement of some of the strategic objectives proved impossible due to two main factors:
 - The weakness of implementation and follow-up mechanisms;
 - Lack of consistency between strategies and execution plans; and
- The international and regional policy environment has experienced many changes, most important of which is the international trend towards further liberalization of agricultural trade, the severe crisis in food markets, the impending climate change due to the greenhouse effect with its probable effects on agricultural areas and the cropping patterns, in addition to other changes that would require a drastic review of applied agricultural policies.

2.2 THE STRATEGIC VISION OF AGRICULTURAL DEVELOPMENT

During the drafting the SADS towards 2030, a special attention was been given to several aspects that can be summarized as follows:

- The positive and negative results of development performance during the last two decades, as manifested by the lessons learned from these experiences;
- Giving agriculture the priority it deserves among the other economic sectors and in the field of directing investments and government support consistent with the contribution of agriculture to the national income and its role in ensuring social security and creating job opportunities;
- The necessity of not sacrificing the social aspects of agricultural development when trying to maximize its economic returns, due to the fact that agriculture has been the highest national economic sector in absorbing population labor , and that investment in agriculture is highly risky and uncertain;
- The necessity of taking into account the developments in international and regional backgrounds when preparing the development strategy, in order to give the agricultural sector and its development plans the highest degree of flexibility in order to be able of respond appropriately to these variables and reduce their negative effects; and
- The real entry point to development is to develop Egypt's human resources and agricultural natural resources.

Within the framework of these considerations, vision, message and objectives, the SADS towards 2030 are as follows:

2.2.1 The strategic vision to sustainable agricultural development

“To achieve a comprehensive economic and social development based on a dynamic agricultural sector capable of sustained and rapid growth, while paying a special attention to helping the underprivileged social groups and reducing of rural poverty.”

2.2.2 The mission

“Modernizing Egyptian agriculture based on to achieve food security and improving the livelihood of the rural inhabitants, through the efficient use of development resources and the utilization of the geopolitical and environmental advantages, and the advantages of the different agricultural regions”

2.2.3 Sustainable Agricultural Development Strategy Objectives towards 2030

The aforementioned vision and mission are the building blocks of the main strategic objectives of the SADS towards 2030, and are as follows:

1. Sustainable use of natural agricultural resources;
2. Increasing the productivity of both the land and water units;
3. Raising the degree of food security in the strategic food commodities;
4. Increasing the competitiveness of agricultural products in local and international markets;
5. Improving the climate for agricultural investment; and
6. Improving the living standards of the rural inhabitants, and reducing poverty rates in the rural areas.

2.3 FUNDAMENTAL AND BASIC SUCCESS FACTORS

The SADS towards 2030 is based on five fundamental attributes that can be utilized and built upon to achieve the planned goals. Those can be summarized as follows:

- There is a political will to support agricultural development in order to reduce the food crisis risks. Although food prices were relatively stable on the international markets for almost two decades, they experienced a sharp and unprecedented upward trend since 2006. Experts and international organizations agree that this trend is not transient and is expected to continue for some time in the near future. Sharp supply fluctuations of the main commodities on the international market are expected to increase, while demand is expected to increase due to the improvement of nutrition patterns and standards of the large population blocks, and the increased use of some basic food commodities in producing alternative energy, particularly after the sharp increase in oil prices that has been recently experienced by world markets. This crises has convinced decision-makers to review the policies applied in the agricultural sector and take all necessary arrangements for reducing the socio-economic risks experienced by a large proportion of the population, particularly limited income groups;
- Resources and human experiences needed to achieve sustainable development in agriculture are available. In spite of some shortcomings, agriculture in Egypt is one of the most viable one in the Middle East, with its heritage, natural resources, farmers' experiences, technical wealth and complimentarity between research institutions and technical development. Two clearly show that agriculture in Egypt has the

fundamentals for sustainable development. This has continued as manifested by the results of its very rich development experience over the last two decades;

- There are large local and international market capacities that would support the achievement of developmental goals. The presence of markets is a precondition for sustainable development. One of the most serious challenges facing agricultural activities is to exert efforts and spend money for producing agricultural products that cannot be marketed at remunerative prices. In this connection, due to its large population, its strategic situation between three continents, its membership in several international agreements Egypt has distinct comparative advantage in its ability to access external markets. Egypt also is endowed with the basic requirements that would enable agricultural products to be present in domestic and foreign markets, as long as such products are competitive and agricultural producers are capable of meeting market requirements and standards;
- Agricultural products' prices have taken a trend that would encourage agricultural investments. Agricultural markets have witnessed an unprecedented increase in world prices in 2006 – 2007. Although the world crisis that has engulfed financial markets during the second half of 2008, lead to decreasing prices, they remained higher by 40% of what they were in 2006 – 2007. Prices are expected to rise in the foreseeable future, thus creating a marketing environment that would encourage investments; and
- Egypt is one of the oldest agricultural countries. During its long developmental process, it has been able to establish a strong legal and institutional base for managing agricultural resources and activities, and established several institutions and agencies specialized in the management of agriculture and water sectors and developing complimentary techniques in both sectors. There are also several successful applications whose results can be replicated. As such, Egypt has the basic legal and institutional requirements that would increase rates of development, if thoroughly reviewed and developed in right context of the ongoing changes and developments.

2.4 THE MAIN STRATEGIC OBJECTIVES

2.4.1 Sustainable use of agricultural resources

Egypt is one of the countries that suffer from the shortage of natural agricultural resources, particularly land and water, due to its increasing population and its concentration in an area not exceeding 5% of the total area, and where all agricultural economic activities are. In spite of this, the sustainable utilization of natural resources is still to be adjusted and refined. Water use efficiency in irrigation is limited; soil fertility is decreasing year after year. In addition, encroachment on agricultural land and diverting it from agricultural to non-agricultural uses still takes place in spite of all the preventive regulations and laws that have been enacted. This part of the document aims at shedding light on the various topics related to the strategic objective of developing the sustainable utilization of natural agricultural resources.

2.3.1.1 Increasing water use efficiency in agriculture

Water resources available to Egypt are limited. In spite of this, the efficiency of using these limited resources is not optimal, which reduces the possibility of reclaiming wider areas in future, and reduces the agricultural sector capability of achieving higher growth rates. Available information indicates that low water use efficiency is due to two main factors:

- High water losses through water conveyance and distribution systems. Present water use efficiency is estimated at 70%; and
- The mean efficiency of field irrigation systems is estimated at 50%, due to the excessive use of irrigation water by the farmers who believe that much water would increase crop productivity, and due to the fact that they do not pay for irrigation water.

Water losses due to these two factors are estimated at billions of cubic meters. While acknowledging that it is impossible to avoid water losses through transpiration and evaporation, as well as through water underground infiltration and other factors, it would be possible to raise the efficiency of water conveyance and on-farm utilization through the development of water conveyance and distribution systems and the adoption of proven mechanized land preparation and leveling which would in addition expand the use of developed irrigation systems.

One of the objectives of the Sustainable Agriculture Development Strategy towards 2030 is to increase the efficiency of water conveyance and distribution systems, starting with tertiary irrigation canals, as well as increasing the efficiency of on-farm irrigation systems. The strategy aims at applying policies and procedures that would help improve water use efficiency from 50% at present to 75% by the year 2017, and to 80% by the year 2030.³ Recent experimental field applications have proven that it is possible to improve the efficiency of field irrigation through improved irrigation systems compatible with the cropping pattern applied in each agricultural zone, to reach about 80%.

In the light of the projected gradual improvement of field irrigation systems, and reducing the areas plated to rice, this would save quantities of water estimated at 5.3 and 12.4 billion cubic meters by the years 2017 and 2030, respectively. This is based on the assumption that the areas in which irrigation would be developed are estimated at 2,250m feddans by 2017, to be increased to 5m feddans by 2030.

2.4.1.2 Sustainable increase of reclaimed agricultural areas

One of the main objectives of the development strategy is to expand reclaimed areas through the use of water quantities to be saved through the improvement of water conveyance and distribution, as well as field irrigation systems. Information contained in Table 2.1 indicates that it would be possible to reclaim about 1.250m feddans by the year 2017, to be increased to about 3.10m feddans by 2030. This would represent an annual increase of 130,000 – 140,000 feddans of newly developed areas. The salient points conveyed by this table can be summarized in the following:

- It is estimated that total cultivated areas would increase from about 8.4m feddans at present to 9.65m feddans by the year 2017, and 11.5m feddans by 2030;
- It is anticipated to increase the percentage of agricultural areas in which irrigation systems would be developed from 2.5m feddans at present to about 6m feddans by the year 2017, representing 62% of total agricultural areas, to be increased to 10.6m feddans by 2030, representing 92% of total agricultural areas;
- Estimates indicate that the average water share per feddan would amount to 6.32 thousand cubic meters by 2017, and about 5.5 thousand cubic meters by 2030, according to the rate of expansion in the areas in which improved irrigation systems would be developed.

³ Computed on the basis of efficiency weighted average, taking into account the percentage of developed areas to total cultivated areas.

Table 2.1 – Estimated areas that can be reclaimed through the use of water quantities to be saved as a result of developing water conveyance and distribution systems and the development of field irrigation systems

Description	2007	2017	2030
Quantities of water used in irrigation (1 million cubic meters)	58,000	61,000	64,000
Field water use efficiency	50%	75% ⁽¹⁾	80%
Areas projected to be developed (1,000 feddans)	–	2250	5,000
Total water quantities expected to be saved as a result of developing irrigation systems and reducing areas planted to rice (1 million cubic meters)	–	5'300	12'400
Land areas expected to be added (1,000 feddans)	–	1'250	3'100
Total areas in which irrigation systems are to be developed (1 million feddans)	2.5	6.0	10.6
Total irrigated areas (1 million feddans)	8.4	9.65	11.5
Percentage of developed areas to total areas	30%	62%	92%
Average water share per feddan (1,000 cubic meter)	6'900	6'320	5'565

⁽¹⁾ Computed on the basis of efficiency weighted average, taking into account the percentage of developed areas to total cultivated areas.

Source: Compiled and computed from technical reports by the experts who participated in preparing the strategy

2.4.1.3 Sustainable development of land and water productivity

It is well known that land and water productivity can be increased through the achievement of one or more of the following objectives:

- Rationalizing water use efficiency through developing the irrigation systems;
- Increasing areas planted to high-value products, provided enough marketing capacity is available; and
- Developing economically viable technical packages.

Figures contained in Table 2.2 indicate the levels of targeted achievements. In this connection, the following salient points may be highlighted:

- It is anticipated that the cropped area would increase from about 15.04m feddans, at an intensification rate of 183% in 2007 to about 19.2m feddans, at an intensification rate of 198% in 2017, and to about 23m feddans, at an intensification rate of 199% in 2030;
- Estimates indicate that average total returns from the water unit, under the anticipated cropping pattern and based on the constant prices of 2006, would increase from about EGP1.91/cubic meter of water at present, to about EGP3.2 and EGP4.17/cubic meter in 2017 and 2030, respectively. This means that the economic efficiency of the water unit compared to total returns is anticipated to increase by 68% by the year 2017, and 118% by 2030. On the other hand, the economic efficiency of the land unit is anticipated to increase by about 74% by 2030 compared to the present; and
- Estimates indicate that total returns per feddan (the land unit) would increase at constant prices by about 2.4% per annum, and that the returns of the water unit would increase by about 3.5% per annum, thus increasing agricultural income growth

rates by 4 - 5% per annum, taking into account the growth rates in the other sub-sectors of livestock, poultry and fisheries production, as well as agro-industries, and reducing marketing losses.

Table 2.2 – Estimated increase of the total returns of land and water units, under the SADS towards 2030, at 2006 constant prices

Description	Measuring unit	2007	2017	2030
Water quantities anticipated to be used	Billion cubic meter	58	61	64
Projected land area	Million feddan	8.4	9.6	11.5
Cropped area	Million feddan	15.4	19.2	22.9
Percentage of intensification	%	183.6	199.1	200
Average rate of return per water unit (1 cubic meter)	EGP	1.91	3.2	4.17
Index of the increase in the returns of the water unit	%	100	168	218
Average rate of return of the land unit (feddan)	EGP1,000	13.2	20.3	22.9
Index of the increase in the returns of the land unit	–	100	154	174

Source: Compiled and computed from the statistical annex tables.

2.4.1.4 Maximizing the sustainable returns of rainfed agriculture

In spite of the limited rainfall on most of Egypt, rainfall ranges between 120 - 150 mm per annum on the north coast area during winter. Several efforts have been exerted for making use of rainfall in cultivating some drought tolerant crops, such as barley, olives and figs. Due to the importance of making use of this water source, it might be appropriate to provide an area of about 350,000 feddan with supplementary irrigation to increase the cultivated areas. This would enable the cultivation of other crops such as wheat. These areas may be added to land-reclamation plans in future. Modern technical applications, such as water harvesting and other suitable techniques may also be applied in order to maximize the use of rainfall.

2.4.1.5 Maintaining and protecting agricultural land

Agricultural land, particularly in the Delta and the Nile valley suffers from two main problems:

- Encroachment on agricultural land and diverting it from agricultural to non-agricultural uses. In spite enacting several laws and regulations to limit this trend, encroachment still continues at an annual rate of more than 20,000 feddans, a situation that requires reviewing applied policies and regulations to address this problem;
- Continued degradation of soil fertility in so many agricultural areas, in addition to rising ground water level due to repeated cultivation of particular crops and not implementing the recommended cropping patterns that would help maintain soil fertility, and not using appropriate fertilizer regimes for each kind of soil. Dealing with these problems would require periodical soil surveys to be taken as a basis to establish kinds and rates of fertilizer use regimes.

However, such arrangements would not be enough unless supplemented by other arrangements for supplying fertilizers in suitable quantities and at the suitable time, and enabling farmers to obtain them at suitable prices.

In this regard, the importance of continued restoration and maintenance of agricultural drainage systems, as well as establishing drainage systems in the areas lacking such systems should be defined. This is also very important for the maintenance of agricultural areas and developing and maintaining their physical and economic productivity.

2.4.1.6 Human resources development

According to the latest population census (2006) the population of Egypt reached about 72.8m inhabitants. Population growth still ranges around 2% since 1990. The percentage of rural inhabitants decreased from about 83% at the beginning of the twentieth century to about 58% in 1966. Since then, this percentage has stabilized between 56 – 58% during the last three decades and until 2007 (Table 3.2). This is due to limited job opportunities in urban areas, particularly in the industrial and services sectors which were the main driving factors behind rural-urban migration during the 1950s and the 1960s, a development that has had continued negative effects as manifested by the spread of squatter areas in the main cities. On the other hand, the trend to divert lands from agricultural to non-agricultural uses intensified. This has been accompanied by the increase and diversity of non-agricultural economic activities in the fields of production and services most of which are closely related to agricultural activities.

Table 2.3 – Population census, rural population census and the working force, 1980 - 2007

Description	1980	1990	2000	2007
Total population (1 million)	42.13	51.91	63.97	72.90
Rural inhabitants (1 million)	23.59	29.39	36.79	42.11
Percentage of rural inhabitants (%)	56.2	56.6	57.5	57.8
Total working force (1 million)	10.94	13.3	17.42	19.85
Agricultural working force (1 million)	4.2	4.5	5.00	5.4
Percentage of agricultural working force (%)	38.4	33.7	28.7	27.00

Source: Ministry of Economy, The Central Agency for General Public Mobilization and Statistics, data from 1980 to 2007.

Looking at the age structure of the population, Table 2.4, shows that approximately half the population of Egypt belong to the age group of 15 – 45 years, 21% of the population will join this group by the year 2030, estimated at 15m people representing an additional supply to the working force in Egypt.

Table 2.4 – Age distribution of the population, according to the 2006 population census

Age group	<5	5-<15	15-<45	45- <60	>60	Total
Number (in millions)	7.72	15.36	36.29	9.00	4.43	72.79
%	10.6	21.1	49.8	12.4	6.1	100

Source: Ministry of Economy, Central Agency for General Public Mobilization and Statistics, 2006.

With around 50% of the population living in rural areas, the strategic vision would call for providing suitable job opportunities for the greatest number of the rural youth entering the labor market, in direct agricultural activities or in other productive services related to agriculture. Data contained in Table 2.4 indicate that in spite of dwindling percentage of the agricultural labor relative to the total number of the working force in all sectors (from about 38.4% in 1980 to about 27% in 2007) the absolute number of those working in agriculture increased year after year, from around 4.2m in 1980 to around 5.4m people in 2007.

By applying the future estimates to growth rates as a basis for estimating the total of the working force in 2017 and 2030, and consequently the working force in agriculture (taking into account the dwindling percentage of those working in agriculture); it is anticipated that the supply of agricultural working force would be around 5.8m people in 2017, representing around 23.1% of the total working force, and around 6.4m people in 2030, representing about 19.3% of the total working force.

According to these estimates, the supply of the working force handling direct field agricultural activities is anticipated to increase by one million persons by 2030 (Table 2.5), in addition to about 3m persons in the other productive and service activities and projects related to agriculture or complementing it. Consequently, one of the main objectives of the strategy is to make available some four million new jobs by the year 2030, through the various agriculture-related or complementary programs and projects in the different activities.

Table 2.5 – Estimated increase in the working force until 2030 (million persons)

Description	2007 (base year)	Estimated increase (in millions)	
		2017	2030
Total population	72.90	92	106
Rural population	41.11	53	62
Increase in the direct agricultural working force		0.4	1.0
Increase in the indirect agricultural working force		1.2	3.0
Total increase in the agricultural working force		1.6	4.0

Source: The Central Agency for General Public Mobilization and Statistics.

The most important considerations that have been taken into account are:

- Reclaiming and developing additional land;
- Expanding the non-farm activities related to, and complementing agricultural activities in the fields of production of agricultural inputs, processing agricultural products and the various other service and support activities, while concentrating on small economic units managed by individuals, cooperatives and associations in the rural areas;
- Adopting labor and capital intensive agricultural technologies, and promoting them in order to achieve better income for workers in the agricultural sector and the rural areas in general. In the field of protected cultivation, for example, the feddan needs 5 to 8 workers, although this type of production is capital intensive as the capital cost for each feddan is around EGP500, 000. This applies also to many production and support services such as milk collecting and processing centers, sorting, grading and packaging stations, vegetable and fruit processing stations, and many other fields; and

- Giving greater attention and support to agricultural human resources' development, including university and secondary education institutions, training, information and skill development centers, as well as other activities that generate enough skilled and specialized laborers to meet the requirements of modernized agricultural activities.

2.4.2 Improving agricultural productivity

In spite of increasing land productivity over the last twenty years that doubled the productivity of some crops such as wheat, rice and maize, as well as increasing the average cow and buffalo milk production, such increases do not reflect the potentials of increasing land and animal productivity. Available data show that the difference between actual and potential productivity amounts to 50% in perennial clover, 45% in sugar beet and citrus, and 25% in wheat and rice.

Due to limited land and water resources, and the strong competition between the various water uses, it is necessary to concentrate on maximizing land and water productivity. From the national and individual stand points, development objectives are not consistent, as shown in Table 2.6. While land returns of agricultural rotations in which rice is a component are high, water returns are low.

Table 2.6 – Estimates of the net returns of land and water under the applied crop rotation, according to 2007 statistics

Order	Net water returns (1,000 m ³) (EGP)	Order	Net feddan returns (EGP)	Agricultural rotation
1	1236	4	4729	One-cut clover/cotton
6	667	6	3744	Maize/wheat
9	513	1	5755	Wheat/rice
3	933	3	5524	Perennial clover/maize
8	645	2	5672	Clover/rice
6	667	6	3603	Sugar beet/maize
4	719	5	4341	Clover/soya beans
2	1022	8	3068	Wheat/sorghum
5	684	9	2368	Sugar beet/ cotton

Source: Compiled and computed from the statistical annex tables.

2.4.2.1 Increasing plant productivity priority areas

To achieve the objectives of the agricultural development strategy, it is necessary to increase the productivity of all field and horticultural crops, through:

- Paying greater attention to the cultivation of salinity- and drought-resistant varieties, in order to cope with the problems of climate change leading to higher temperatures in the Near East and North Africa. It is also necessary to develop high salinity resistant varieties suitable for the use of agricultural drainage water, as well as expanding the use of marginal saline lands in horizontal expansion projects in north Sinai;

- Using early-maturing varieties, leading to saving irrigation water and achieving high crop intensification rates. More than one crop can be cultivated in the same year. This would also save water needed for horizontal expansion;
- Developing clover production. Areas planted to clover amount to 2.3m feddans, including some 1.8m feddans for perennial clover and some 0.5m feddans for one-cut clover. Yields are at present around 30 tons while potential productivity is around 60 tons. Therefore, there is a high potential to increase productivity and lower the feed cost of livestock thus increasing their competitiveness;
- Developing long and medium staple cotton varieties so that Egyptian cotton can regain its competitiveness in the international market. This would also provide an incentive to farmers to cultivate these cotton varieties. Research policies and programs should be developed for the development of excellent long staple varieties with an average productivity of not less than 10 kantars⁴, as well as medium-long staple varieties with an average productivity of 12 – 15 kantar/feddan. This would require obtaining new genetic resources and genetically modify them to suit Egyptian conditions. However, identifying new international and local markets is essential for cotton revival;
- Giving greater attention to horticultural crops with limited water consumption, particularly date palm, olive, fig, pomegranate and grapes, as well as developing commercial varieties with competitive marketing properties in the world market; and
- Giving greater attention to integrated farm management and cultural practices, through introducing integrated technological packages, and ensuring availability of adequately trained and qualified extension staff capable of transferring technical recommendations to farmers, particularly small farmers. This would require developing policies to establish integration between extension, credit and marketing services for both inputs and final products.

Under these priority areas, the anticipated productivity of the main crops has been calculated on the basis of the following three elements:

- Increasing land productivity, through development and breeding programs executed at present by the Agricultural Research and Development Center, while making use of genetic engineering techniques;
- Continuing present and proposed research programs for the development of tolerant varieties to unsuitable environmental conditions, such as temperature, soil salinity and water shortage, as well as early-maturing, high-yielding crop varieties, as it is the case with rice and wheat; and
- Improving farm management systems.

Based on the aforementioned objectives, estimated yields of these crops have been calculated for 2017 and 2030, as shown in Table 2.7.

⁴ One *kantar* is approximately 45 kilograms.

Table 2.7 – Present and anticipated productivity of the main crops (tons/feddan)

Crop	2007	2017	2030
Wheat	2.7	3.2	3.6
Rice	4.1	4.5	5.2
Maize	3.5	4.4	5.0
Sugar cane	49.0	56.6	65.4
Sugar beet	22.0	28.0	35.0
Groundnut	1.4	2.0	2.5
Fava beans	1.4	1.6	1.8
Cotton	1.4	1.6	1.8
Citrus	9.1	12.0	15.0
Grapes	9.9	12.0	14.0
Olives	4.6	6.0	8.0
Mango	4.6	6.0	10.0
Tomatoes	14.5	20.0	30.0
Beans	5.1	7.0	8.0
Potatoes	10.7	12.0	14.0
Medicinal plants	1.0	1.1	1.3
Perennial clover	29.6	35.0	40.0
Dates (kg/tree)	104.0	110.0	120.0

Source: Compiled and computed from the statistical annex tables.

2.4.2.2 Priority areas to increase livestock productivity

The main objective of developing livestock, poultry and fisheries is to increase *per capita* share of animal protein by approximately 4 gm/day by the year 2030, as well as reconstructing the animal protein basket from the different sources in favor of local less costly sources, and consequently prioritizing development efforts for the different sources of animal protein on the basis of their economic efficiency, while concentrating on the development of the production of small and medium breeders. To achieve these goals, priority areas to increase animal productivity have been identified as follows:

I. Priority areas to increase milk and red meat productivity

- Meat production is a by-product of livestock husbandry because milk is the main product. Therefore, attention should be mainly given to the improvement of milk productivity in the first place;
- Genetic engineering improvement programs should aim at improving milk productivity of cattle and buffaloes in order to meet the needs of the increasing

population, and in the meantime increase *per capita* share from 63 kg/person to 90 kg/person per annum by 2030 (Table 2.8);

- *Per capita* share of red meat is foreseen to decline by 0.5 kg every five years. There is a trend for reducing red meat production by 2% per annum until the year 2030, through reducing carcass weight of fattened heifers;
- Milk imports are foreseen to decrease by the year 2030 to marginal quantities; and
- Paying greater attention to the eradication of animal diseases, as well as common diseases transmitted between animals to humans, causing severe losses to milk producing animals, particularly Brucellosis, Foot and Mouth disease, Rift Valley disease and bovine tuberculosis. An early warning system against trans-boundary diseases should be established.

II. Priority areas to increase poultry productivity

The strategy for the development of poultry production aims at increasing average *per capita* share of poultry protein by 1 gm/day by the year 2017, to reach 2 gm/day by the year 2030. In order to achieve this goal, policies and programs should be put in place to:

- Increase the imports of grandparent fattening stock to 348,000 birds, and the imports of parent laying hens to 536,000 birds, by the year 2030;
- Continuously improve feed conversion ratios to reach 1:1.8 for meat poultry, and 1:2.6 for egg poultry. This would require the development of rearing and husbandry practices, as well as improving feed in order to raise feed conversion efficiency and reduce feed consumption;
- Continuously improve rural household poultry breeding, through the improvement of local breeds, intensification of vaccination campaigns and veterinary services, introducing feed alternatives and introducing technological alternatives to help rural women manage economic medium size flocks that can be an additional source of household income, as well as ensuring a satisfactory level of food security; and
- Give priority to the containing of *avian influenza* (Bird Flu) which has caused severe losses to the poultry industry, particularly to the rural flocks, as well as improving household rearing practices in order to contain the spread of this disease.

2.4.2.3 Priority areas to increase fisheries productivity

The fisheries sector provides the cheapest source of animal protein. It has the greatest potentials to increase animal protein production due to the existence of vast water bodies that can be utilized in fish production. The main objective is to increase production to around 2m tons by the year 2030, thus increasing *per capita* share from 13 kg at present to 18.5 kg by the year 2030. In order to achieve this goal, policies and programs should be put in place to:

- Sustainably increase the production of lake fisheries, through clearing water weeds, clearing and maintaining straits, and reducing or banning the disposal of contaminants. This would lead to increasing productivity, and improving product quality;
- Expand fishing in the Mediterranean into the exclusive economic zone, extending to 200 nautical miles, instead of the 12 nautical miles constituting Egyptian regional waters; and
- Encourage investments in marine fish farming and the establishment of hatcheries. Expanding fish farming activities is anticipated to increase fish production from 595,000 tons in 2007 to around 1.39 m tons by 2030, i.e. an increase of 133%.

Table 2.8 – Anticipated livestock products and imports under the SADS towards 2030

Year	2007	2017	2030
Milk production (million tons)	4.4	7.2	9.54
Milk imports (million tons)	0.46	0.14	—
Red meat production (million tons)	0.67	0.853	1.089
Red meat imports (million tons)	0.33	0.251	0.077
Fattening broilers' production (million birds)	850	1095	1411
Egg production (billion eggs)	6	7.2	9.32
Sea fish production (1,000 tons)	11.6	200	250
River and lake fish production (1,000 tons)	256	295	320
Aquaculture production (1,000 tons)	595	1005	1390

Source: Compiled and computed from the statistical annex tables.

2.4.3 Increasing the competitiveness of agricultural products in local and international markets

2.4.3.1 Justifications and available opportunities

At present, as well as in the foreseeable future covered by the time span of the SADS towards 2030, the world is becoming increasingly interdependent, particularly after the establishment of the World Trade Organization (WTO) and moving towards removing tariff and non-tariff trade barriers and the establishment of several regional economic groupings. Within this framework, competitiveness has acquired increased attention by economists, planners and policy-makers in all developed countries and some developing countries. Increasing competitiveness means increasing the capability of managing resources and processes, creating an added value by achieving sustainable growth in production and employment, thus raising economic welfare in general.

From the perspective of Egypt's natural resources, agriculture benefits from substantial competitive elements. Therefore, it is necessary to improve all the other elements of competitiveness in the light of the problems and challenges facing agricultural development. The suitable starting point would be to clarify the concept of competitiveness to all interested parties - policy-makers, executives and farmers - in order to adopt policies and programs for properly and sustainably supporting the competitiveness of the agricultural sector and products.

2.4.3.2 Elements of competitiveness and challenges faced

Agriculture in Egypt enjoys some features and advantages that support its competitiveness. Thanks to these features and advantages, agricultural products continued to play a principal role in Egyptian exports for long decades. Until the early 1960, agricultural exports constituted 85% of total exports. Agricultural exports included a limited number of products such as cotton, rice, onion, groundnut, and some kinds of fresh vegetables needed in world markets.

Egypt is one of the oldest agricultural countries that has benefited from its natural and environmental conditions in producing several products that are exported during the different seasons of the year. Its geographical situation and good communications with the rest of the world confer on it special advantages in European and Arab markets. In addition to regaining its

reputation and distinction in exporting traditional commodities, there is also an opportunity to increase its exports of promising non-traditional commodities, particularly medicinal and aromatic plants, organic products, cut flowers and ornamental plants.

However, world markets have experienced changes and developments that constitute basic challenges that would require serious efforts for responding to such changes and developments, most important of which are:

- Liberalization of world trade, and obligations under WTO agreements;
- The proliferation of regional economic groupings and their implications on international trade;
- The appearance of other competing countries in different export markets;
- The predominance of adhering to overall quality standards; and
- Implementing modern techniques in production, marketing and information to strengthen Egypt's competitiveness.

2.4.3.3 The main elements to strengthen Egypt's competitiveness of agricultural products

It is well known that any endeavor to develop and improve the competitiveness of Egyptian agricultural products in local and international markets would require serious and sustained efforts at different levels: the national, international, the agricultural sector, as well as all involved stakeholders.

On its part, the government endeavors to strengthen competitiveness at the national level, through economic reforms and improvement of investment environment, financial and monetary macro-policies, and external trade policies. However, greater efforts have to be invested to penetrate new international markets.

At the agricultural sector level, there are many elements and areas that have to be targeted for improvement. Strategic priority areas are as follows:

- Giving greater attention to the improvement of product traits in accordance with the requirements of domestic and foreign markets, as well as marketing and processing requirements;
- Establishing quality standards for agricultural products, and expanding sorting, grading and packaging processes in accordance with such standards;
- Keeping abreast of modern and advanced techniques that support the economic efficiency of agricultural production, particularly as related to the development and use of high-yielding, early-maturing varieties and varieties that can endure unsuitable environmental conditions;
- Using modern information and communication techniques that serve the agricultural sector;
- Developing needed marketing facilities and services and agricultural markets;
- Refining pre- and post-harvest practices to improve product quality;
- Applying modern techniques in monitoring, analyzing and forecasting natural, technical and marketing risks, under a special unit for the management of agricultural risks;
- Linking farmers, particularly small farmers, with markets, including the development of marketing systems and channels, the provision of marketing information and marketing extension;

- Activating and strengthening the role of the government in achieving the right equilibrium between this role and market forces, including exercising supervision on quality standards of both inputs and outputs, strengthening competitiveness, banning monopoly and adulteration, improving consumer protection, as well as supporting civil society organizations; and
- Strengthening institutional and organizational mechanisms that support the linkages between local and external marketing, including contract marketing as well as establishing specific commodity boards and associations.

2.4.4 Achieving higher rates of food security in strategic goods

The world food crisis of the early 1970s led to the emergence of food security support policies. The predominant concept of food security in most countries at that time was self-sufficiency, i.e. increasing self-reliance in basic food commodities, without paying attention to the other food security aspects under the present concept, including ensuring food needs for the poor, the stability of food supplies and prices, and the quality standards.

As a result of the 1970s food crisis, Egypt adopted policies and programs to increase production of the main food commodities. An intensive program was put in place to subsidize several food commodities, under the central planning and management system covering the production and marketing of most of the agricultural products.

By the beginning of 2006, the second food crisis led to unprecedented increases of food prices, due to high demand for food commodities in densely populated countries like China and India and increasing improvement in their dietary patterns. The most striking example is that *per capita* share of meat rose from around 20 kg to around 50 kg. In addition, there appeared a trend to use some food commodities, such as maize and oil seeds and sometimes wheat for producing bio-fuel, in order to reduce the demand on oil whose prices reached unprecedented increases during that period. In this connection, available information shows that the world's production of bio-ethanol increased by 800% from 1995 – 2007, and the volume of maize used in producing bio-ethanol increased to 100 million tons in 2007, including 81m tons in the USA only, using 37% of the total maize production in the USA.

This latest crisis has affected most of the food importing countries. Egypt is one of the countries that have been seriously affected, due to its substantial imports of wheat, maize and vegetable oil, with unforeseen financial burdens to cover the increase of food prices, particularly subsidized food items such as bread, edible oils and some other food items. The implications of this crisis are as follows:

- Increased price distortions in the local market, for wheat flour and edible oils due to the high margins between subsidized prices and open market prices – leading to increased infiltration of subsidized goods to untargeted groups and purposes;
- Sharp increases of other food items important to the dietary patterns even for limited-income groups, such as poultry and animal products, due to increased feed prices, and increased production costs as a result; and

- Increased numbers of consumers facing difficulties in obtaining their basic food needs of subsidized or un-subsidized items. Indications show that unless drastic solutions are found, these groups would not be able to withstand the pressure, leading to social, economic, and even political instability.

As all international market indications show that effects of this world crisis are foreseen to continue for some time, the situation calls for introducing new more effective and equitable policies that would concentrate on the positive aspects of the problem in order to maximize its benefits, and containing its negative effects⁵.

Priority areas of action:

2.4.4.1 Raising the levels of self-reliance and self-sufficiency in strategic food commodities

Facing the implications of the present food crisis, calls for a focused review of agricultural development policies. The goals of this review should be to increase self-reliance and self-sufficiency in the main food commodities, without jeopardizing the achievements of economic reform. The SADS towards 2030 has given special attention to this aspect, through government programs, institutional reform and the adoption of new policies. Table 2.9 shows probable and projected developments in self-reliance and self-sufficiency to meet the main food commodities needs for direct consumption or agro-industries. The table highlights the following points:

- Egypt would be capable of achieving near-self-sufficiency in some food commodities imported at present, particularly wheat, maize, sugar and fish, through strengthening agricultural research institutions and focused technical development objectives;
- The rate of self-sufficiency is foreseen to rise to 81% for wheat, 80% for maize, 91% for fava beans, 93% for sugar, and 93% for red meat, by the year 2030.
- Achieving the above increases does not mean neglecting other food commodities with wide export opportunities, and products that are highly competitive in foreign markets, such as vegetables, fruits, and medicinal and aromatic plants. For example, exports of tomato and its products are foreseen to increase to 42% of their present production; citrus and citrus products available for exportation are foreseen to increase from 850,000 tons in 2006 to 1'900 thousand tons by the year 2017 and 3'260 thousand tons by the year 2030. Similar increases are also foreseen for grapes and potatoes, as shown in Table 2.9; and
- It is worth mentioning that through decreasing pre- and post-harvest losses and establishing stricter controls over in-kind support, *per capita* share of wheat is foreseen to exceed 155 kg per annum, thus raising self-sufficiency rate from 54.4% to around 74% in 2017 and to 81% in 2030. Figures 1-4, below show anticipated developments in production and consumption of wheat, rice, maize and sugar.

⁵ FAO estimates indicate that world prices of the main food commodities are foreseen to re-rise after the present financial crisis recedes, and that prices would not return to their levels before the food crisis.

Table 2.9 – Estimated rates of self-reliance and self-sufficiency in the main food commodities, under the SADS towards 2030

Main food commodities	2007*			2017 estimates			2030 estimates		
	Prod. (1,000 tons)	Requirements (1,000 tons)	Self-suf. (%)	Production (1,000 tons)	Requirements (1,000 tons)	Self-suf. (%)	Prod. (1,000 tons)	Requirements (1,000 tons)	Self-suf. (%)
Wheat	7388	13591	54.4	12000	16238	73.9	15120	18709	80.8
Milled rice	4553	3273	139.1	4161	3956	105.2	4809	4664	103.1
Maize	6300	11900	53.2	12600	16100	78.3	18500	20600	91.9
Sugar	1487	1933	76.9	2260	2760	81.9	3460	3710	93.3
Fava beans	301	578	52.1	480	690	69.6	720	795	90.6
Potatoes	2793	1548	180.4	3600	2024	177.9	4900	2650	184.9
Tomatoes	7888	7623	103.5	11600	9200	126.1	18600	10812	172.0
Citrus	3594	2672	134.5	5400	3496	154.5	7500	4240	176.9
Grape	1783	1294	128.5	2400	1656	144.9	3500	2120	165.1
Milk	4400	4859	90.6	7200	7332	98.2	9540	9540	100
Red meat	670	1001	66.9	853	1104	77.3	1089	1166	93.4
White meat	850	847	100.4	1095	1095	100	1410	1410	100
Eggs	240	240	100	288	288	100	373	373	100
Fish	971	1001	97	1500	1380	108.7	1950	1961	99.4
Population number	77 millions			92 millions			106 millions		

Source: Compiled and computed from the statistical annex tables.

* Food balance sheet data for 2007 are not available. Estimates of *per capita* share are based on 2006 data.

Figure 1 – Wheat production and consumption

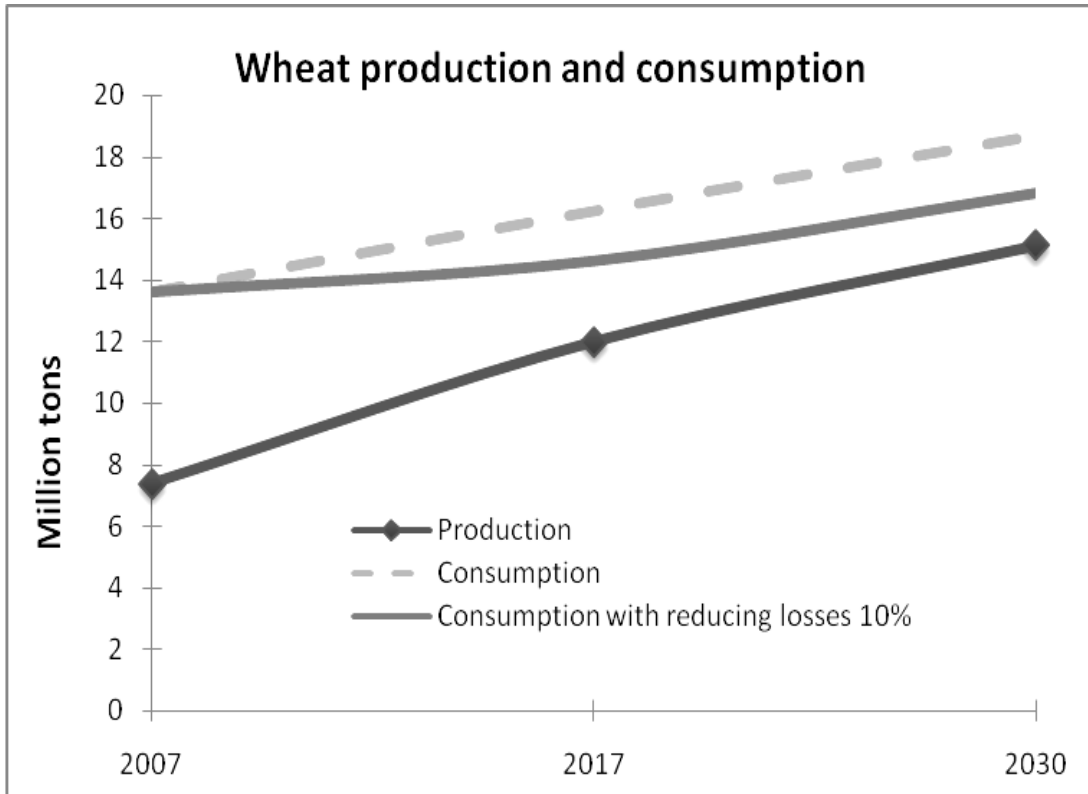


Figure 2 - Milled rice consumption and surplus for exports

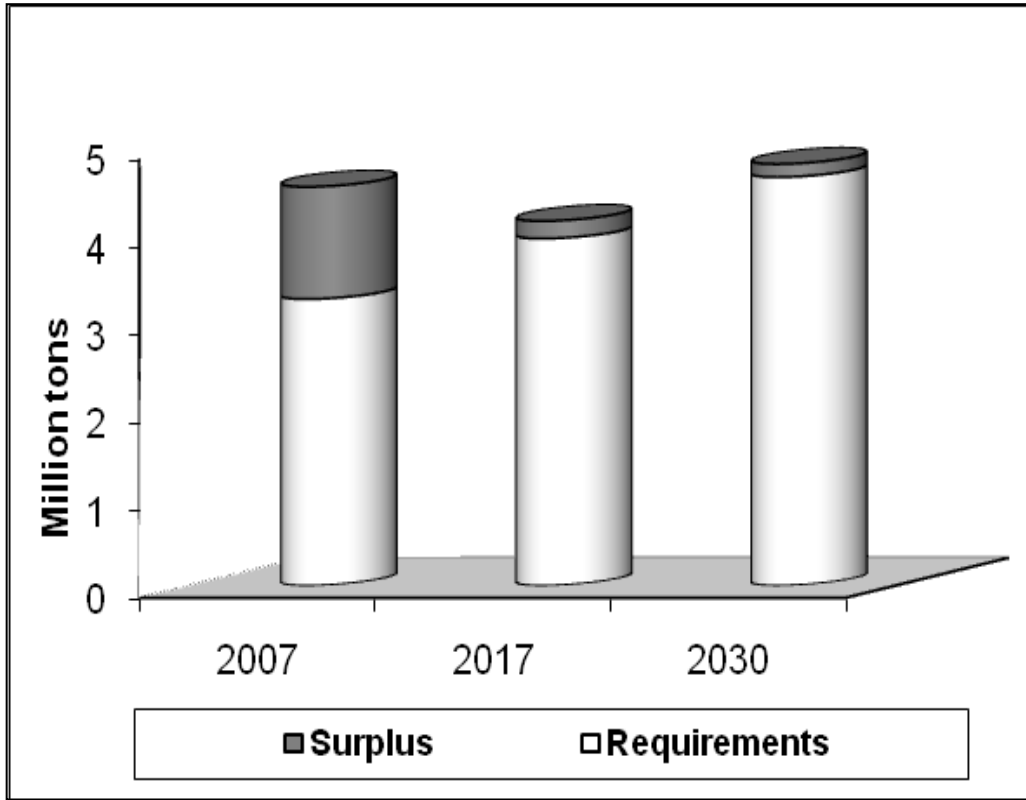


Figure 3 – Sugar production and imports

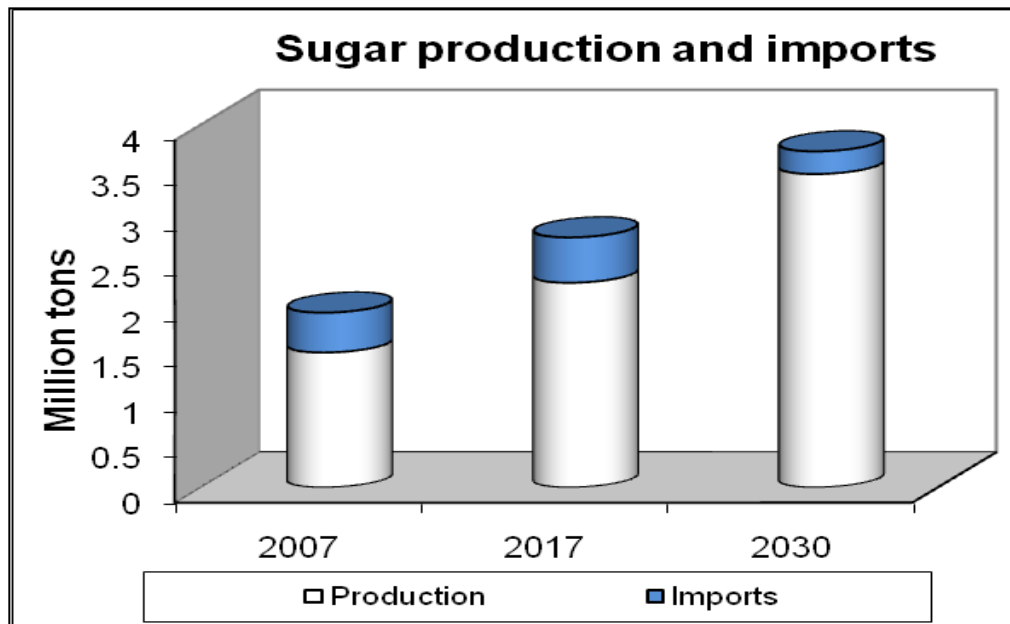


Figure 4 – Maize production and imports

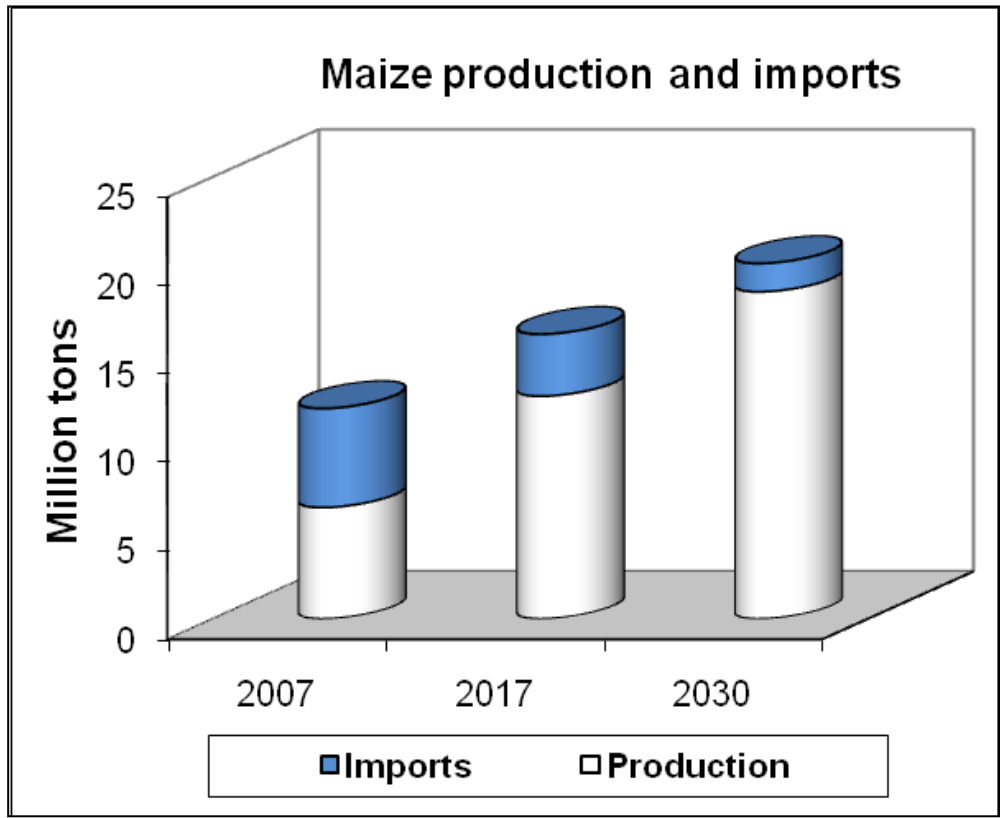
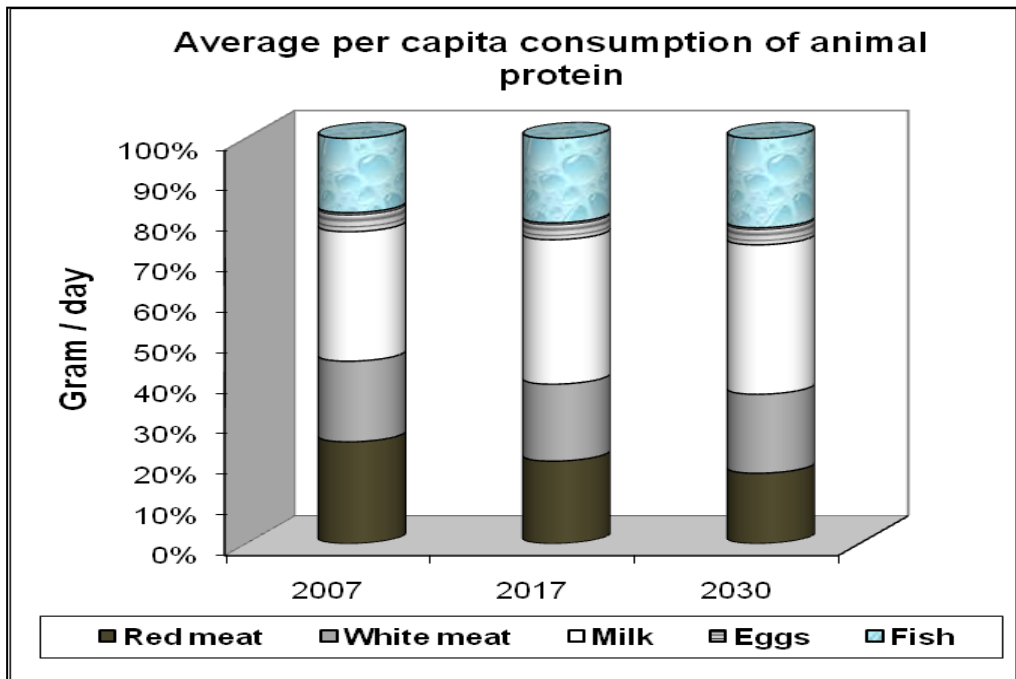


Figure 5 – Average per capita consumption of animal protein



2.4.4.2 Improving consumption patterns to improve nutritional standards

Available data and statistics indicate that predominant dietary patterns suffer from shortcomings that can be summarized in the following:

- There is a dietary intake imbalance in favor of energy foods. Dietary intake of energy foods is in excess of the recommended rates, while the intake of micro elements such as Vitamin A, Vitamin C, iron, zinc and calcium is in short supply; and
- Around 45% of the population gets more than their needs of carbohydrates, leading to obesity among mothers. Most of this overweight is due to the high proportion of subsidized food items in the diet of most of the population.

As a result, one of the priority areas of the SADS towards 2030 is to improve dietary patterns, through policies and programs that encourage local production of highly nutritive foods called muscle building foods, including meat, milk, eggs and fish, as well as protective foods such as vegetables and fruits. Table 2.10 shows the likely developments in *per capita* share of such foods by the year 2030, while Figure 5 shows *per capita* animal protein content and its likely sources.

Table 2.10 – Estimates of *per capita* share of some highly nutritive food items, under the SADS towards 2030

Some highly nutritive food items	2007		Estimate for 2017		Estimate for 2030	
	Average <i>per capita</i> share kg/year	Protein content gm/day	Average <i>per capita</i> share kg/year	Protein content gm/day	Average <i>per capita</i> share kg/year	Protein content gm/day
Red meat	13.0	4.8	12.0	4.4	11.0	4.1
White meat	11.0	3.8	11.9	4.1	13.3	4.6
Total meat	23.0	8.6	23.9	8.3	24.3	8.7
Milk	63.1	6.1	79.8	7.7	90.0	8.7
Eggs	3.1	0.9	3.1	0.9	3.5	1.0
Fish	12.6	3.5	16.3	4.5	18.5	5.2
Total	-	19.1	-	21.7	-	23.5

Source: Compiled and computed from the statistical annex tables.

2.4.4.3 Reducing food marketing losses

Food marketing losses have been estimated at 30% for vegetables and fruit, 20% for legumes, and not less than 10% for cereals. There is another type of losses related to converting these products from human consumption to the production of animal feed, in addition to quality deterioration during transportation.

In spite of the numerous estimates of the different types of losses, the most conservative assumptions indicate that they constitute one fifth of the annual agricultural income.

For redressing this situation and its implications on the income of farmers who receive lower prices on the one hand, as well as on consumers who bear part of the cost of losses on the other, the strategy contains policies and programs for developing marketing operations and increasing the rate of agro-industries. This will lead to gradually decreased pre- and post-harvest losses for the benefit of both producers and consumers, and improving the status of food security on the other. Generally, the strategy aims at reducing losses to half their present rates, through the development of marketing systems and policies, as well as reviewing the present policies of in-kind support and putting in place more effective support policies.

2.4.4.4 Improving food quality and safety

Food quality and safety are among the most important aspects of food security. To meet food quality and safety requirements, efforts should be exerted in two main directions, namely:

- Establishing specific standards for food products offered on the market; and
- Enacting laws and regulations to streamline markets, and commit dealers to apply quality standards, and inform consumers of these standards and their implications on price levels, as well as the different uses of goods offered on the market.

The strategy has given great attention to the above two aspects, through identifying implementation mechanisms, as will be detailed under the proposed strategic actions.

2.4.4.5 Improving social safety nets

Egypt is one of the first states to establish social safety nets to minimize burdens on limited-income groups, through establishing a system for in-kind support that benefits quite a large number of the population. There are also different direct financial support systems, such as pension systems applied by the Ministry of Social Solidarity.

There is no doubt that these systems have considerably contributed to curbing the effects of rising food prices for the limited-income groups. However, resulting price distortions which accompanied the implementation of these policies – particularly the intensive in-kind support system of bread and the ration cards - have been detrimental to the support policy itself, due to the fact that in-kind support infiltrates to other undeserved income groups, thus decreasing the actual effect of the support policies. Such policies have caused major financial burdens related to field application and control. All this has led to sharp increases in food support bills. For this and other reasons, food support policies have to be reviewed in light of related international experiences. The strategy includes a specific proposal in this connection, within the framework of the proposed policies for furthering food security.

2.4.5 Improving the climate for agricultural investment

Over the last ten years, Egypt has given greater attention to policies and regulations pertaining to investment in general and agricultural investment in particular. Regulation have been revised and amended to make investment more attractive and to simplify procedures particularly as related to direct investments, capital inflows and capital and returns outflows. The banking system has been reorganized and developed. Procedures of the money market have also been simplified, in order to create an encouraging investment climate. Recently, the government has introduced a new income tax law. Tax collection procedures have also been simplified and arrangements have been put in place to build confidence between the tax authorities and tax payers, including investors and businessmen. A new policy has also been instituted for supporting exporters and reducing administrative and tax financial burdens that reduced their competitiveness in international markets during the 1980s.

The above arrangements have led to a noticeable improvement in investment climate in general. Agricultural activities, particularly those related to land reclamation have been exempted from paying taxes. Financial support has been granted to agricultural exports, through reducing transportation and shipping costs, as well as promotion costs in foreign markets.

However, in spite of the positive results achieved, there are still some pending restrictions and problems that reduce the positive impact of newly-introduced laws and regulations that can be summarized as follows:

- The complexity of agricultural investment procedures, particularly as related to land reclamation, due to the multiplicity of government agencies and institutions handling

agricultural investments and the weak coordination between them, reflecting negatively on investors and agricultural producers;

- The lengthy period necessary before obtaining reclaimed land title deeds, extending to more than ten years, thus depriving land holders from using their holdings as bank collaterals to obtain medium- and long-term credit – a basic tool to promote direct agricultural investment activities, as well as agriculture-related and complementary activities;
- Reduced public investments in the agricultural sector, particularly in irrigation and drainage projects during the last few years. Public investments are a precondition for the entry of private investments, and their reduction leads to decreased private investments; and
- Lack of coordination between horizontal agricultural expansion policies. While government policies are based on providing agricultural infrastructural facilities, not enough attention has been given to the establishment of agricultural and non-agricultural services needed for the settlement of new communities in the newly-reclaimed areas, leading to scarcity and increased wages of agricultural labor, thus increasing investment burdens in these areas.

Improving agricultural investment climate requires greater attention by the MALR, in collaboration with other concerned ministries, for eliminating constraints limiting agricultural investments, particularly in the following fields:

- Facilitating the allocation of newly-reclaimed areas, through establishing a single administration comprising representatives from all concerned regulatory ministries with which investors and businessmen are in direct contact;
- Reviewing land allocation laws and procedures, in order to expedite the issuance of title deeds, or putting in place a new process to enable farmers and investors to whom the new areas have been allocated to use their holdings as bank collaterals for obtaining medium- and long-term credit;
- Reviewing credit and lending policies, in order to rationalize lending terms and conditions, and facilitate lending procedures. This should be done in accordance with new credit lines that would increase investment flows in certain fields consistent with the objectives of the development strategy, such as:
- Improving field irrigation systems;
 - Developing the manufacturing of agricultural and irrigation machinery and equipment;
 - Processing agricultural products to the extent that helps integration between the various steps of the value chain, i.e. vertical integration between production, processing and marketing;
 - Developing and modernizing seed and seedling industry;
 - Developing agrochemical and biological industries;
 - Encouraging the establishment of farmers' institutions, and providing such institutions with the necessary powers for serving their members; and
 - Reclaiming new agricultural lands;
- The MALR to prepare a clear map for investing in agriculture defining the following elements and components:
 - Areas allocated to horizontal expansion provided with all facilities for agricultural settlement;
 - Areas allocated to the establishment of marketing and pre- and post-harvest processes, such as sorting, grading and packaging stations, stores, drying medicinal and aromatic plants, and other similar projects;
 - Areas allocated to the establishment of agro-industries related to planted crops; and

- Areas allocated to housing, as well as educational, health and social care facilities.

The agricultural investment administration of the MALR should be responsible for preparing a technical and economic framework for agricultural, marketing and processing projects within an investment map for each area. This framework would be used in promoting these projects, and can also be used as a framework for collective action through voluntary farmers' associations established for this purpose.

2.4.6 Improving livelihood of rural inhabitants

2.4.6.1 Justifications and opportunities

Improving the standard of living of rural inhabitants and bridging the gap between rural and urban areas constitutes a social and humanitarian obligation, as well as an essential strategic objective for national development in general and agricultural development in particular, in light of the following considerations:

- Addressing poverty, illiteracy and poor standard of living in the rural areas is the main arena for the battle against illiteracy and poor standard of living at the national level;
- There is a close linkage and interdependence between agricultural development and the standard of rural inhabitants, hence the importance of improving the standard of living of rural inhabitants in addition to its being a social imperative;
- Although predominantly traditional, agriculture in Egypt has great potentials for development, modernization, improving resource use efficiency, and raising production. Accordingly, agriculture has the basic requirements for leading the national development and improving development performance in general, and consequently improving the standard of living of farmers and rural inhabitants; and
- From the perspective of improving food security of the Egyptian population, including the large numbers of rural inhabitants, improving the standard of living serves a dual purpose: it supports their capability to improve and increase food products and enables them as consumers to satisfy their needs of these products.

2.4.6.2 Priority areas for improving the standard of living of rural inhabitants

Improving rural conditions and raising the standards of living of rural inhabitants are of major concern within the national overall development objectives, policies and programs. Related responsibilities are divided among several ministries and institutions, particularly in relation to the establishment of infrastructures such as roads, electricity, drinking water and sewage, as well as the basic services such as education, health and environment protection. Consequently, developing the infrastructure and services in rural areas is a high priority area in the national development strategy. Raising the standard of living of rural inhabitants would be the outcome of achieving positive results in the five objectives referred to earlier in addition to being an objective whose achievement would require putting in place policies and programs for improving rural conditions and raising the standard of living. The main objective is to endeavor to take the rural areas out of the restricted one-sided "agricultural" development and place them within a wider perspective involving the different production and services sector in an integrated framework, in accordance with the conditions and capacities of each area. The main priority areas to achieve this objective can be summarized in the following:

- Diversifying job opportunities and economic activities through encouraging agriculture-related activities and projects in rural areas, such as agricultural inputs and outputs production and marketing;

- Planning new agricultural expansion areas on the basis of diversifying activities and projects, for the establishment of integrated agricultural, manufacturing and service communities;
- Supporting and developing small rural handicrafts and industries suitable to production and environmental conditions, leading to the creation of more job opportunities and improving income levels;
- Maximizing the utilization of agricultural plant and animal residues, and converting them to useful materials and an added economic value (such as fertilizers, animal feed and energy), thus contributing to environmental improvement and cleanliness;
- Supporting and developing small farmers' institutions, particularly as related to marketing, in order to improve their bargaining powers in buying agricultural inputs and selling their products;
- Involving small farmers in export activities, in order to improve their returns and incomes, and develop their agricultural knowledge and practices; and
- Activating the role of women in the different rural development areas.

2.4.6.3 Estimated investments to achieve the strategic objectives

Based on the results of the econometric relation between total agricultural investments and economic growth rates achieved during 1970 – 2005, total agricultural investments needed for the achievement of the projected growth rates have been estimated. Table 2.11 below shows the results of computing this relation. Results indicate that total projected investments by the public and private sectors to achieve the strategic objectives are estimated at EGP500 billion, considering a projected growth rate of 4% during 2009 – 2030. In case of a projected growth rate of 5%, total investments would be around EGP640 billion until the year 2030. National investments allocated to agricultural and irrigation sectors in the sixth five-year plan 2007/2008 – 2011/2012 are estimated at EGP12.3 billion per annum, to achieve a growth rate of 3.6% at the beginning of the plan and 3.9% by the end of the plan. Projected investments by the private sector are estimated at EGP49.4 billion, i.e. 80.2% of the total.

Table 2.11 – Projected investments until 2030 (in billion EGP at 2005 constant prices)*

Year	Investment expenditure (4% growth rate)	Investment expenditure (5% growth rate)	Year	Investment expenditure (4% growth rate)	Investment expenditure (5% growth rate)
2009**	13.4	15.2	2020	22.3	28.3
2010	14.1	16.2	2021	23.4	29.8
2011	14.8	17.1	2022	24.4	31.5
2012	15.5	18.1	2023	25.5	33.2
2013	16.2	19.2	2024	26.7	35.0
2014	17.0	20.3	2025	27.9	36.9
2015	17.8	21.5	2026	29.1	38.9
2016	18.7	22.7	2027	30.4	41.0
2017	19.5	24.0	2028	31.7	43.2
2018	20.4	25.4	2029	33.1	45.5
2019	21.4	26.8	2030	34.6	48.0
Total				497.9	640.8

* Computed on the basis that capital coefficient is 1.55, and amortization rate is 7.3%.

** Investment expenditure in 2007/2008 amounted to EGP8.4 billion to achieve a growth rate of 3.65%.

Source: Results on the econometric relation between investment expenditure in the agricultural sector and achieved growth rates during 1970 – 2005.

2.5 PROPOSED IMPLEMENTATION MECHANISMS TO ACHIEVE THE STRATEGIC OBJECTIVES

Execution mechanisms mean the activities and procedures that need to be put in place by government institutions – the MALR and other ministries and institutions – for the achievement of the strategic objectives.

Execution mechanisms fall under three main categories:

- **Institutional reform:** This category covers institutional reform of the MALR and its institutions, as well as private sector and civil society institutions. The functions and execution capabilities of these institutions need to be reoriented, in order to be able to achieve the strategic objectives;
- **Policies:** This category covers all the policies that need to be reconsidered or introduced to establish an environment that would help achieve the strategic objectives or those that are necessary to direct private sector decisions and activities towards the achievement of these objectives. This would require a legislative basis – ministerial decrees, laws and regulations – for committing the targeted groups to implement the proposed policies; and
- **Programs and projects:** This category of execution mechanisms covers all programs and projects that come under the government responsibility and should be included in the annual execution plans. It should include all research and extension programs, as well as investment programs and projects to achieve strategic objectives, such as the development of irrigation canals and other similar projects, including what the government might assign to investors and businessmen within their participation in executing development plans and programs.

2.5.1 Reform of agricultural institutions

Agricultural development strategies adopted since the early 1980s have concentrated on reforming price policies and unleashing market forces, as well as transferring and adapting modern technology as a means to addressing the shortage of food supplies. This has met the strategic objectives only partially, due to the fact that the implementation of these strategies relied on institutional frameworks and mechanisms incompatible with the nature of the market economy, leading to the emergence of many problems and crises related to the marketing of some strategic crops, such as cotton and wheat, as well as the provision and sale on agricultural inputs.

The institutional structure of the agricultural sector is highly complex, duplicative, with overlapping duties and responsibilities in some cases and the absence of an institutional structure in others. In addition, there are some institutional frameworks that lack the appropriate mechanisms for carrying out the tasks assigned to them, while some other entities carry out tasks incompatible with their nature and basic functions.

Generally, three kinds of institutions active in the agricultural sector may be identified. They are:

- Government institutions, represented by the MALR and other related institutions;
- Civil society organizations active in the field of agricultural rural development; and
- Cooperative organizations and institutions.

2.5.1.1 Priority areas for institutional reform of the MALR

I. Objectives of institutional reform

The institutional structure of the MALR is highly complex due to diversity of research, extension, planning, follow-up and productive tasks performed by the ministry, in addition to developing policies and providing information, resulting in numerous administrative units at the central and governorate levels.

The organizational structure of the ministry is based on functional, commodity, specific, geographical and historical units. Under the ministry, there are also several stand-alone general organizations with no defined horizontal or vertical linkages, such as the Principal Bank for Agricultural Development and Credit, the General Authority of Land Reform, Agricultural Reconstruction and Development Authority, the General Authority for Veterinary Services, the Egyptian Agricultural Authority, and The General Authority for Fisheries, the ARC, and the Desert Research Center.

The institutional reform of the ministry has the following objectives:

- Restructuring the institutional structure on a functional basis, in order to improve performance;
- Removing contradiction and duality between the roles of the different units;
- Establishing administrative and organizational conditions conducive to the achievement of the strategic objectives of the agricultural sector; and
- Maximizing technology implementation in all fields through the establishment of appropriate institutional frameworks.

II. Priority areas for institutional reform of the MALR

In order to develop the institutional structure of the ministry and related institutions, it would be necessary to take the following actions:

- Identify the tasks of the ministry and related institutions in the fields of research, extension, planning, follow-up, providing data and information, as well as protecting and developing agricultural resources (the supervisory role), and the establishment of the necessary infrastructure for land reclamation;
- The MALR should relinquish its role in production as in the case of the Fisheries Authority, as well as reconsider the service role performed by the General Authority for Veterinary Services and the agricultural mechanization sector;
- The Principal Bank for Agricultural Development and Credit should relinquish its role in the provision and distribution of agricultural inputs, and concentrate on its principal role of financing agricultural activities and banking activities. The provision and distribution of agricultural inputs should be handled by the cooperative and the private sectors, under laws and regulations which effectively regulates markets;
- Merge institutional units with similar functions under one strong entity with defined terms of reference, as in the case of the Fisheries Authority;
- Review agricultural law and related laws, such as the veterinary services law and the Fisheries Authority Law, with a view to amending them to keep abreast of the socio-economic developments and continue integrating the Egyptian economy with the world economy;

- Restructure the agricultural extension service into a knowledge entity transferring technology to small farmers, and establish an institutional framework for linking agricultural extension with research institutions in and outside the MALR;
- Merge and strengthen entities responsible for agricultural data collection, analysis and dissemination, as well as establish a mechanism for making such data available to all interested parties particularly at the village level;
- Establish a new coordination mechanism between the different units of the MALR;
- Introduce a system for results-based evaluation and monitoring, as well as monitor and evaluate staff performance with the participation of all staff. Such a system should be the basis for granting incentives and promotions;
- Establish a new institutional entity to be responsible for the elaboration of standards for agricultural inputs, as well as their circulation in the market, and establish the modalities that would allow such system to be applied effectively;
- Merge entities responsible for training and human resources' development in one entity to be responsible for continued training of staff;
- Establish a system for internal and external training of researchers in the Agricultural Research and Development Center and the Desert Research Center, and establish linkages between these centers and other research centers and Egyptian and foreign universities for ensuring the continuous development of research and innovation capabilities;
- Establish mechanisms for safeguarding researchers' to their Intellectual Property Rights and royalties to their research and development programs, as well as, and;
- Review the institutional structure of the different entities and units of the MALR, and define their strengths, weaknesses and relations with other entities, as well as define their tasks in accordance with their functions.

2.5.1.2 Reforming and supporting civil society organizations active in rural development

In spite of the vital role that can be played by civil society organizations in expediting economic reform and agricultural development, there is only a small number of such organizations, such as the Poultry Producers' Association, the Association of Producers and Exporters of Horticultural Crops, the Association of Horticultural Crops Development, the Association of Seed Producers, and a few other non-governmental organizations active in agricultural development.

Generally speaking, institutional reform goals of civil society organizations active in the field of agricultural development can be summarized in the following:

- Enacting a unified law for regularizing the establishment umbrella special-purpose associations, instead of enacting a special law for each special-purpose association to be established. The MALR should be responsible for the registration fostering of these associations;
- The MALR should provide technical support to all associations and organizations, and consider them a principal partner with the agricultural extension service in executing extension plans and programs;
- Establishing linkages between the ministry's research centers and other research institutes and civil society associations, and involving all institutions and organizations in developing research plans, their execution and follow-up, as well as applying research results; and

- Relying on professional management staff to manage the activities of civil society organizations instead of staff seconded from the government.

2.5.1.3 Institutional reform of agricultural cooperatives

Economic and political variables as well as economic reform programs in Egypt have had their clear imprint on the economic system. Many laws and regulations governing the economic activities have been amended in order to give more freedom to the private sector to play its role in a free and competitive environment, the government continued its interference in the cooperative sector and has not taken serious steps towards its reform.

This has had its implications on cooperatives' performance whose role has markedly shrunk, leading to a situation that calls for restructuring the cooperative movement and changing its orientations and work modalities.

Law 122/1980 governs cooperative activities in three areas: credit cooperatives, land reform cooperatives, and land reclamation cooperatives. Fisheries cooperatives come under a separate law. The cooperative movement comprises 15 cooperatives at the national level, 45 cooperatives at the governorate level, 227 joint cooperatives at the administrative centers level, and 5707 local cooperatives.

I. Constraints facing the cooperative movement

- The multiplicity of cooperatives: there is one cooperative, and in some cases more than one cooperative, in each village,
- The weak financial positions of many cooperatives, and their inability to establish economically viable projects;
- Unavailability of suitable venues that would allow staff to effectively carry out their duties, in addition to the unavailability of suitable stores;
- Shortage of administrative staff skills and the elected members of the cooperatives' boards of directors, most of whom are seconded from the government;
- The low level of services rendered by the cooperatives to their members, and their inability to provide their needs of production inputs and marketing outputs;
- The fake cooperatives' general assembly meetings, and members loss of confidence in the important role that can be played by cooperatives;
- Direct government interference in the management of cooperatives and their subjection to the direct supervision of the Central Department of Agricultural Cooperatives of the MALR and the Agricultural Cooperatives' Directorates in the governorates, in addition to the right of the government to challenge the decisions of cooperatives' boards of directors, and even the dissolution of these boards in some cases. As a result of this serious government interference, cooperatives cannot take initiatives be accountable or promptly respond to changing situations and effectively manage their activities and finances; and
- Government opposition to the attempts to reform the cooperative movement.

II. Points of strength and opportunities available to cooperatives

- The availability of substantial assets and investments owned by the cooperatives;
- Cooperatives can establish a fund for financing the trade of production inputs, in order not to borrow from the banking system;

- Providing training and human resources' development through training centers owned by the cooperatives in all governorates;
- Members suffer from input and product marketing problems. Cooperatives constitute the best institutional framework for providing marketing services to farmers;
- With the emergence of the water shortage problem and the need to develop the irrigation system, the cooperative system can provide an effective institutional framework for the development and maintenance of the irrigation system; and
- Transforming many of the small farmers from subsistence production to market production.

III. Priority areas for institutional reform of agricultural cooperatives

- Amending Law 122/1982 articles that contradict with cooperative independence, in conformity with the conditions of market economy;
- Redefining the role of the administrative machinery in conformity with the principles of democratic management and internal monitoring;
- Eliminating waste of financial and human resource particularly at the village level;
- Merging weak cooperatives and establishing economically viable ones, as regards membership size, financial resources, activity size and the area served;
- The staff structure of the cooperatives should be based on a professionally functional structure;
- Redesigning the role of multi-purpose cooperatives at the administrative centers level or abolishing them;
- Allowing cooperatives to establish funds (savings funds, financing funds, insurance funds, etc.);
- Designing the relationship between cooperatives and agricultural research and extension centers in a way that considers cooperatives as centers to promote the use of modern techniques in the different agricultural domains;
- Encouraging and supporting the establishment of cooperatives in the field of marketing plant and animal products, as well as the production of fertilizers, through providing technical support and long- and medium-term financing at appropriate terms; and
- Developing training programs and materials with a view to developing the skills of cooperatives' staff and elected members.

2.5.2 Developing policies for supporting agricultural development

Agricultural policies constitute the most important tools and mechanisms for improving the management of the agricultural sector for the general good of the society, without sacrificing the farmers' interests. Generally, the mix of the proposed agricultural policies aims at meeting the agricultural development strategic objectives, including:

- Linking the agricultural sector with the national objectives, e.g. improving growth rates, raising income levels, promoting exports and creating more job opportunities for reducing unemployment especially among the youth;
- Achieving the highest possible rates of self-sufficiency in strategic commodities, without sacrificing the principle of agricultural resources' efficiency, especially land and water;

- Strengthening the role of the state in the management of the agricultural sector and directing development efforts to achieve: i) planning and execution of public investments that support the private sector, ii) carrying out research and extension activities, iii) developing natural agricultural resources, iv) developing and evaluating agricultural policies, v) compiling and disseminating information and agricultural statistics, supporting small farmers' associations, vi) establishing standards for agricultural inputs and outputs, and vii) playing an effective role in the implementation of agricultural interdependence policies and contractual farming;
- Maximizing the benefits of Egypt's geographical position and its political weight due to its regional location, through making use of the positive elements of regional and international agreements;
- Maximizing the benefits of internationally-allowed subsidies for supporting agricultural activities and promoting competitiveness where needed, particularly in supporting research, extension, marketing and environment protection;
- Improving the efficiency of food subsidies and social security networks, with a view to reducing market distortions and poverty rates;
- Improving growth rates of the agricultural sector, through achieving a noticeable progress in the reclamation and development of new areas and on-farm application of new agricultural technologies;
- Improving the performance of the wide base of small farmers, and directing them to interact with the requirements of domestic and foreign markets, in order to improve their standard of living and reduce their economic and social problems, and encourage them to establish voluntary associations for providing agricultural and marketing services in order to increase their competitiveness;
- Encouraging the private sector to participate actively in the agricultural development effort, whether through direct agricultural activities or other related and complementary activities, through increasing the economic attractiveness of agricultural investments and improving agricultural investments climate in general; and
- Increasing the efficiency of agricultural research institutions, in order to be able to lead the technical development of the agricultural sector, through providing support and encouraging coordination, and concentrating on finding economically viable solutions to agricultural problems.

In conformity with the above, the nexus of the proposed policies includes a long list of objectives that can be reduced under six main groups, each related to the strategic objectives. The elements and components of these policies are as follows:

I. Policies for the sustainable use of natural agricultural resources

2.5.2.1 Rationalization of water resources use policy

A. Main justifications

- Water resources are limited and water supplies are not flexible. Egypt is already suffering from water poverty at a rate that increases year after year;
- The very low rate of water use efficiency, exceeding 50% of available water; and
- The achievement of a noticeable progress in land reclamation depends on improving water use efficiency to save enough water for the reclaimed areas.

B. Main objectives

- Meeting the needs of land reclamation plans;
- Achieving an appropriate rate of vertical agricultural development, as the application of a rationalized irrigation system would normally lead to developing agricultural practices and operations that would improve agricultural productivity;
- Implementing a voluntary change in the cropping pattern that would lead to increasing return per water unit, and consequently improve farmers' income; and
- Improving environmental conditions and public health in rural areas.

C. Elements and components

- Reviewing tax policies related to agricultural land, with a view to amending them so that tax assessment would be based on the area under cultivation, the cropping pattern and the irrigation method applied;
- Introducing new concessional credit lines to encourage farmers to improve field irrigation systems within the framework of the policies applied by the Principal Bank for Agricultural Development and Credit, or aid programs that may be introduced for this purpose;
- Improving the performance of government institutions responsible assessing and collecting agricultural taxes, in light of the requirements of proposed policies;
- Granting tax exemption to farmers applying improved irrigation systems and complying with proposed cropping pattern;
- Estimating water-consumptive use of different crops in the different environments, taking into consideration soil, climate and water characteristics;
- Determining the areas to be cultivated of each crop, and their distribution between the different holdings. This should take place through:
 - Using remote sensing and the Geographical Positioning System (GPS) in each season; and
 - Field verification, through agricultural directorates;
- Quantitative assessment of water consumptive use: concerned authorities in the MALR should assess water consumption of each holding on the basis of the assessed water consumptive use and the area cultivated;
- Quantitative correction: estimating water consumptive use in light of the quantities of water withdrawn from the irrigation water canal, in order to correct for the amounts used for water losses;
- Tax assessment: tax assessment should take into consideration water quantities used, on condition that during the first phase of application, total tax should not exceed property tax on small farmers;
- Notifying tax collection authorities of the Ministry of Finance of tax assessment data for collection. It is proposed that due taxes be collected twice a year after crop sale;

2.5.2.2 Agricultural land protection policies

A. Main Justifications

- *Per capita* share of agricultural land has dwindled to around 0.1 feddan;
- In spite of applying laws and regulations for curbing the encroachment on agricultural land, such policies have not succeeded in stopping urban encroachment

on agricultural land. Lost agricultural land has been estimated at around 20,000 feddan per annum; and

- In spite of their limited effect, applied procedures have become a pivotal concern of agricultural directorates at the governorate level, thus reducing the institutional capabilities of these directorates to untangle the constraint.

B. Main objectives

- Reducing agricultural land loss to the minimum; and
- Establishing an integrated framework to achieve balance between rural population urbanization requirements, due to the fast population increase of rural inhabitants, and protecting agricultural land.

C. Elements and components

- Undertaking an analytical review of applied laws, regulations and procedures for the protection of agricultural land, within the following framework:
 - Merging the different entities responsible for implementation in one entity with the appropriate terms of reference and powers necessary for law enforcement;
 - Establishing integrated housing plans for the Egyptian villages, with a view to developing the rural housing environment;
 - Providing village leaders with the opportunity to participate in laying down the conditions and standards included in these plans, so that such plans would meet the requirements and expectations of the rural inhabitants and facilitate implementation procedure;
 - Periodically monitoring law enforcement, through the use of aerial photography; and
 - Introducing machinery for linking the non-encroachment on agricultural land and benefitting from the ownership of newly-reclaimed areas.

2.5.2.3 Agricultural land maintenance policy

A. Main justifications

- Dwindling soil fertility levels of agricultural land in both the Delta and the Nile valley;
- Rising ground water level adversely affecting agricultural productivity; and
- Reduced fertilizer use efficiency, leading to increased production costs.

B. Main objectives

- Physically and economically increasing the productive capacity of agricultural land;
- Rationalizing fertilizer and pesticide use; and
- Rationalizing irrigation water use.

C. Elements and components

- Periodically updating soil surveys and analyses;
- Classification of agricultural land in accordance with soil surveys;
- Determining fertilizer rates for the different crops, in accordance with the soil profile fertility level, at the different stages of growth;

- Preparing extension manuals for fertilizer application in the different agricultural regions;
- Establishing a system for fertilizer distribution in accordance with the survey results and the recommendations of agricultural research institutions;
- Planning and execution of soil improvement programs; and
- Expanding the use of agricultural mechanization.

2.5.2.4 Fisheries development policy

A. Main justifications

- Reduced productivity of captured fisheries, in spite of the existence of vast water bodies totaling some 14 m feddans, and the diversity of water environments, the availability of scientific and practical expertise capable of successfully executing development activities;
- The non-compatibility of fisheries Law 142/1983 with changes that have taken place locally and internationally, requiring review and amendment of the law;
- The diversity of fish culture systems, providing a means for regulating production under various environmental conditions; and
- Spending substantial investments in fishing gear and fish culture activities, and the availability of wide possibilities for expanding sea fish culture and making use of underutilized Mediterranean fisheries.

B. Main objectives

- Reducing the pollution of water bodies and strictly applying fisheries and environmental laws and regulations in order to increase sustainable productivity;
- Protecting water bodies from the encroachment on other activities;
- Establishing an integrated management system for coastal areas;
- Establishing and updating data bases needed for planning and designing development projects;
- Developing captured fisheries management systems and mechanisms; and
- Supporting sea and fresh water fish farming, through the application of modern technologies.

C. Elements and components

- Reviewing and amending Law 142/1983;
- Developing and restructuring the General Authority for Fisheries to enable it carry out its responsibilities in monitoring law enforcement, developing and executing extension programs and projects;
- Supporting and developing the Aquatic Resources' Cooperative Association in order to assume an active role in the improvement of fisheries products and opening new marketing channels, and modernizing fishing vessels;
- Laying down an integrated system for the compilation and dissemination of information. Such a system should be an integral part of the agricultural information system; and
- Establishing an effective coordination mechanism for the integrated management of captured fisheries.

2.5.2.5 Horizontal agricultural expansion and settlement policy

A. Main justifications

- The numerous serious passive effects of horizontal agricultural expansion policies based only on the establishment of infrastructure (roads, electricity networks and irrigation canals), while neglecting agricultural services (provision of inputs, extension and marketing services) and other social services needed for the establishment of viable rural communities in the newly reclaimed areas;
- The availability of a critical mass of expertise over the last three decades in the different types of distributing newly reclaimed areas to companies, graduates, farmers and cooperatives. Such accumulated expertise could be used in developing land distribution patterns in future; and
- There is a pressing need for expanding agricultural land in order to address the problem of increased rural population density, and reduce the implications of the world food crisis on the economic and social conditions in Egypt.

B. Main objectives

- Increasing the capability of adding new lands, through effective and less costly methods;
- Ensuring that the newly reclaimed areas are used for agricultural production, within a framework that would enable investors to achieve suitable returns and strengthen the state's productive and export capacities; and
- Securing conditions to establish viable settled agricultural communities in the newly reclaimed areas.

C. Elements and components

- Land reclamation maps should include all necessary elements for the development and settlement of new communities, in addition to the areas that should be allocated to agro-industries;
- Small farmers in the newly-reclaimed areas should be encouraged to form voluntary institutions to defend their interests, regulate their production activities and help marketing their products in domestic and foreign markets, with the state providing catalytic support as needed to enable such institutions carry out their role;
- Preparing a technical and financial framework for investment opportunities in agricultural projects and other related and complementary projects, in order to draw farmers' and businessmen's attention to invest in such projects; and
- Introducing new concessional credit lines for reclaiming and developing new areas.

II. Policies to increase land and water productivity

2.5.2.6 Scientific research and agricultural technology development policy

A. Main justifications

- Limited and weak coordination between the different agricultural research institutions;
- Weak linkages between research topics and practical field application in the different agricultural fields;

- Reduced research budgets, amounting to less than 10% of similar budgets in other developing countries, leading to reduced research efforts;
- The progress and results of research projects are not subjected to transparent monitoring and evaluation mechanisms, leading to the loss of limited research budgets;
- The lack of a national research plan indicating application problems that need to be given priority, and would constitute the technical and financial framework to enable all research institutions would carry out their activities;
- Lack of cooperation between universities and research institutions in identifying the weaknesses of the agricultural performance, and in preparing a cadre of young researchers; and
- The very low incomes received by researchers and lack of interaction between them and international and regional counterparts, a fact that led to reducing the capabilities of a great number of researchers to keep abreast of scientific developments and achievements thus leading to neglect resolving agricultural research issues and problems.

B. Main objectives

- Establishing close coordination between agricultural research institutions, under a national research plan defining research areas and budgets. Such coordination should be based on strong institutional relations that do not change with the change of the top management of research institutions;
- Increasing research budgets in order to enable researchers carry out their responsibilities, under a system of continued performance evaluation through evaluation modalities to be introduced for this purpose;
- Improving income levels of researchers;
- Establishing closest possible coordination and cooperation between universities and specialized research institutions; and
- Enabling the younger generation of researchers to interact with their counterparts at the international level, for improving their research capabilities.

C. Elements and components

- Issuing a Prime Minister's decree commissioning the Agricultural Research and Development Council to prepare a national plan for agricultural research and supervise its implementation;
- Identifying the required research programs and projects, necessary budgets, research results evaluation standards and execution modalities to be applied;
- Reviewing the salary structures of researchers, with a view to raising their wages;
- Establishing cooperation protocols and agreements between the Agricultural Research and Development Council and universities in executing the planned research projects. Such protocols and agreements should be periodically reviewed and evaluated; and
- Exploring possible sources of finance for supporting research budgets, making use of the experiences of other countries that have achieved great successes in this field such as India and other countries.

2.5.2.7 Agricultural extension system development policy

A. Main justifications

- Weak performance, limited capabilities and continued erosion of the agricultural extension system staff structure,
- Weak confidence between extension workers and agricultural producers, particularly those engaged in the more specialized and advanced productive fields;
- Weak linkages between research institutions and agricultural extension. Additionally, agricultural researchers and university staff hardly ever undertake direct or indirect roles through the extension system;
- The obviously low income levels of extension workers, leading them to concentrate on other fields to improve their standard of living;
- Availability of experienced staff capable of exerting great efforts if they are given the opportunity under enabling environment. The increase in productivity achieved in several crops such as wheat, rice and sugar cane as a result of cooperation between research and extension institutions bears testimony to this.
- Absence of an official system describing extension role that can be handled by the private sector under government supervision, as to the qualifications and capabilities of extension services' providers, costs and their independence from promotion activities related to the products of certain companies, and all the other details that should be regulated by law.

B. Main objectives

- Strengthening and reforming extension institution, and developing its technical and administrative capabilities;
- Establishing close cooperation and coordination between scientific research and agricultural extension in identifying research topics, and in field application of research results;
- Modernizing extension systems to be compatible with the recent developments in information and communication, to maximize benefits of available extension experiences;
- Regulating private sector participation in extension activities, under the supervision of a specialized neutral entity.

C. Elements and components

Restructuring the agricultural extension system and preparing a detailed plan for its reform, covering the following elements:

- Designing an annual implementation plan supported by an appropriate budget;
- Preparing and executing an intensive program for the training of extension workers in the different specializations needed;
- Reviewing working procedures with a view to their development and for exercising coordination within the agricultural extension system, as well as with agricultural research;
- Introducing a transparent mechanism for monitoring and evaluating extension activities, with the participation of researchers and farmers;

- Introducing an officially integrated system to regulate private sector participation in extension activities; and
- Linking incentives granted to extension workers to their achievements.

2.5.2.8 Activating the media role to resolve agricultural development issues

A. Main justifications

- TV communication programs to rural areas are limited and deal with traditional poorly-prepared and presented topics that do not attract farmers attention;
- Information media can play a stronger role in influencing the behavior of both consumers and producers, hence it is important to make use of agricultural communication capabilities to develop extension, investment and marketing activities; and
- There are a great number of government and private sector TV channels that can be viewed in rural areas, this would enable the preparation and broadcasting of specialized agricultural development programs, if financial resources be made available and the concerned department in the MALR is appropriately strengthened to carry out this role.

B. Main objectives

- Strengthening agricultural extension efforts, through the use of modern and effective agricultural communication media in order to increase agricultural productivity and promote agricultural activities that meet market requirements;
- Raising the awareness of the wide base of rural inhabitants, particularly youth, of the scientific solutions that would support development efforts, especially as related to:
 - Using productive packages leading to maximizing production;
 - Applying improved irrigation systems that would reduce excessive use of irrigation water;
 - Urging farmers to form their voluntary associations, as joint efforts constitute the starting point for modernizing agriculture;
 - Communicating with farmers to convince them to adopt the cultivation of new economic crop varieties; and
 - Highlighting on local and international market changes and how to benefit from marketing opportunities in these markets.

C. Elements and components

- Allocating a special TV channel to agricultural communication and information, or expanding agricultural programs broadcasted over the present TV channels; and
- Strengthening the agricultural communication and information entity in the MALR, through providing adequate human and financial resources.

2.5.2.9 Voluntary farmers' associations' development policy

A. Main justifications

- Most of the farmers' associations, particularly voluntary associations, suffer from shortcomings and weaknesses that limit their ability to help farmers, particularly small farmers suffering from many problems that can be effectively handled by institutional associations. Shortcomings and weaknesses can be summarized in the following:

- Lack of knowledge of local and international market requirements, limiting their ability to make use of potential marketing opportunities, a situation that is reflected in fluctuating and reduced farm prices and low farm income;
- Limited financial resources and consequently limited ability to adopt agricultural techniques related to irrigation systems, and the use of high-yielding crop varieties, etc. Lack of concessional financing that would encourage farmers to apply improved agricultural techniques aggravates this problem;
- Limited knowledge of agricultural practices appropriate to plant varieties preferred in international markets, as to crop husbandry, pre- and post-harvest crop handling and packaging; and
- Inability to provide necessary marketing facilities for the different types of high-value crops such as vegetables, fruit, medicinal and aromatic plants, etc., requiring cold storage, sorting, grading and packaging and other facilities that cannot be provided by small and medium farmers.

Therefore, collective action by farmers' associations can play an effective role in alleviating these problems and reducing their negative effects. As such, the main priority area in improving the performance of agricultural associations is to reduce their development constraints.

B. Main objectives

The objectives of the proposed policy for improving the performance of voluntary agricultural associations can be summarized as follows:

- Reducing the negative effects of agricultural holdings fragmentation. Improving the performance of agricultural associations would help apply production specialization in accordance with the environmental and economic condition of the different areas;
- Promoting small farmers' participation in achieving the state's export objectives, particularly of non-traditional high-return crops as regards land and water productivity; and
- Promoting farmers' participation in improving agricultural practices and techniques, leading to increased returns from available agricultural resources at the farm and national levels.

C. Elements and components

To achieve the above objectives, the proposed policy is based on the following components:

- Enacting a law to regulate activities of the non-governmental organizations active in the agricultural sector, to ensure flexibility while enforcing required regulations, without interfering in their activities or using them for purposes other than those for which they have established;
- Providing appropriate support to encourage cooperative organizations and promote the concept of group action. This support may be in the form of concessional loans to be available only to the members of such associations;
- Raising awareness of the importance of group action, through introducing special TV and radio communication programs, as well as using worship places to mobilize people to adopt collective action in alleviating their problems and increasing their income; and

- Implementing intensive training programs on the modalities of establishing and managing collective organizations, and possible ways and means of ensuring enough financial resources to cover their expenditure. In this connection, appropriate use can be made of aid programs, utilizing various international and local experiences that have been applied and achieved success.

III. Policies to increase the competitiveness of agricultural products in domestic and foreign markets

2.5.2.10 Contract farming policy

A. Main justifications

- Many countries have applied integrated contractual farming that would benefit farmers, processors and exporters, leading to raising development rates; and
- The absence of an integrated system of contract farming to alleviate the difficulties facing farmers in marketing and improving production systems.

B. Main objectives

- Reducing marketing losses, increasing agro-industries and promoting exports;
- Achieving coordination between production and marketing, and improving competitiveness of agricultural products in domestic and foreign markets; and
- Increasing farmers' income.

C. Elements and components

- Establishing a neutral entity for arbitration, as well as penalizing the breach of marketing contracts;
- Establishing specialized economic courts for resolving disputes (this system has been recently introduced);
- Establishing a system for the registration of agricultural marketing contracts; and
- Introducing credit lines for providing suitable loans to farmers, using contractual farming contracts as guarantees.

2.5.2.11 Commodity futures market policy

A. Main justifications

Futures contracts are standardized contracts to buy a specified commodity of standardized quality at a certain date in the future. This is also based on a market determined price at contract signing. This means that buying takes place at present while selling and product delivery takes place at a certain date in future. Commodity Exchanges (futures markets) are barometers of the economic conditions as they refer to price trends. Future prices published by commodity exchanges affect all elements related to the commodity in question, and may even affect farmers and stock exchanges;

- The presence of agricultural commodity exchanges ensures quick response to price changes in the world markets and linkages to world economy. The Alexandria Commodity Exchange was one of the most important and oldest commodity exchanges. It was established in 1871 and used to play a major role in the world cotton trade;

- Agricultural commodity exchanges usually specialize in a certain commodity. Dealing in such commodities is conditional to:
 - The commodity should not be perishable and could be stored;
 - The commodity should have specified standardized specifications that would facilitate market dealings by all interested buyers; and
 - Transactions should be in large quantities so that a large number of traders can specialize in such trade.

B. Main objectives

- Ensuring the selling of the entire crop even before production, thus avoiding the problem of not finding a buyer after producing the crop;
- Ensuring all future needs, and consequently avoiding the problem of the supply being short of meeting demand at any time;
- Ensuring a standing market for the commodity, with adequate presence of an adequate number of buyers and sellers ready to buy and sell;
- Making available up to date price data to all dealers, leading to a higher degree of transparency and competitiveness between them. Such prices reflect world prices, and consequently reduce the possibilities of traders achieving unfair profits at the expense of producers;
- Reducing the risks related to trading a certain commodity or crop, through making available complete information on spot and future prices, the conditions of supply and demand in local and world markets, the conditions of transport, factors related to the stockpiles of the commodity in question, and the size of open and closed deals. This would have positive implications on both buyers and sellers, and would make the commodity available at fair prices and minimize market risks;
- Undertaking commercial insurance, whereby dealers can insure their positions against price fluctuations, through precautionary measures far from speculation. Such insurance would benefit producers, traders and processors; and
- Reducing price fluctuations due to speculation, leading to creating a demand for each transaction, and to an equilibrium price for the commodity in question.

C. Elements and components

- Reopening the Alexandria Commodity Exchange and Cotton Spot Exchange, as a start, and establishing other commodities' exchanges for other crops such as cereals at a later stage;
- Limiting dealings in the commodity exchange to individuals and entities that are closely related to trading in the commodity in question;
- Establishing a clearing house within the Commodity Exchange;
- Establishing an insurance fund for brokers and members, for guaranteeing their loans from the clearing house; and
- Establishing a system for settling the differences in financial positions at the closure of each trading session, at the rates decided by the prices committee.

2.5.2.12 Agricultural commodities electronic marketing and trade policy

During the last decade, world markets have witnessed a revolution in trading systems that encompassed traditional trading systems and introduced new trading ways and means

through the use of modern computer-based technologies, software and the information systems. The internet has been used in meeting the requirements of the new trading system, and has become the best and fastest means for executing trade transaction.

Electronic trade systems led to a revolution in international marketing systems and the introduction of new marketing techniques through the internet for all types of trade in goods and services. Transformation has been fast in certain businesses with the development of e-trade, and lead to a comprehensive change in marketing modalities applied for facing the severe competition on the part of the internet marketing sites. Consequently, e-trade has been able to open new markets and expanding existing markets for all producers in all countries, and create a new trade competition environment that caters for the expansion of world trade.

A. Main justifications

There are several justifications that call upon decision-makers to develop policies that would allow the use of e-trade in the agricultural sector, most important of which are:

- Speedy technological developments;
- Globalization and liberalization of world trade;
- The availability of so many technologies, services and markets;
- International economic agreements and blocks;
- Globalization of money markets and the transfer of capital and investments;
- Spread of electronic communication means; and
- The need to quickly respond to marketing operations, through direct transactions with consumers.

B. Main objectives

- Achieving cost-effectiveness in marketing operations and product pricing, through reducing and rationalizing marketing costs for the benefit of producers, and strengthening competitiveness between producers;
- Promoting competitiveness, through the use of electronic marketing and promotion, and other related benefits;
- Broadening the distribution of trademarks among consumers; and
- Strengthening linkage between business associations and consumers, through e-marketing.

C. Elements and components

Elements and components of e-trade policy in the agricultural sector include:

- Establishing national rules and regulations for regulating e-trade, and applying international laws and regulations;
- Establishing contractual rules for electronic signature and its use;
- Applying the central registration system for dealers data and documents, as well as simplifying customs regulations for benefiting from e-trade in customs operations;
- Using the same net for protecting e-trade;
- Designing and updating marketing web sites on the World Wide Web;
- Servicing e-trade system on the site, as well as the communication system connecting the banking system serving credit cards;

- Providing protection and encoding services to e-trade within marketing sites as a defense against spam;
- Supporting the e-marketing system, through updating cost and price changes, as well as exchange rates; and
- Providing companies with marketing tools to support electronic marketing, such as CDs and electronic sites and electronic catalogues.

2.5.2.13 Regional agricultural cooperation policy

A. Main justifications

- Egypt has signed several regional agreements but has not developed a clear policy framework for making use of such agreements in alleviating agricultural and food problems;
- There are vast unutilized opportunities for regional agricultural cooperation under these agreements, including the Greater Arab Free Market Zone, the Common Market of Eastern and Southern Africa Agreement (COMESA), and other regional economic agreements;
- Weakness of regional coordination in international fora and negotiations with direct impact on agriculture; and
- Food markets has experienced world crises that have had negative implications on the economic and social conditions of many countries, including Egypt and other Arab and African countries, a situation that calls for strengthening regional agricultural cooperation in order to increase the efficiency of national policies.

B. Main objectives

- Strengthening cooperation and coordination, particularly to achieve the optimum utilization of available agricultural resources, as well as reinforcing joint investments opportunities particularly with Arab and African countries, as well as coordinating policies and negotiating positions in international fora and organizations; and
- Expanding opportunities for marketing agricultural inputs and products, leading to increased development rates.

C. Elements and components

- Establishing joint boards for agricultural cooperation with states with suitable investment opportunities in agriculture and food security projects. Such joint boards should include:
 - Businessmen from the concerned parties;
 - Representatives of concerned ministries (ministries of agriculture, trade, foreign affairs, international cooperation and industry); and
 - Technical experts in strategic and developmental fields.

The functions of the joint boards should include:

- Proposing fields for joint cooperation and investment;
- Coordinating joint positions of member countries in the international fora;
- Developing recommendations for concerned executing agencies of the member countries on the possible solutions of problems hindering cooperation;

- Establishing a permanent secretariat at the MALR to be entrusted with the following functions:
 - Monitoring implementation of the joint boards decisions;
 - Preparing studies and executing projects to sustain joint cooperation; and
 - Establishing regional information networks with free access to investors and all interested parties.

2.5.2.14 Inter-state cooperation policy in international organizations and agreements

A. Main justifications

International technical, economic and trade cooperation in agricultural fields are now governed and practiced under international agreements and organizations. Agriculture has been directly affected by the Uruguay Round, the establishment of the World Trade Organization (WTO), and the different WTO agreements that have direct effects on agriculture, particularly Agreement on the Application of Sanitary and Phytosanitary Measures (the "SPS Agreement"), Agreement on Trade-Related Aspects of Intellectual Property Rights, as well as some WTO working mechanism particularly the Trade Policy Review Mechanism (TPRM), and the Dispute Settlement Mechanism.

After more than ten years of establishing the WTO and implementing the different WTO-sponsored agreements, the agriculture file is still the source of sharp differences between developed and developing countries, including Egypt. The Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) includes highly important international obligations as related to agriculture, particularly breeders' and new plant varieties rights, and geographical indications and trademarks. The Agreement on the Application of Sanitary and Phytosanitary Measures (the "SPS Agreement").includes, *inter alia*, international controls and obligations related to international safety and protection standards of plant and animal products and human health, in coordination with Codex Alimentarius, the World Organization for Animal Health (OIE) and the International Plant Protection Convention (IPPC).

Many developing countries, including Egypt, are still trying to catch up with developed countries to maximize the benefits of these agreements and reduce their burdens.

B. Main objectives

The main objectives of international cooperation within the above international agreements and organizations are as follows:

- Maximizing the benefits and positive effects and minimizing the burdens and negative effects of the different international agreements and treaties, particularly within the WTO;
- Improving negotiating performance of the new agricultural issues in the different organizations, and the different international agreements and treaties; and
- Raising awareness of the rights, obligations and issues related to the agricultural sector, as well as international agricultural, economic and trade relations.

C. Elements and components

- Deepening and widening understanding of the contents of the most important international agreements closely related to the agricultural sector;
- Supporting and activating organizational and institutional frameworks and execution modalities for making sure that other countries application of the agricultural aspects of international agreements would not be against Egypt's national interests;

- Paying greater attention to local and international registration and documentation of trademarks and national products covered by intellectual property rights and geographical indications, as well as the products and varieties developed by researchers and breeders;
- Improving national sanitary, phyto-sanitary and animal health standards, in conformity with international standards and recommendations compatible with local conditions, as well as actively applying such standards on imported agricultural goods and products of plant and animal origin;
- Improving the understanding of, and adherence to international standards and obligations, and those of the countries importing Egyptian agricultural commodities and products, as to sanitary and phyto-sanitary and animal health considerations, based on suitable and effective modalities for control and inspection;
- Upgrading staff capabilities in the fields of the management and follow-up of agriculture related files within the framework of international treaties and organizations, particularly in the fields of negotiations and the preparation of studies and reports;
- Reviewing the functions of the MALR unit(s) handling the files of agriculture-related organizations and agreements, with a view to restructuring them and merging them in a single unit;
- Establishing an intensive training program for the staff of such a unit;
- Establishing a council or committee of advisers from the different related institutions for supporting this unit and ensuring coordination and cooperation among the different concerned entities; and
- Developing a training and educational program on international organizations, agreements and obligations related to agriculture.

2.5.2.15 Agricultural information systems development policy

A. Main justifications

- Incomprehensive and contradictory statistics and data on agricultural activities;
- Existence of many information-producing agencies and weak coordination between them;
- Limited human resources' skills and weak information infrastructure;
- Absence of an integrated system for the production and exchange of agricultural information; and
- Databases are scarcely used in decision-taking, particularly at the level of small administrative units and at the farmers' level.

B. Main objectives

- Establishing an integrated system for the production and dissemination of agricultural information, capable of improving data accuracy and reducing contradictions and inconsistencies;
- Linking the information system to the strategic development objectives, so that results may be used in evaluation and follow-up activities; and
- Expanding the use of information applications in decision-taking at the level of all administrative, research and extension units of the MALR, as well as all farmers' associations.

C. Elements and components

- Issuing a ministerial decree identifying a single entity for the administration of the agricultural information network and the dissemination of agricultural information and statistics, in collaboration with other concerned administrative, organizational and research institutions of the MALR;
- Developing and implementing a program to support and develop information infrastructure at the MALR;
- Establishing data bases to support the strategic objectives and facilitate monitoring and evaluation activities; and
- Designing and implementing an integrated program to upgrade human resources' skills needed to administer the information system.

IV. Policies to achieve food security of the main food commodities

2.5.2.16 Food safety policy

A. Main justifications

Food production and safety is one of the most important preconditions for economic and social development, as food safety is one of the main factors in protecting public health. Due to the scientific and technological advances, chemicals are increasingly being used in agricultural production primarily for animal and plant production. Food industries have also greatly advanced due to the use of vegetable or chemical extracts. Along the food chain, from production to final consumption, food is exposed to contamination. To address this problem, developed countries have enacted laws and regulations that would ensure food quality and safety, e.g. US Food and Drug Administration (FDA).

B. Main objectives

- Taking all necessary arrangements for ensuring food quality and safety;
- Establishing standards for safe quality food;
- Establishing standards for ensuring that food is not contaminated with pesticides;
- Determining the maximum levels of chemical and pesticide residues in food;
- Developing and applying necessary policies for evaluating risks related to the use of chemical or biological compounds in food production;
- Establishing conditions and standards for the registration of food products and preservatives; and
- Exercising control on imported food.

C. Elements and components

- Establishing an Egyptian food safety code of practice;
- Establishing an Egyptian feed safety code of practice;
- Establishing Egyptian standards for maximum residues; and
- Establishing Egyptian standards for food additives, preservatives, colors and flavor- and aroma-enhancers;
- Establishing a national council for food safety, comprising ministers of agriculture, health, industry, trade and environment, as well as the chairpersons of Agriculture and Irrigation Committee and Health and Environment Affairs Committee of the People's and Consultative Assemblies, and the directors of research institutions concerned with food production and safety procedures;

- Consolidating food-related production and handling laws, and reviewing them with a view to eliminating contradictions;
- Studying food safety laws in developed countries and international organizations, with a view to amending Egyptian food safety laws; and
- Consolidating institutions and entities concerned with food safety under the proposed national council for food safety.

2.5.2.17 Consumption support and rationalization policy

A. Main justifications

- The sharp increase in the financial burden of subsidizing basic foods, due to the infiltration of support to non-deserving groups. Improving the distribution of food support would limit infiltration and help addressing the poverty problem and achieving social and political stability;
- The serious distortions of the presently-applied policy in food markets, leading to increased losses because of using food stuffs in other non-nutritional purposes, increasing losses in bread production process, and increased profits gained by traders at the expense of the poor and limited-income groups;
- The complex and burdensome arrangements taken by the government for the management and supervision of in-kind support, a fact that overburdens concerned agencies and does not lead to achievement of policy objectives; and
- High percentages of loss and spoilage of agricultural products. Estimates indicate that changing the in-kind support and introducing another policy that does not lead to the distortion of food markets would contribute to reducing food losses and spoilage at a rate of not less than 10% of annual food consumption. This means achieving savings of more than 500,000 tons of wheat per annum, as an example. These savings are equivalent to the production of 180,000 feddans of wheat at no cost, valued at around USD200m per annum, at the latest world wheat prices (estimated at an average price of around USD400 during the first half of 2008).

B. Main objectives

- Increasing the efficiency of support and social safety nets policies applied by the state for reducing poverty;
- Reducing losses and spoilage of the subsidized basic food goods, thus reducing demand pressure on such goods, whether locally-produced or imported;
- Eliminating one of the main causes of price distortion, leading to increased resource use efficiency in general; and
- Reducing administrative burdens related to the management of the support system, leading to increased efficiency of the government administration machinery and eliminating part of the causes of authority misuse.

C. Elements and components

- Discontinuing in-kind support and switching to a direct financial support system or financial support through food coupons;
- Applying an exclusion system based on sound household surveys to identify beneficiaries in accordance with objective incontestable standards, and establish a database that would help in excluding families that e.g. fulfill one or more of the following conditions:
 - Private car owners or owners of heavy trucks;

- Families whose monthly telephone bills exceed EGP 100;
- Mobile phone owners whose monthly telephone bills exceed EGP 100;
- Families whose monthly electricity bills exceed EGP 150;
- Dwellers in houses taxed under the new property tax system (under preparation by the state at present);
- Commercial and industrial tax payers and professionals whose tax assessment exceeds the limits of tax exemption;
- Land owners with holdings exceeding 5 feddans;
- Employers whose monthly income exceeds EGP 3,000; and
- Developing and executing a wide mass media campaign to promote the proposed policy, and clarifying the real effect of the new policy on the poor and low-income groups.

2.5.2.18 Improving the climate for agricultural investment policy

A. Main justifications

- The existence of many and contradictory laws regulating agricultural investments. There are 10 laws regulating the agricultural sector, 13 laws regulating agricultural land ownership, 7 laws regulating transactions of state land, in addition to irrigation and drainage law. There is no doubt that the array of these laws has created contradictions between the terms of reference of the different departments and administrations of the MALR, and between the different ministries and institutions, a fact that constitutes a burden on decision-makers and reduces the attractiveness of agricultural investment;
- Complexity of investment executive procedures, particularly land reclamation, due to the diverse government executing entities and institutions and weak coordination among them, a fact that has negatively affected agricultural investment and reduced investors readiness to direct their investments to agricultural projects;
- The lack of a map identifying fields to invest in agriculture and related of complementary activities, for investors and businessmen to explore suitable opportunities for their investments; and
- The relatively low public investments allocated to establish infrastructure in the newly-reclaimed areas or areas that would be possibly added in future, this reduces private investors' willingness to invest in agriculture and reduces capital flow to the agricultural sector in general. This is clearly manifested in agriculture-related projects, such as agricultural processing, agro-industries, sorting and grading stations, marketing centers and other necessary service projects.

B. Main objectives

- Reducing inconsistency between laws and regulations regulating direct and indirect agricultural investments;
- Establishing coordination between agricultural investments' related entities and departments of the MALR or other ministries; and
- Facilitating executive arrangements for agricultural projects, as well as agriculture-related or complementary activities.

C. Elements and components

- Reviewing agricultural investment laws and administrative procedure, particularly as related to agricultural investment in general, and the following fields in particular:
 - Allocation of the newly-reclaimed areas;
 - Simplifying land ownership procedures;
 - Allocating areas needed to establish of necessary agricultural and agriculture-related and complementary activities, such as areas needed for drying medicinal plants, establishing grading and packaging stations, food processing plants, and other similar projects;
 - Merging the entities responsible to deal with agricultural investors in one entity; and
 - Establishing a database for appropriate agricultural investments, to be periodically updated.

V. Policies for improving the standard of living of rural inhabitants

2.5.2.19 Agricultural financial assistance policy

A. Main justifications

- Farmers are exposed to natural disasters thus affecting their production and income, as well as their ability to honor their financial and marketing commitments with no agricultural assistance support system to mitigate the effects of these disasters; and
- There are international experiences widely applied to provide a safety net.

B. Main objectives

- Increasing farmers capability to endure natural disasters;
- Improving investment climate of agricultural activities; and
- Establishing a more appropriate climate for contract farming and insurance systems.

C. Elements and components

Enacting a law for regulating agricultural financial assistance procedures, with due regard to the following:

- Participation in such a system should be voluntary;
- The government should cover part of the installments due on small farmers who cultivate the strategic crops, and comply with achieving the national purposes of agricultural development;
- Identifying a recognized arbitration entity for resolving disputes; and
- Requesting insurance companies to develop implementation procedures.

2.5.2.20 Strengthening the role of women in agricultural development

A. Main justifications

- The majority of rural women do not have legal or fixed assets that would enable them to effectively carry out their roles in rural development;
- The dominance of poverty, illiteracy and unemployment prevails among rural women;

- Women have diverse responsibilities in the absence of a high percentage of their spouses to earn off-farm income, this that calls for enabling women to appropriately carry out their responsibilities and provide them with an enabling environment; and
- The presence of many entities active in the fields related to rural women in the MALR, with no effective coordination, a fact that reduces the effects of the administrative and technical effects of these units.

B. Main objectives

- Increasing women’s capability to endure natural disasters;
- Improving investment climate of agricultural activities for women; and
- Establishing a more appropriate climate for contractual farming for women.

C. Elements and components

- Issuing a ministerial decision for merging all entities active in the field of rural women in one entity, such as a policy and coordination unit at the MALR, for supporting rural women;
- Providing institutional and financial support to the designated entity enabling it to play its role in implementing the proposed policy, establishing a plan of work, and providing financial and human resources means capable of achieving its goals; and
- Introducing new concessional credit lines compatible with the economic conditions of rural women, and facilitating group lending procedures, through women’s associations active within economic projects.

2.5.3 Development programs and projects

In addition to reforming ongoing policies and introducing new ones, and reforming the institutional structure of the agricultural sector; development programs and projects constitute the third side of the triangle of implementation mechanism of the different components and objectives of the strategy to achieve its goals.

The cluster of national- and sub-programs proposed at the strategic level in this document constitutes a general structure and a comprehensive reference framework for the detailed programs and projects to be executed within the time span of the strategy. Accordingly, the proposed national- and sub-programs are only for identifying the main strategic components to be taken as a framework for laying down detailed executive plans and programs.

This part of the document contains a brief summary of the general framework of the national programs, while Annex II contains the details of each sub-program.

2.5.3.1 National program for rationalizing and upgrading the efficiency of water use in agriculture

A. Main objectives

- Improving the efficiency of field irrigation systems from around 50% to 80%;
- Saving the greatest possible quantities of water resources for use in reclaiming and developing additional areas. It is anticipated to save enough water for adding some 3.1m feddans by the year 2030;
- Raising water productive efficiency for all agricultural products;
- Increasing water productive efficiency of rainfall, and reducing losses;
- Maximizing the utilization of ground water resources in economic uses in general and agriculture in particular, and their protection from misuse and unplanned use;

- Promoting sustainability of projects using ground water resources;
- Exploring alternative water resources that can be used in appropriate agricultural fields; and
- Establishing a modern national network covering all areas, for monitoring and measuring the different climate and environment variables, using state-of-the-art information and communications techniques. Such a network would serve agricultural development purposes, including agricultural research and extension, early warning, risk prediction, assessment and management, and would offer its services for societal benefits, and to the private and business sectors at suitable charges.

B. Sub-programs

- Expanding the use of modern field irrigation systems;
- Expanding protected agriculture;
- Improving water use efficiency in rainfed agriculture;
- Rationalizing water-use efficiency of ground water resources;
- Developing unconventional water resources; and
- Establishing a national network of agricultural meteorology.

2.5.3.2 National program for maintaining and upgrading the productive efficiency of agricultural land

A. Main objectives

- Maintaining the productive-worthiness of agricultural land resources and their protection against deterioration;
- Making better use of land classification maps in analyzing negative phenomena and determining the factors that need to be addressed;
- Seriously addressing the basic problems leading to the deterioration of agricultural land, and restoring and increasing their efficiency in achieving development and food security goals;
- Routinely maintaining agricultural land that constitutes a natural capital asset;
- Protecting agricultural land, rangelands, and the biological diversity against quantitative and qualitative deterioration;
- Developing the uses of agricultural mechanization in field operations, and expanding the use of agricultural mechanization to cover the different agricultural areas and crops; and
- Maximizing the use of soil micro-organisms in increasing soil fertility and plant production, and increasing the nitrogen-fixing bacterial inoculation and organisms that dissolve phosphate and feldspar, as well as disease-resistant organisms, in addition to isolating organisms that would help decompose cellulose residues into silage and compost.

B. Sub-programs

- Developing and updating agricultural land classification maps;
- Supporting agricultural land maintenance and improvement projects;
- Protecting agricultural land against desertification;
- Using micro-organisms in improving soil qualities and fertility; and

- Developing the use of agricultural mechanization.

2.5.3.3 National program for the development of field crops

A. Main objectives

- Raising wheat production and productivity in order to increase self-sufficiency and food security, and meet the ever-increasing needs of an ever-increasing population;
- Increasing areas planted to wheat to 4.2m feddans, and wheat productivity to 3.6 tons/feddan, in order to raise the local production of wheat to 15.1m tons, enough to achieve a self-sufficiency rate of around 80.8% by the year 2030;
- Reducing the areas planted to rice from around 1.6m to 1.35m feddans by the year 2030;
- Increasing rice productivity from 4.11 tons/feddan at present to 5.2 tons/feddan by the year 2030. This would achieve self-sufficiency and provide quantities that can be exported. Projected volume of production by the year 2030 is estimated at 7.0m tons of paddy, achieving self-sufficiency at around 103%;
- Raising production and productivity of maize used in poultry feed, in order to decrease the importation of feed ingredients;
- Increasing production and productivity of maize used in bread production, in order to supplement wheat flour;
- Expanding the areas planted to maize to 3.7m feddans, and raising productivity to 5 tons/ feddan, thus raising production to 18.5m tons by the year 2030;
- Raising production and productivity of other cereal crops, particularly sorghum and barley, through increasing cultivated areas from around 773 feddans to one million feddans by the year 2030;
- Increasing cotton production through increasing cultivated areas and productivity particularly in the new lands, in order to meet the needs of local industries and export markets, by concentrating on the most suitable varieties. Productivity is projected to be increased to 1.8 tons/feddan;
- Increasing utilization of cotton seeds to meet self-sufficiency needs of vegetable oil;
- Increasing the productive efficiency of sugar from around 1.4m tons at present to 3.5m tons by the year 2030, through increasing sugar cane productivity from around 49 tons/feddan at present to around 65.4 tons/feddan by the year 2030, as well as expanding the cultivation of sugar beet to raise production from around 189,000 tons at present to 800,000 tons, and raising productivity from 22 tons/feddan at present to around 35 tons/feddan by the year 2030;
- Increasing production and productivity of feed crops for developing animal production. This would be achieved through increasing areas planted to perennial clover, one-cut clover and alfalfa from around 2.19m feddans at present to around 3.05m feddans by the year 2030, in addition to raising productivity to around 50 tons/feddan for perennial clover, 15 tons/feddan for the one-cut clover, and 50 tons/feddan for alfalfa;
- Introducing the cultivation of multi-foliolate clover (Fahl cultivar) in the agricultural rotation through cultivating an area of 600,000 feddans by the year 2030;
- Increasing the areas planted to fava beans from 202,000 feddans at present to around 400,000 feddans by the year 2030, as well as increasing productivity from 1.4 tons/feddan at present to 1.8 tons/feddan, in order to raise production to around 720,000 tons by the year 2030;

- Doubling the areas planted to oilseed crops to 525,000 feddans by the year 2030, as well as increasing productivity, in order to increase local production of vegetable oils for improving the rate of self-sufficiency;
- Introducing new oilseed crops in the new lands, in order to increase local production and reduce imports;
- Developing new onion varieties, to meet the needs of local and export markets;
- Restoring and improving the export position of Egyptian onion through quality improvement that meet the requirements of export markets;
- Reducing chemical pesticide use to the minimum levels required for combating agricultural pests; and
- Increasing the export potentials of the different field and horticultural crops to improve export returns.

B. Sub-programs

- Developing the wheat crop;
- Developing the rice crop;
- Developing the maize crop;
- Developing other cereal crops;
- Developing cotton crop;
- Developing sugar crops;
- Developing feed crops;
- Developing legume crops;
- Developing oilseed crops;
- Developing the onion crop; and
- Integrated pest and disease control.

2.5.3.4 National program for the development of horticultural crops

A. Main objectives

- Quantitative and qualitative development of vegetable crops to maintain self-sufficiency and provide a surplus for export;
- Increasing production and productivity of the different fruit crops, particularly the main fruit crops (such as citrus, grapes, peach and mango), improving their quality and increasing exports;
- Increasing areas planted to olive trees from 125,000 feddans at present to 300,000 feddans by the year 2030, as well as increasing productivity from 5.03 to 8 tons/feddan, to increase local production of vegetable oils and increasing the rate of self-sufficiency;
- Increasing the areas planted to medicinal and aromatic plants from around 70,000 to 200,000 feddans by the year 2030, as well as increasing exports to meet the increasing demand;
- Breeding new improved high-yielding varieties of medicinal and aromatic plants producing higher percentages of active ingredients;
- Increasing the areas planted to cut-flowers and ornamental plants in accordance with improved practices, as well as increasing productivity and improving quality traits; and

- Increasing exports of cut-flowers and ornamental plants due to their being one of the most promising export goods.

B. Sub-programs

- Developing the main vegetable crops;
- Developing fruit crops;
- Developing and improving dry areas fruit trees;
- Developing the production of medicinal and ornamental plants; and
- Developing the production of cut-flowers and ornamental plants.

2.5.3.5 National program for the development of animal production

A. Main objectives

- Increasing average *per capita* consumption of locally-produced milk from 63 kg/year to 90 kg by the year 2030, and putting away with imports;
- Achieving the highest productivity of milk;
- Securing high-quality milk in quantities enough for meeting the requirements of dairy processing plants;
- Increasing red meat production from 670,000 tons at present to around one million tons by the year 2030;
- Reducing red meat imports from 330,000 tons/year at present to marginal quantities by the year 2030;
- *Per capita* red meat consumption is anticipated to decline by 0.5 kg every five years;
- Developing the rural poultry sector for producing poultry meat and eggs;
- Increasing *per capita* share of poultry animal protein by one gram/day every ten years;
- Developing the institutional structure of the poultry industry;
- Raising *per capita* consumption of locally produced fish to approximately 18.5 kg by the year 2030;
- Protecting livestock, poultry and fisheries against veterinary endemic and trans-boundary diseases; and
- Protecting consumers against common diseases transmitted from animals to humans;
- Reducing dependence on conventional feed sources, and reducing the gap between available and required feed quantities; and
- Improving livestock and poultry husbandry to increase productivity.

B. Sub-programs

- Developing milk production;
- Raising red meat productive capacity of milk-producing herds;
- Developing small ruminants;
- Developing poultry production of the rural sector;
- Developing poultry production of the commercial sector;

- Developing fisheries production;
- Protecting animal health; and
- Developing feed sources.

2.5.3.6 National program for the socio-economic development of rural areas

A. Main objectives

- Improving the living conditions of rural women and enabling them to participate positively and actively in the different socio-economic activities, to improve the living conditions of rural families and rural inhabitants;
- Diversifying income-generating rural agricultural activities and other related and complementary activities;
- Improving the quality of rural small industries to increase their economic and marketing efficiency and increasing exports;
- Reviving rural industries and handicrafts and applying modern production systems that would help support and improve the productive capacities of rural villages;
- Creating an added-value in favor of small farmers, through the economic utilization of agricultural residues; and
- Contributing to reducing the negative environmental effects resulting from the neglect of recycling agricultural residues and treating them as rubbish that has to be disposed of albeit by ways that are detrimental to the environment and human health.

B. Sub-programs

- Strengthening the role of women in rural development;
- Strengthening and developing small rural projects; and
- Maximizing farmers' utilization of agricultural residues.

2.5.3.7 National program for developing and modernizing agricultural marketing and agro-industries

A. Main objectives

- Reducing pre- and post-harvest losses;
- Improving the quality of agricultural products and their preparation for domestic and foreign markets, for improving their competitiveness, and to increase producers' prices;
- Enhancing vertical integration linkages between production and marketing, as well as keeping farmers informed of market conditions and variables;
- Increasing farmers' abilities to participate in the processing and export of their products;
- Developing agricultural systems, practices, and marketing channels;
- Providing a user-friendly information environment for all interested parties in all agriculture-related production, services, marketing, exportation and processing activities;
- Paying greater attention to providing marketing extension services to small farmers and farmers' associations as beneficiaries of the agricultural information system, for improving their productive and marketing abilities;

- Promoting and supporting agricultural small- and medium-size processing industries in rural areas, and helping them introduce technically- and environmentally-sound practices for improving their productive and marketing abilities, as well as product quality; and
- Banning unsafe processing practices, and promoting product quality and safety.

B. Sub-programs

- Improving pre- and post-harvest practices;
- Supporting small farmers' marketing associations;
- Developing and modernizing marketing information systems; and
- Developing and modernizing traditional agricultural processing units.

2.5.3.8 National program for agricultural research, extension and technology transfer

A. Main objectives

- Maximizing sustainable productivity levels of both land and water units;
- Raising production and productivity levels of field and horticultural crops;
- Applying modern technology to the development of disease- and pest-resistant crop varieties, and climatic and environmental adverse conditions tolerant varieties (salinity, drought and temperature);
- Improving product quality and traits to meet consumer preferences and processing and export requirements;
- Supporting the development and diversification of horticultural exports, particularly the non-traditional crops;
- Promoting the productive efficiency of livestock, poultry and fisheries;
- Finding solutions to respond to the probable adverse effects of the climate change on agricultural production;
- Applying modern technology to the development of new crop varieties and lines, as well as reducing the period needed to develop new varieties;
- Improving value added activities to boost small farmers income, e.g. through the economic utilization of agricultural residues;
- Developing the use and application of agricultural expert systems to increase knowledge leading to promote the achievement of development objectives;
- Continuously developing evolving and need based agricultural research and extension systems and practices to keep pace with global research activities;
- Keeping abreast of global scientific research developments in the field of nanotechnology agricultural uses and applications;
- Incorporating economic efficiency into consideration in all agricultural scientific programs and activities;
- Monitoring and evaluating agricultural development performance at the national level and in all sectors; and
- Developing agricultural extension modalities and approaches, through technology transfer.

B. Sub-programs

- Research for improving natural resources' use efficiency;

- Research for developing field crops;
- Research for developing horticultural crops;
- Research for developing animal, poultry and fisheries production;
- Research for the control of animal diseases and improving animal health;
- Research in the fields of biotechnology, genomics, proteomics and bioinformatics;
- Research on the utilization of agricultural residues;
- Plant diseases and control research;
- Food processing technology research;
- Agricultural expert systems research;
- Research for developing the performance of agricultural scientific research institutions;
- Nanotechnology research;
- Agricultural economics research;
- Agricultural extension and technology transfer research;
- Research on climate change and the alleviation of its probable effects on agriculture; and
- Agricultural mechanization research.

2.5.3.9 National program for settlement, and encouraging investments in agriculture and agriculture-related projects

A. Main objectives

- Establishing necessary physical foundations in areas intended for settlement and agricultural investment, including needed infrastructures and services;
- Promoting complementarity between infrastructures, services and supporting facilities for the success of settlement projects in the newly developed areas;
- Popularizing investment opportunities, providing data and information, and carrying out basic studies that would help investors and businessmen in decision-taking; and
- Popularizing the advantages and facilities provided by the government to encourage investments in agriculture and agriculture-related and complementary activities.

B. Sub-programs

- Settlement in agricultural investment areas; and
- Identifying and promoting investment opportunities.

2.5.3.10 National program to increase competitiveness of Egyptian agricultural products in domestic and foreign markets

A. Main objectives

- Increasing competitiveness, through upgrading national Sanitary and Phytosanitary Standards (SPS);
- Ensuring sanitary and quality standards of agricultural products;
- Rationalizing production decisions, practices, export and import decisions based on related international developments and variables;

- Reducing the risks of negative effects related to changing global and international markets; and
- Promoting the presence of Egyptian agricultural products and exporters in international events (marketing events and fairs, etc...) in order to increase exports.

B. Sub-programs

- Establishing and applying quality standards for agricultural products;
- Monitoring international and regional variables; and
- Promoting agricultural products in foreign markets.

2.5.3.11 National program of agricultural human resources capacity building

A. Main objectives

- Upgrading the scientific and technical skills of research, extension and technology transfer staff;
- Upgrading the scientific and technical skills and expertise, as well as the scientific practices of staff working in the fields of agricultural policies' designing, analysis, monitoring and evaluation;
- Modernizing agricultural education programs in all educational institutions and at all levels, to achieve complementarity between academic formation and practical application, based on international scientific developments;
- Strengthening linkages between agricultural education programs and graduates, and the requirements of the labor market;
- Sensitizing farmers' leaders to the importance of monitoring agricultural developments, and
- Encouraging rural leaders to share their experiences and knowledge with other farmers.

B. Sub-programs

- Training staff active in the fields of research, extension and technology transfer,
- Upgrading the skills of staff working in the fields of agricultural policy designing, analysis, monitoring and evaluation;
- Developing agricultural education; and
- Building the capacities of rural leaders.

2.5.3.12 National program to promote the role of information and communications technology in agricultural development

A. Main objectives

- Establishing and developing modern networks linking individuals and different sectors at all levels;
- Modernizing and developing equipment and hardware needed to raise the efficiency of agricultural information and communications systems,
- Ensuring the availability and overflow of information to all the parties concerned with agricultural development, to rationalize decision-making and increase the efficiency of the different related activities;
- Applying modern techniques in establishing databases and agricultural information systems, to keep abreast of the latest developments; and

- Raising agricultural information and communications system efficiency and operation.

B. Sub-programs

- Strengthening agricultural information systems' infrastructure;
- Developing agricultural information systems and databases; and
- Building human resources' capacities in the field of agricultural information and communications system management and operation.

The following table summarizes the potential linkages between the strategic objectives and the proposed execution modalities under the SADS towards 2030.

Table 2.12 – Potential linkages between the strategic objectives and the proposed execution modalities

Strategic objectives towards 2030 Proposed execution modalities	Sustainable use of agricultural resources	Increasing productivity	Ensuring food security in strategic food items	Improving investment climate	Strengthening agri. products competitiveness	Improving the standard of living of rural inhabitants
Policies group:						
1. Rationalizing water use	*	*	*			
2. Protecting agricultural land	*		*			
3. Maintaining agricultural land	*	*	*			
4. Developing capture fisheries	*		*	*		*
5. Horizontal agri. expansion	*		*			
6. Scientific research and technology transfer	*	*	*		*	*
7. Developing agri. extension	*	*	*		*	*
8. Activating the role of the media	*	*	*	*		
9. Developing voluntary institutions	*	*	*			*
10. Contract farming policy			*	*	*	*
11. Futures markets policy					*	*
12. Trade systems' development				*	*	
13. Regional cooperation				*	*	
14. International cooperation				*	*	
15. Inf. systems development	*	*	*	*	*	*
16. Food safety			*		*	*
17. Support and rationalization of consumption			*			*
18. Improving investment climate	*	*	*	*		*
19. Agricultural assistance	*		*			*

Sustainable Agricultural Development Strategy towards 2030

Strategic objectives towards 2030 Proposed execution modalities	Sustainable use of agricultural resources	Increasing productivity	Ensuring food security in strategic food items	Improving investment climate	Strengthening agri. products competitiveness	Improving the standard of living of rural inhabitants
20. Promoting the role of women	*		*			*
Institutional reform group						
1. Institutional reform of MALR	*	*		*	*	
2. Civil society organizations reform and support	*	*	*		*	*
3. Institutional reform of agricultural cooperatives	*	*	*		*	*
Programs and projects:						
1. Field crops development	*	*	*		*	*
2. Horticultural crops Development	*	*	*		*	*
3. Animal production development	*	*	*			*
4. Rationalization of water resources' use	*	*	*			
5. Protecting agricultural land	*	*	*			
6. Reinvigorating rural areas					*	*
7. Agricultural products' marketing and processing			*		*	*
8. Research, extension and technology transfer	*	*	*	*	*	*
9. Encouraging investments			*	*	*	*
10. Strengthening product competitiveness			*		*	*
11. Human resources capacity building	*	*	*	*	*	*
12. Strengthening and developing the role of information technology	*	*	*	*	*	*

2.6 EXPLOITING THE DISTINCTIVE ATTRIBUTES OF THE DIFFERENT REGIONS

Agricultural development strategies illustrate the general objectives of agricultural development in general, without paying attention to the economic, social and environmental differences between the different agro-ecological regions.

This would lead to drawing wrong conclusions and too much generalization between the different geographic regions. It is noteworthy that there are many indicators that underline the distinctive attributes of the different regions in Egypt, where the milk and rice production belts are concentrated in northern Delta, while the vegetable production belt is concentrated in the governorates surrounding the greater Cairo region, the medicinal and aromatic plants production belt in Middle Egypt, the sugar cane and the dry- and semi-dry dates production belts in Upper Egypt. In spite of the differences between the different regions in natural resources and climatic conditions, these differences have not been taken into consideration in policies regulating the use of land and water resources, as well as fertilizer application policies for the different crops, marketing policies and policies for localizing agricultural technology.

To address this situation, it would be necessary to know the attributes of the different regions, as well as the problems and constraints facing the developmental efforts, and recognize development opportunities in each region. This would help achieve two main goals:

- Establishing development strategies and goals based on actual regional knowledge and characteristics; and
- Designing executive plans in such a way that would exploit the distinctive features of the different regions, and address the regional problems and determinants that constrain development.

Based on the above, Egypt has been divided into five geographical regions, taking into consideration the distinctive features of the agricultural regions. They are:

Upper Egypt: including Asyut, Sohag, Qena, Aswan and the New Valley governorates;

Middle Egypt: including Giza, Bani-Sweif, Al-Fayoum, and Minya governorates;

Middle Delta: including Al-Qaliobeya, Al-Menoufeya, Al-Gharbeya, Al-Dakahleya, Kafr-el-Sheikh and Dumyat governorates;

Eastern Delta: including Al-Sharkeya, Port Said, Ismailia, Suez, Northern Sinai and Southern Sinai governorates; and

Western Delta: including Al-Beherah, Alexandria, Al-Nubareyah, and Matrouh governorates.

Data and information related to the distinctive features, as well as the problems, constraints and development opportunities through a questionnaire addressed to the stakeholders in each region, and expanded workshops held in each region, in addition to published and unpublished data and information taken from the different official sources. The following section briefly reviews development opportunities and areas in each region, while the annexes contain other details pertaining to the distinctive potential and determinants in each region.

2.6.1 Future development opportunities and areas in Upper Egypt

- Paying greater attention to the infrastructure, including roads, drinking water, electricity, and communications needed to link the areas under horizontal expansion and other communities, as well as providing indispensable services to settle families, allowing for the establishment of settled communities and leading to accelerated and sustainable development;
- Encouraging farmers to establish voluntary associations for cooperation action, and providing technical support to such associations in order to be able to participate in development programs and benefit from the successful experiences, such as the successful results achieved by Al-Shams project;
- Developing irrigation systems in order to save water requirements for horizontal expansion projects, as well as establishing drainage systems in the areas lacking such systems;
- Promoting organic agriculture to meet export requirements, as well as producing early-maturing vegetable and fruit varieties, as in the case of green beans, grapes and pomegranate;
- Expanding the application of modern techniques in sugar cane production in order to increase productivity and reduce water consumptive use, as well as expanding wheat, vegetables and oilseed crops inter-plantation in the fields of sugar cane planted in the spring season;
- Expanding the cultivation of high-value leguminous tree species suitable for the climate of the region, such as mahogany trees, as well as growing Getrova and jojoba trees (as a source of bio-energy);
- Promoting the production of dry and semi-dry date varieties, introducing the cultivation of sugar beet, as well as establishing sugar factories in Al'Wadi Al'Jadeed (the New Valley) and Asyut governorates;
- Expanding the areas planted to olive trees, and increasing olive production, especially in the New Valley;
- Expanding the cultivation of alfalfa in areas under horizontal expansion for feeding cattle herds;
- Supporting vegetable and fruit marketing facilities, through the establishment of grading and packaging stations, as well as the establishment of refrigerated facilities in Luxor, Asyut and Aswan airports.

2.6.2 Future development opportunities and areas in Middle Egypt

- Encouraging farmers to establish voluntary associations for collective action in the fields of production and marketing, making use of the experiences gained in Al-Shams project;
- Establishing infrastructure and institutional frameworks to enable the region to specialize in the production of medicinal and aromatic plants, as well as protected agriculture;
- Improving field irrigation systems and increasing the productivity of long-medium staple cotton varieties cultivated in this region; for meeting the requirements of national industries and encouraging farmers to resume cotton growing;
- Reviewing and diversifying agricultural credit lines to cover production and marketing, as well as agriculture related activities;

- Promoting contract farming of vegetables, garlic, onion, oilseed crops and aromatic pastes, for manufacturing purposes;
- Increasing the productivity of the main crops cultivated in the region, especially wheat and maize;
- Promoting small agricultural projects and income-generating projects for the poorer families, and establishing a mechanism for providing concessional credit to the groups that do not have enough collaterals; and
- Increasing cattle and buffalo milk productivity through genetic improvement. Genetic improvement rate in this region is the lowest in the country, where the percentage of foreign and mixed breeds is 20%, against 35% in higher Egypt;

2.6.3 Future development opportunities and areas in Eastern Delta

- Considering agricultural development in Eastern Delta as a priority development area, particularly in Sinai, where it is necessary to introduce policies for encouraging agricultural investments and the establishment of tourism service industries boosting off-farm development activities. This would require reviewing the distribution system of the newly reclaimed areas, as well as establishing necessary the basic infrastructure and the social services essential for the establishment of settled communities;
- Encouraging farmers to establish voluntary associations for cooperative action in the fields of production and marketing and establishing linkages between small farmers and large companies active in the region, as well as establishing the bases that would ensure mutual benefits for both parties (small and large farmers);
- Establishing infrastructure and institutional frameworks to enable the region to specialize in production of protected agriculture and the cultivation of organic products for export;
- Developing field irrigation and drainage systems, as well as establishing strict water-use controls and limiting areas planted to rice in order to save water for horizontal expansion projects;
- Increasing the productivity of the main crops (wheat, rice, groundnut and clover), as well as expanding the cultivation of sugar beet, and fodder beet, especially in Al-Husainiya plain and the El-Tina plain, and establishing a sugar factory, contributing to meeting local needs of sugar and animal feed;
- Developing the production of horticultural crops cultivated in the region (mango, peach, olive and citrus), through introducing new varieties and improving cultivated varieties, indentifying suitable agricultural practices and improving farm management techniques;
- Promoting contract farming for processing and export purposes, particularly as related to crops such as potatoes, green beans, tomatoes, and strawberry, as well as establishing processing factories for juices, concentrates and dried products;
- Promoting captured fisheries in the vast water bodies in the region, as well as sea aquaculture off the shores of Sinai; and
- Developing buffalo, sheep and goat production in the region where 10% of the animal population exist, and where there are wide possibilities for green fodder production.

2.6.4 Future development opportunities and areas in Western Delta

- Encouraging farmers to establish voluntary associations for cooperative action in the fields of production and marketing, paying greater attention to establishing

economically viable associations with enough capital to develop marketing infrastructure;

- Establishing an appropriate framework for partnership and integration between small farmers and medium and large agricultural companies, in order to expedite technology transfer to small farmers;
- Developing and executing a national program for removing the explosive mines in the North West Coast region, making the most possible use of international organizations, and involving civil society organizations;
- Promoting inland as well as off-coast fish culture;
- Increasing the productivity of the main crops cultivated in this region (wheat, cotton, clover, rice and potatoes), to reach maximum possible levels;
- Expanding the cultivation of sugar beet, as climatic conditions allow for its cultivation in more than one season, thus adding a new crop to the cropping pattern of the region, and helping provide feed stuffs for developing animal production in the region;
- Expanding the cultivation of vegetables and fruits for processing and export purposes, and establish an institutional framework for contract farming of these products;
- Improving nurseries for producing leguminous and fruit trees, as well as date palm nurseries and providing them with good genetic material;
- Developing a program for preserving the excellent animal genetic stocks of the region, and encouraging small farmers to breed such stocks;
- Developing credit lines suitable to the sizes of agricultural holdings and the nature of agricultural activities in the region;
- Establishing appropriate conditions for expanding the areas planted to olive trees, through the establishment of processing units, and an institutional framework for marketing products, as well as providing seedlings of olive trees suitable for growing under the climatic and environmental conditions of the region;
- Developing policies to establish agro-industrial communities in the region;
- Establishing an agricultural extension entity in the newly-reclaimed areas to work with small farmers and provide them with technical and marketing information;
- Developing field irrigation systems, as well as establishing strict water-use controls in order to save water for horizontal expansion projects;
- Establishing milk-collection centers for small farmers in order to expand animal production in the region, establishing artificial insemination centers for cattle and buffaloes, as well as providing veterinary services to be managed by the private sector;
- Establishing sorting, grading and packaging centers owned by small farmers, and establishing linkages between such centers, and export companies; and
- Developing a program for range development in the North Coast areas.

2.6.5 Future development opportunities and areas in Middle Delta

- Developing field irrigation in the region, as well as establishing water-use controls in order to reduce water-logging and improve soil fertility and consequently raising the productivity of the land unit;
- Establishing a mechanism for solving the problems related to the fragmentation of agricultural holdings, to enable the application of a sound agricultural rotation;
- Proving suitable technology for developing aquaculture production, as well as developing the marketing system of aquaculture products;

- Establishing the infrastructure and institutional framework that would enable achieving the greatest possible benefits from the region's specialization in poultry, fish and milk production;
- Increasing the productivity of the main crops (wheat, clover, maize, rice, cotton and citrus);
- Establishing mechanical poultry slaughterhouses, and providing linkages between them and poultry farms;
- Establishing milk collection centers, as well as the institutional framework for their administration for the benefit of small farmers;
- Developing the utilization of agricultural residues, particularly maize and rice, using such residues in producing silage;
- Developing conventional milk processing units, raising product quality and safety, and improving their marketing positions;
- Developing fruit trees and ornamental plants nurseries;
- Expanding artificial insemination services for cattle and buffaloes, providing veterinary services and establishing a suitable machinery to maximize efficiency of such services;
- Encouraging farmers to establish voluntary associations for collective action in the fields of production and marketing;
- Paying greater attention to crop intensification and introducing the cultivation of multi-foliolate clover (Fahl cultivar) after the early-maturing rice crop;
- Developing agricultural credit system and finding alternatives to solve the mortgage problem, thus facilitating the provision of long- and medium-term financing of agriculture-related activities;
- Promoting rural women projects and income-generating projects to destitute small farmers; and
- Developing rural and environmental industries.

2.7 MONITORING AND EVALUATION MECHANISMS

Reviewing the proposed implementation mechanisms of this strategy reveals several aspects that can be summarized in the following:

- There is an institutional intertwining and overlapping between implementation mechanisms, particularly in relation to the executing procedures of the proposed policies or the executive responsibility for government investment programs, and the affiliation of the institutions targeted by reform. Terms of reference are overlapping between institutions of the ministries closely-related to agricultural activities particularly the MALR and the Ministry of Irrigation and Water Resources, in addition to other ministries, such as the ministries of Environment, Finance, Economy and Industry;
- There is a great need for detailed studies on the proposed implementation mechanisms, with the aim of detailing execution procedures and allocating the terms of reference to government institutions that would be responsible for field implementation, in order to reduce conflict of responsibilities and facilitate implementation procedures; and
- There is a need for prioritizing implementation steps, due to the multiplicity of proposed mechanisms, particularly as related to institutional reform or investment programs and projects. Standards should be established for prioritizing implementation steps according to which field execution would be carried out under the successive execution plans of the strategy.

In conformity with the afore-mentioned implementation aspects, the proposed monitoring and evaluation mechanism should be:

- An institutional umbrella mechanism capable of coordinating the performance of all institutions active in the agricultural sector, whether they are part of the MALR or other ministries; and
- It should include representatives from the private sector and the civil society, in addition to representatives from government entities and institutions active agriculture capable of undertaking detailed studies of implementation issues, as well as developing implementation recommendations suitable to each entity and region.

Based on the above, it is proposed that the monitoring and evaluation mechanism be as follows:

- Commissioning the Agricultural Research and Development Center to undertake periodical monitoring and evaluation of the agricultural development strategy, in collaboration with all concerned ministries, as well as other concerned governmental and non-governmental entities; and
- The Agricultural Research and Development Center should establish a technical committee or committees to prepare detailed implementation studies on the proposed implementation mechanisms, in collaboration with concerned ministries and institutions, and include the results of the work done by these committees in the execution plans to be prepared in this connection;
- Establishing three technical units, under consultative boards members of which should be of distinguished merits in their field of specialization:
 - Monitoring and Evaluation Unit: to be responsible for the follow-up of execution activities and projects;

- Agricultural Policies Unit: to be responsible for the analysis and development of agricultural policies, in collaboration with the concerned ministries and other related institutions; and
- Risk Management and Mitigation: to be responsible for monitoring changes in the international and regional arenas and taking necessary actions to anticipate risks and develop suitable mitigation measures.

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EGYPTIAN UNITS OF MEASURE-FIELD CROPS

<u>Winter Crops</u>	<u>Unit</u>	<u>Weight (kilograms)</u>
Barley	Ardeb	120.00
Barseem seed	Ardeb	157.00
Broadbeans, horse beans	Ardeb	155.00
Chick peas	Ardeb	150.00
Crushed beans	Ardeb	144.00
Crushed lentils	Ardeb	148.00
Fenugreek	Ardeb	155.00
Flaxseed	Ardeb	122.00
Lentils	Ardeb	160.00
Linseed	Ardeb	122.00
Lupines	Ardeb	150.00
Onion	Kentar	45.00
Safflower	Ardeb	113.00
Wheat (grain)	Ardeb	150.00
<u>Summer crops</u>		
SK cotton (unginned)	Seed metric kentar	157.50
LK cotton (lint or ginned)	Lint metric kentar	50.00
Cottonseed	Ardeb	120.00
Cowpeas	Ardeb	120.00
Groundnuts (in shell)	Ardeb	75.00
Maize (grain)	Ardeb	140.00
Rice (husked)	Ardeb	200.00
Rice (rough or unmilled)	Dariba	945.00
Rice (paddy)	Ardeb	300.00
Sesame	Ardeb	120.00
Sorghum (grain)	Ardeb	140.00
Sugar cane	Kentar	45.00
<u>Crop residues</u>		
Bran	Ardeb	67.50
Broadbean straw	Camel load (heml)	250.00
Cotton stalks	Camel load (heml)	250.00
Flax straw	Ton	1,000.00
Hay	Camel load (heml)	250.00
Maize stalks	Camel load (heml)	250.00
Rice straw	Camel load (heml)	250.00
Wheat straw	Camel load (heml)	250.00

ANNEXES

ANNEX I

STATISTICAL TABLES

Table 1 – Estimates of cultivated areas under the SADS towards 2030 (in thousands of feddans)

Main commodity group	Situation in 2007*	Estimates for 2017	Estimates for 2030
I. Cereal crops:			
Wheat	2716	3750	4200
Rice	1673	1250	1300
Maize	1848	3150	3700
Other cereals	733	888	1058
Total cereal crops	6970	9038	10258
II. Sugar crops:			
Sugar cane	335	340	350
Sugar beet	248	500	800
Total sugar crops	583	840	1150
III. Oilseed crops:			
Groundnut	155	230	350
Sesame	75	85	100
Other oilseed crops	55	63	75
Total oilseed crops	284	378	525
IV. Legume crops:			
Fava beans	212	300	400
Other legume crops	33	38	45
Total legume crops	245	338	445
V. Fiber crops:			
Cotton	575	750	1000
Other fiber crops	16	18	21
Total fiber crops	591	768	1021

Sustainable Agricultural Development Strategy towards 2030

Main commodity group	Situation in 2007*	Estimates for 2017	Estimates for 2030
VI. Fodder crops:			
Perennial clover	1824	1900	2200
One-cut clover	483	540	650
Alfalfa	39	100	200
Multi-foliolate clover (Fahl cultivar)	-	300	600
Other fodder crops	403	460	600
Total fodder crops	2749	3300	4250
VII. Vegetable crops:			
Tomatoes	537	580	620
Potatoes	257	300	350
Green beans	73	100	125
Other vegetable crops	1147	1300	1550
Other vegetable crops	2014	2280	2645
VIII. Fruit crops:			
Citrus	395	450	500
Grapes	170	200	250
Mango	184	160	180
Other fruit crops	561	690	825
Total fruit crops	1310	1500	1755
IX. Other crops:			
Onion and garlic	113	136	155
X. Medicinal and aromatic plants:			
	76	120	220
Total cropped area (in million feddans)	15,346	19,162	22,984
Agricultural intensification rate	183%	198%	199%

* Source: MALR, Economic Affairs Department, Agricultural Statistics Bulletin (2007).

Table 2 – Estimates of total returns per water unit, under the SADS towards 2030

Crops	Situation in 2007				Estimates for 2017				Estimates for 2030			
	Area 1000 feddans	Water consumptive use (m ³)	Productivity (Ton/Feddan)	Water unit return*	Area 1000 feddans	Water consumptive use (m ³)	Productivity (Ton/Feddan)	Water unit return*	Area 1000 feddans	Water consumptive use (m ³)	Productivity (Ton/Feddan)	Water unit return*
Wheat	2716	1560	2.72	1.97	3750	1200	3.2	3.29	4200	1040	3.6	4.66
Rice	1673	5189	4.11	0.85	1250	4000	4.5	1.38	1300	4000	5.2	1.69
Maize	1843	2333	3.45	1.59	3150	1795	4.4	2.64	3700	1600	5	3.72
S. cane	335	7809	49	1.00	340	6000	56.6	1.5	350	6000	65.4	1.74
S. beet	248	1858	22	2.04	500	1429	28	3.37	800	1240	35	4.85
Groundnut	155	3438	1.4	1.16	230	2645	2.0	2.15	350	2300	2.5	3.09
Fava beans	212	1197	1.42	2.65	300	920	1.6	3.89	400	800	1.8	5.04
Cotton	575	2822	1.37	2.36	750	2170	1.6	3.58	1000	2170	1.8	4.03
Perennial clover	1824	2519	29.6	2.06	1900	1937	35	3.16	2200	1680	40	4.17
One-cut clover	483	942	12.5	2.32	540	725	13.5	3.25	650	630	15	4.17
Alfalfa	39	5000	40.5	1.41	100	3850	45	2.05	200	3300	51	2.7
Multi-foliolate clover	-	-	-	-	300	725	16	3.86	600	630	17	4.72
Citrus	395	3135	9.1	2.90	450	2412	12.0	4.97	500	2100	15.0	7.14
Grapes	170	3135	9.9	2.84	200	2412	12.0	4.48	250	2100	14.0	6.0
Mango	184	5147	4.6	2.23	160	3950	6.0	3.80	180	3431	10.0	7.29
Tomatoes	537	2800	14.5	3.36	580	2160	20.0	6.0	620	1900	30.0	10.3
Potatoes	257	2680	10.7	2.55	300	2061	12.0	3.73	350	1780	14.0	5.04
Green beans	73	1100	5.1	3.86	100	850	7.0	7.00	125	750	8.0	9.06

* Water unit return = EGP/one cubic meter of irrigation water

Source: Compiled and computed from:

1. MALR, Economic Affairs Department, Agricultural Statistics Bulletin (2007)
2. The Central Agency for General Public Mobilization and Statistics, Water Resources Bulletin (2007)

Table 3 – Farm gate prices of the main crops, in EGP per ton, 2006*

Crop	Price
Wheat	1127
Rice	1078
Maize	1078
Sugar cane	159
Sugar beet	172
Groundnut	2840
Fava bean	2238
Cotton	4863
Perennial clover	175
Alfalfa	175
Multi-foliolate clover	175
Citrus	1000
Grapes	900
Mango	2500
Tomatoes	650
Potatoes	640
Green beans	850

* Estimated average prices have been weighted by cultivated areas in the different seasons, based on 2006 prices as 2007 prices were subjected to unprecedented increases.

Source: MALR, Economic Affairs Department, Farm gate prices indicators, Parts I and II, 2006.

Table 4 – Estimates of consumption requirements of the main food commodities under the SADS towards 2030

Main food commodities	Situation in 2007*		Estimates for 2017		Estimates for 2030	
	Average per capita share (kg/year)	Total requirements (1000 tons)	Average per capita share (kg/year)	Total requirements (1000 tons)	Average per capita share (kg/year)	Total requirements (1000 tons)
Wheat	176.5	13591	176.5	16238	179.5	18709
Milled rice	42.5	3273	43	3956	44	4664
Sugar	26.9	2071	30.0	2760	35.0	3710
Fava bean	7.5	578	7.5	690	7.5	790
Potatoes	20.1	1548	22.0	2024	25.0	2650
Tomatoes	99.5	7623	100.0	9200	102.0	10812
Citrus	34.7	2672	38.0	3496	40.0	4240
Grapes	16.8	1294	18.0	1656	20.0	2120
Milk	63.1	4859	79.7	7332	90.0	9540
Red meat	13.5	1001	12.0	1104	11.0	1166
White meat	11.5	247	11.95	1095	13.3	1410
Eggs	3.1	239	3.1	288	3.5	371
Fish	13.5	1001	15.0	1380	18.5	191
Population number	77 million people		92 million people		106 million people	

* Source: Compiled and computed from the data available at the MALR, Economic Affairs Department, Agricultural Statistics Bulletin (2007)

Table 5 – Distribution of the buffalo population by herd size and agricultural holding size (%)

Herd size \ Area in feddans	< 5	5 - 10	11 – 50	51 – 100	> 100	Total	Cumulative distribution
Landless	13.98	2.02	1.01	0.13	0.12	17.26	17.26
< 1 feddan	23.96	1.7	0.38	0.04	0.02	26.1	43.36
1 – 5	34.07	9.47	1.74	0.08	0.05	45.42	88.78
6 – 10	2.89	2.56	1.09	0.06	0.09	6.69	95.47
11 – 50	0.78	1.19	1.42	0.12	0.22	3.73	99.2
> 50	0.01	0.02	0.21	0.07	0.43	0.74	99.94
Total	75.7	16.99	5.86	0.5	0.96	100	
Cumulative distribution	75.7	92.69	98.55	99.05	100.1		

Source: Compiled and computed from the data available at the MALR, Economic Affairs Department, Livestock, poultry and fisheries statistics bulletin (2007)

Table 6 - Distribution of the cattle population by herd size and agricultural holding size (%)

Herd size / Area in feddans	< 5	5 - 10	11 - 50	51 - 100	> 100	Total	Cumulative distribution
Landless	1.5	2.95	1.32	0.14	0.12	6.12	6.12
< 1 feddan	19.95	2.15	0.46	0.03	0.07	22.67	28.8
1 - 5	32.93	11.11	2.02	0.09	0.12	46.26	75.06
6 - 10	5.97	6.19	2.74	0.14	0.31	15.35	90.41
11 - 50	1.07	2.13	2.91	0.25	1.02	7.38	97.79
51 - 100	0.02	0.06	0.31	0.11	0.3	0.8	98.59
> 100	0.01	0.02	0.16	0.07	1.15	1.41	100
Total	61.44	24.61	9.93	0.83	3.18	100	
Cumulative distribution	61.44	86.06	95.99	96.82	100		

Source: Compiled and computed from the data available at the MALR, Economic Affairs Department, Livestock, poultry and fisheries statistics bulletin (2007)

Table 7 – Distribution of the cattle population by region and breed

Region / Breed	Indigenous	Foreign	Mixed	Total
Delta	1017	93	1110	2220
Middle Egypt	971	13	224	1208
Upper Egypt	648	21	275	944
New lands	105	31	100	237
Total	2741	158	1710	4610

Source: Compiled and computed from the data available at the MALR, Economic Affairs Department, Livestock, poultry and fisheries statistics bulletin (2007)

**Table 8 – Distribution of the population of fattening broilers
by region and production system (in one million birds)**

Region	Commercial sector		Rural sector		Total	
	No. of batteries	Production	No. of batteries	Production	No. of batteries	Production
Delta	16286	265.6	3433	49.3	19719	314.9
Middle Egypt	2625	53.1	292	4.3	2917	57.4
Upper Egypt	949	12.3	130	19719	1079	13.0
Outside the valley	1200	31.3	41	2917	1241	32.1
Total	21060	362.3	3896	1079	24956	417.4

Source: Compiled and computed from the data available at the MALR, Economic Affairs Department, Livestock, poultry and fisheries statistics bulletin (2007)

ANNEX II

DEVELOPMENT PROGRAMS AND PROJECTS

1. National program for rationalizing and upgrading the efficiency of water use in agriculture

Under the problem of water shortage that is worsening year after year, this major program aims at achieving the maximum possible rationalization of water use in agriculture, as well as reducing quantitative and qualitative water losses, and raising the efficiency of water use at the field level, to save the greatest possible quantities of water needed for horizontal expansion and raising water productivity.

1.1 Sub-program for expanding the use of modern field irrigation systems

A. Main objectives

- Raising the efficiency of field irrigation systems from around 50% to 80% by the year 2030;
- Saving the greatest possible quantities of water to be used in reclaiming and development of new areas. It is estimated that the saved volume of water would be enough to add some 3.1 m feddans by the year 2030;
- Raising water productivity in cultivating the different crops; and
- Contributing to solving the problem of soil degradation.

B. Main components

- Implementing a mass media campaign to popularize modern field irrigation systems, as well as the support and incentives given by the government for this purpose;
- Designing and implementing extension campaigns to achieve this purpose;
- Providing support and credit facilities that would attract farmers to adopt modern irrigation systems and acquire the necessary equipment and requisites;
- Strengthening quality controls and supervision on equipment used in modern pressurized irrigation and surface irrigation systems, as well as on their marketing and importation, and encouraging investments for producing such equipment locally;
- Strengthening research in the field of planning and designing modern irrigation systems recommended for each crop and each environment, and
- Strengthening the legal and supervisory roles on the application of pressurized irrigation (sprinkler irrigation and localized irrigation) in the new lands and in desert lands.

1.2 Sub-program for protected agriculture

- Protected agriculture is a modern technique for raising productivity. It is labor- and capital-intensive, with high cash revenue. Due to the highest rate of water use achieved by protected agriculture, it is suitable in the production of vegetable crops, ornamental plants and some fruit crops.

A. Main objectives

- Raising land and water productivity, through maximizing crop productive potential under protected agriculture;
- Growing non-traditional off-season crops, for raising land and water returns;
- Encouraging the development of national industries feeding protected agriculture; and
- Establishing a modern horticultural extension system based on the use of meteorological data in determining water and fertilizer consumptive use of the different crops under protected agriculture.

B. Main components

- Implementing an information campaign at the level of priority areas for protected agriculture;
- Informing farmers of the modern techniques used in protected agriculture, particularly soil-less agriculture as a substitute for conventional agriculture in order to save the cost of agricultural inputs and minimize pesticide application;
- Strengthening research in the different fields of protected agriculture, soil-less agriculture, and providing information on the use of information technology and computer-based expert systems; and
- Developing intensified programs for the development of human resources working in the field of protected agriculture.

1.3 Sub-program for improving water use efficiency in rainfed agriculture

A. Main objectives

- Improving agricultural and living conditions in rainfed areas; and
- Raising water productive efficiency of rainfall, and reducing losses.

B. Main components

- Paying greater attention to rain water harvesting projects and expending such projects in accordance with modern techniques;
- Applying supplementary irrigation systems, making use of the results of local and international research;
- Developing infrastructure and facilities in rainfed areas;
- Developing a map of water basins, in order to raise their use in supplementary irrigation; and
- Media coverage of rainfed areas under development programs, social studies, extension and increased awareness programs, and helping them diversify their activities, including herding, and environmental handicrafts, and introduce the growing of suitable perennial plants and shrubs.

1.4 Sub-program for rationalizing water use efficiency of ground water resources

A. Main objectives

- Maximizing ground water resources' use in economic uses in general and in agriculture in particular, and protecting them against unplanned depletive use;
- Raising ground water use efficiency to enhance agricultural development and production; and
- Promoting settlement in areas depending on ground water for irrigation.

B. Main components

- Supporting and updating detailed studies on ground water resources, within the framework of developing a national map for ground water resources, under a national plan to achieve the optimum and sustainable use such resources;
- Applying modern techniques in monitoring and evaluating ground water and assessing projects and activities to be based on them; and
- Establishing a national institutional entity to survey, monitor and manage ground water resources, as well as amending related laws and establish strict regulations to apply such laws and controls.

1.5 Sub-programs to develop unconventional water resources

A. Main objectives

- Developing alternative water sources that can be used in certain appropriate agricultural uses; and
- Contributing to environmentally safe disposal of sewage and treated water from residential areas.

B. Main components

- Expanding modern projects for the treatment of sewage water through the use of modern techniques;
- Applying an effective agricultural and environmental management for the use of non-conventional water sources (sewage and agricultural drainage water);
- Strengthening research and applied programs in the field of developing and selecting plant varieties that can be grown using saline and low-quality water; and
- Participating in regional and international research efforts for cost-efficient sea water desalination.

1.6 Sub-programs to establish a national network of agricultural meteorology

A. Main objectives

- Establishing a modern national network covering all areas, for monitoring and measuring the different climate and environment variables, using state-of-the-art information and communications techniques. Such a network would serve as a modern tool for agricultural development purposes, including agricultural research and extension, early warning, risk prediction, assessment and management, and would offer its services for societal benefits, and at affordable cost to the private and business sectors.

B. Main components

- Allocating enough funds to establish a national agricultural meteorology network according to the most up-to-date international systems, studies and detailed designs in identified areas of the fine agricultural regions;
- Internal and external training and formation of required human resources; and
- Allocating enough funds for the efficient and sustainable operation of the network, as well as for its maintenance, replacement and continuous development.

2. National program to maintain and upgrade the productive efficiency of agricultural land

The survey and protection of resource assets constitutes the primary component of good management of such assets and maintaining their growth, sustainability and productivity. Agricultural land in Egypt constitutes the most valuable of its national non-renewable resources getting scarcer year after year. Therefore, it is of utmost importance, within the framework of the strategic vision of agricultural development, to survey and protect these resources against the negative effects of the various factors that cause deterioration and reduce their productive worthiness, hence the importance of the following sub-programs.

2.1 Sub-program for developing and updating agricultural land classification maps

A. Main objectives

- Maintaining the productive worthiness of agricultural land resources against deterioration;
- Establishing a reference framework and an appropriate information system for monitoring land classification conditions, natural and productive traits of land resources, as well as monitoring probable changes; and
- Making better use of land classification maps in analyzing negative phenomena and determining the factors that need to be addressed.

B. Main components

- Supporting the efforts aimed at developing and continuously updating national land classification maps by natural resource endowment and productive worthiness;
- Technical training of specialized cadres; and
- Applying modern scientific techniques in developing and updating land classification maps, as well as using remote sensing and geographical information system (GIS) data.

2.2 Sub-program for supporting agricultural land improvement projects

A. Main objectives

- Addressing land degradation problems, and restoring and increasing their efficiency in achieving development and food security goals;
- Routinely maintaining agricultural land that constitutes a natural capital asset; and
- Monitoring agricultural land quality traits and applying the most up-to-date techniques.

B. Main components

- Giving greater attention to integrated farm management practices, including cropping patterns, agricultural lands maintenance and their sustainable use;
- Supporting entities and departments responsible for agricultural land maintenance and improvement, and strengthening coordination and collaboration among them;
- Expanding the application of modern irrigation systems, and improving agricultural drainage systems and facilities;
- Providing technical services in the field of soil analysis; and
- Training technical cadres in the fields of land maintenance and improvement.

2.3 Sub-program to protect agricultural land from desertification

A. Main objectives

- Protecting agricultural, land, rangelands, and the biological diversity from quantitative and qualitative deterioration.

B. Main components

- Applying modern monitoring techniques and practices through the use of remote sensing and GIS;
- Expanding the cultivation of man-made forests and green belts;
- Using modern techniques in sand-dune fixation, and making use of the experiences of other countries in this connection; and
- Strengthening specialized environmental extension efforts in areas under risk of desertification

2.4 Sub-program to improve soil fertility

A. Main objectives

- Maximizing the use of soil amendments including micro-organisms in increasing soil fertility and plant production, and increasing the nitrogen-fixing bacterial inoculation, and organisms that dissolve phosphate and feldspar, as well as disease-resistant organisms, in addition to introducing organisms that would help decompose cellulose residues into silage and compost.

B. Main components

- Using modern techniques in isolating and defining nitrogen-fixing organisms (Rhizobia, Spirilla, Phrankia, Mycorrhiza and green-blue algae);
- Promoting the production of inoculums containing these organisms, through isolation and selecting the suitable media for growing such organisms and increasing their effectiveness;
- Undertaking laboratory and field tests using such inoculums and their hosts (legumes, wheat, rice, maize, vegetables and fruit trees);
- Using inoculums to improve the decomposition of plant residues for producing silage and compost; and
- Using micro-organisms in producing mono-cellular protein, amino-acids and alcohol from plant residues.

2.5 Sub-program to develop and expand the use of agricultural mechanization

A. Main objectives

- Supporting and contributing to raising agricultural commodities productivity;
- Maximizing the positive returns of field irrigation systems, through expanding the use of agricultural mechanization and modern irrigation systems;
- Expediting the performance of agricultural operations, contributing to raising agricultural intensification;
- Opening wider opportunities for individuals and the private sector in the provision of agricultural mechanization services, and in the operation and maintenance of machinery;

- Providing wider opportunities to invest in manufacturing agricultural machinery and equipment; and
- Promoting the use of new and renewable energy in agriculture.

B. Main components

- Developing and modernizing training and extension centers and services, to provide needed agricultural skilled labor;
- Developing and modernizing agricultural education curricula, to meet market demand;
- Introducing appropriate credit lines to encourage farmers to acquire agricultural machines and equipment for private or commercial use, particularly through agricultural and rural associations;
- Encouraging investments in manufacturing agricultural machines and equipment; and
- Reviewing laws and regulations related to production and importation of agricultural equipment and machinery.

3. National program for field crops development

Increasing field crop production and productivity, which are of a high priority in the agricultural development strategy due to the importance of this commodity group from production perspective, securing consumption needs and food security, providing raw material requirements to agro-industries and increasing export commodities and products. This national program includes 10 sub-programs that can be summarized in the following:

3.1 Sub-program for wheat crop development

A. Main objectives

- Raising wheat production and productivity in order to increase self-sufficiency and food security, and to meet the ever-increasing needs of an ever-increasing population; and
- Increasing areas planted to wheat to 4.2m feddans, and wheat productivity to 3.6 tons/ feddan, in order to raise the local production of wheat to 15.1m tons, enough to achieve a self-sufficiency rate of around 80.8% by the year 2030.

B. Main components

- Using bio-techniques particularly in high-yielding varieties' breeding programs, and expending the cultivation of such varieties;
- Expanding the cultivation of wheat in new lands;
- Developing higher-yielding, drought- and high-temperature-tolerant varieties, as well as disease-resistant varieties, particularly rust;
- Propagating and securing certified seeds; and
- Applying optimum agricultural practices and developing wheat farm management systems.

3.2 Sub-program for rice crop development

A. Main objectives

- Reducing the areas planted to rice from approximately 1.7 m to around 1.35 m feddans by the year 2030; and
- Increasing productivity to 5.2 tons/ feddan by the year 2030 instead of 4.11 ton/ feddan at present, in order to achieve self-sufficiency and produce a surplus for exportation. It is

projected to achieve a total volume of 7m tons of paddy rice, enough to achieve full self-sufficiency.

B. Main components

- Expanding the cultivation of high-yielding and low-water requirement varieties, and their seed multiplication; and
- Applying effective mechanisms to cultivate of such varieties in the areas allocated for them.

3.3 Sub-program for the development of the maize crop

A. Main objectives

- Increasing production and productivity of maize used in poultry feed and minimize dependence on importing poultry feed;
- Increasing production and productivity of white maize to contribute to bread production; and
- Expanding areas planted to maize to reach 3.7 feddans, and raise productivity to 5 tons/ feddan, thus raising production to around 18.5 m tons by the year 2030.

B. Main components

- Continuing the breeding of high-yielding cross varieties tolerant to unfavorable environmental conditions;
- Expanding the cultivation of improved varieties and securing their seeds;
- Allocating suitable areas in the newly-reclaimed lands to cultivate these varieties; and
- Improving maize cultivation practices and farming systems.

3.4 Sub-program for other cereal crops development

A. Main objectives

- Raising production and productivity of other cereal crops, particularly sorghum and barley, through expanding areas planted from 773,000 feddans at present to 1.008 m feddans by the year 2030.

B. Main components

- Continuing breeding programs for barley and sorghum to develop high-yielding varieties tolerant to high temperature and drought;
- Securing the seeds of high-yielding and disease-resistant varieties;
- Expanding the cultivation of such varieties in the newly-reclaimed areas; and
- Expanding the cultivation of barley in areas of suitable rainfall, using supplementary irrigation.

3.5 Sub-program for cotton crop development

A. Main objectives

- Increasing cotton production through increasing areas planted to cotton, in order to meet the requirements of the evolving local industries and exportation, concentrating on the cultivation of suitable varieties for these purposes, and increasing productivity to 1.8 tons/feddan; and
- Increasing the production of cotton seeds which will lead to increasing the rate of self-sufficiency of vegetable oil.

B. Main components

- Expanding the application of bio-technology to reduce the period needed for seed multiplication;
- Importing foreign germplasm to support breeding of high-yielding, early-maturing and stress-tolerant varieties;
- Establishing a chromosome map for the Egyptian cotton varieties;
- Expanding the application of genetic engineering in developing pest-resistant cotton varieties;
- Expanding the cultivation of long-medium staple high-yielding cotton varieties cultivated in this region; and
- Expanding the application of optimum agricultural and farm management practices.

3.6 Sub-program for sugar crops development

A. Main objectives

- Increasing the productive efficiency of sugar from around 1.4m tons at present to 3.5m tons by the year 2030, through increasing sugar cane productivity from around 49 tons/feddan at present to around 65.4 tons/feddan by the year 2030, as well as expanding the cultivation of sugar beet to raise production from around 189,000 tons at present to 800,000 tons, and raising productivity from 22 tons/feddan at present to around 35 tons/feddan by the year 2030;
- Raising the rate of self-sufficiency in sugar;
- Increasing the utilization sugar crops by-products used in several industries;
- Increasing farmers' returns, as well as increasing agricultural intensification through inter-planting of other crops with sugar cane; and
- Increasing land and water returns from sugar crops.

B. Main components

- Paying greater attention to breeding indigenous sugar cane varieties, through the application of modern techniques and bio-technology;
- Expanding the application of optimum agricultural practices and integrated pest control in sugar cane and sugar beet crops;
- Collating agro-climatic areas of early-, medium- and late-maturing sugar cane varieties for the different sugar cane producing areas;
- Using mono-embryonic seeds and the application of decortation practices in the cultivation of sugar beet; and

- Expanding the application of double-cropping with sugar cane, according to recommended practices.

3.7 Sub-program for feed crops development

A. Main objectives

- Increasing production and productivity of feed crops to develop animal production. This would be achieved by increasing areas planted to perennial clover, one-cut clover and alfalfa from around 2.19m feddans at present to around 3.05 m feddans by the year 2030, in addition to raising productivity to around 50 tons/feddan for perennial clover, 15 tons/feddan for the one-cut clover, and 50 tons/feddan for alfalfa;
- Introducing the cultivation of multi-foliolate clover (Fahl cultivar) in the agricultural rotation by cultivating an area of 600,000 feddans by the year 2030;
- Maximizing the utilization of crop residues in producing feed, in order to contribute to securing feed requirements; and
- Maximizing the use of rangelands in some areas.

B. Main components

- Genetically improve high-yielding feed crops;
- Developing field agricultural practices;
- Propagating and securing improved seeds;
- Introducing the cultivation of multi-foliolate clover (Fahl cultivar) and other feed crops in the agricultural rotation;
- Expanding the cultivation of alfalfa in the new lands;
- Applying modern techniques in the cultivation of feed crops in marginal lands (such as fodder beet, Torpedo grass, Sudan grass, etc; and
- Developing available rangelands and improving their management.

3.8 Sub-program for legume crops development

A. Main objectives

- Increasing legume crop production, through increasing planted areas and raising productivity in order to raise the rate of self-sufficiency;
- Increasing the areas planted to fava beans from 202,000 feddans at present to around 400,000 feddans by the year 2030, as well as increasing productivity from 1.4 tons/feddan at present to 1.8 tons/feddans in order to raise production to around 720,000 tons by the year 2030;
- Raising productivity rates in order to raise farmers' returns and encourage them to expand their cultivation.

B. Main components

- Breeding, multiplication and expanding the cultivation of high-yielding, early-maturing and disease- and pest-resistant varieties;
- Developing improved farm management and agricultural practices;
- Modernizing legume crops irrigation systems; and
- Genetically improving fava bean and lentil crops, in order to raise productivity and improve product quality.

3.9 Sub-program for oil seed crops development

A. Main objectives

- Expanding the areas planted to oilseed crops to reach 525,000 feddans by the year 2030, increasing productivity and domestic production of vegetable oils to improve self-sufficiency; and
- Introducing new oilseed crops and expanding their cultivation in the newly-reclaimed areas, to increase domestic production of vegetable oils and reduce imports.

B. Main components

- Improving productivity levels, through developing and expanding the cultivation of high-yielding and disease- and pest resistant varieties;
- Expanding the cultivation of salinity- drought- and environmental conditions tolerant varieties in the new lands;
- Introducing new oil crops, such as canola, and expanding its cultivation in the newly reclaimed areas; and
- Applying modern agricultural and farm management practices to increase land and water productivity.

3.10 Sub-program for onion development

A. Main objectives

- Developing the quantitative and qualitative traits of onion to meet the needs of local and export markets; and
- Restoring and improving the export position of Egyptian onion through improving quality traits that meet the requirements of export markets.

B. Main components

- Genetically improving High-yielding, good quality varieties which has high demand in foreign and local markets;
- Paying greater attention to breeding onion varieties for size and color and other properties related to disease resistance, particularly white rot;
- Improving seed production and securing seed in appropriate quantities; and
- Improving on-farm operations and practices, particularly transplanting.

3.11 Sub-program for the integrated control of plant pests and diseases

A. Main objectives

- Reducing chemical pesticide use to the minimum levels utilizing integrated pest management practices;
- Producing agricultural products that are free from pesticide residues, safe for humans and reducing environmental pollution;
- Increased export capacity of the different field and horticultural products, and increasing this economic returns; and
- Reducing production costs of the different crops, through improved cultural practices, thus increasing their competitiveness in international markets.

B. Main components

- Establishing an integrated data base on agricultural pests and proven bio-control methods, and using such data in developing a program to predict the spread of pests and develop pest thresholds for control applications;
- Applying the different bio-control methods, whether through the use of parasites, insect or animal predators, or through microbial control;
- Applying biotechnology in pest and disease prevention and control, through the use of pest- and disease-resistant varieties;
- Establishing a strategy for organic agriculture to the latest bio-technologies and the use of organic fertilizers, biological control of pests and continuous monitoring of field and horticultural crops;
- Undertaking practical and field studies to monitor the side effects of pesticides, and establishing a database for pesticides and the physical and chemical properties using the latest techniques in analyzing pesticides, and improving laboratories to be certified internationally;
- Using up-to-date technology in measuring pesticide residues and heavy metals in food; and
- Developing a national program for weed control, and reducing the use of chemical pesticides.

4. National program for horticultural crops development

Horticultural crops are high-value products, of a vital importance to increase exports; increasing value along the links of the production to marketing chain. The different agro-ecological zones increase Egypt's comparative advantage seasonally and quality-wise. This national program includes the following sub-programs.

4.1 Sub-program to develop the main vegetable crops

A. Main objectives

- Improving productivity as one of the main elements of achieving the optimum use of land and water;
- Quantitative and qualitative development of vegetable crops to maintain self-sufficiency and provide export products; and
- Establishing linkages between production and local and foreign markets, according to quantitative and qualitative requirements of each.

B. Main components

- Studying the gap between actual productivity and potential, and identifying ways and means for reaching world productivity through vertical expansion;
- Establishing national programs to produce seeds of high-quality and high-yielding vegetable varieties with demand in local and foreign markets;
- Expanding areas planted to potatoes in the new lands, and increasing productivity through the use of high-yielding varieties, as well as through improving agricultural practices;
- Expanding areas planted to sweet potatoes to bridge the food gap, as well as increasing the productivity of high nutritional value varieties in the new lands;

- Developing new hybrids of important vegetable and fruit crops such as tomatoes, green pepper and strawberry, through conventional breeding methods and genetic engineering;
- Reducing pre- and post-harvest losses, particularly in highly-perishable products;
- Concentrating on the cultivation of special purpose vegetable crops such as the production of tomatoes for canning as close as possible to processing plants, as well as paying greater attention to establishing small processing units in production areas;
- Providing specialized training for farmers in order to improve the productivity of highly-perishable products and reduce pre- and post-harvest losses (such as strawberry and leaf vegetables); and
- Developing and executing extension programs for improving pre- and post-harvest practices and reducing losses and spoilage.

4.2 Sub-program to develop fruit crops

A. Main objectives

- Increasing production and productivity of the different fruit crops in drought prone areas and modern on-farm irrigation systems, particularly the main fruit crops such as citrus, grape, peach and mango;
- Importing new and early-maturing varieties of nectarine and peach and improving their productivity due to their export importance;
- Introducing new mango varieties and expanding their growing; and
- Reducing horticultural post-harvest losses from 20 – 30 % to 5 – 10 %.

B. Main components

- Developing a map for early- medium- and late-maturing mango varieties, in accordance with suitability to the different agro-climatic zones and disease resistance;
- Improving horticultural crops production practices including adoption of integrated pest management practices;
- Improving fruit picking, packaging and transportation methods to local markets and foreign markets;
- Organizing training and extension programs to improve product quality and reduce losses; and
- Improving seedling production, particularly disease-free certified seedlings.

4.3 Sub-program to develop fruit trees in dry areas (olive, palm, fig and pomegranate)

A. Main objectives

This sub-program aims at directing greater attention and efforts towards the development of desert fruit trees that have not so far enjoyed enough attention in spite of their economic, social and environmental importance. These crops enjoy unique features that underline the importance of their development, including:

- There are great potential of growing such crops in desert areas, as well as in the newly-reclaimed valleys;
- Their high water-use efficiency;
- Their contribution to the income of the inhabitants of desert areas;
- Their importance of improving environmental conditions and reducing desertification;

- Their importance of establishing many small industries and projects using their products and by-products;
- Their nutritional importance in addition to their potential contribution to increasing agricultural exports as fresh or processed products;
- Expanding areas planted to olive trees, in order to increase local production of edible oil and improve self-sufficiency, through increasing planted areas from around 125,000 feddans at present to 300,000 feddans by the year 2030, as well as increasing productivity from 5.03 to 8 tons/feddan;
- Introducing new date varieties such as Al-madjool and Al-barhi, and expanding their growing due to their local and export importance, and their good economic returns; and
- Expanding areas of pomegranate from 6,000 feddans with an average of 8.37 tons/feddan at present to 40,000 feddans with an average of 12 tons/feddan by the year 2030.

B. Main components

- Breeding, developing and introducing high-yielding and distinctive quality varieties and lines that are capable of tolerating drought, dry and desert environments, using of modern tissue culture and genetic engineering techniques, etc;
- Making available improved and new varieties in enough quantities to replace old varieties or to expand cultivation in desert and newly-reclaimed areas, as well as establishing related extension programs;
- Establishing nurseries of improved and new varieties, under adequate supervision, and providing financial and extension services, particularly in targeted areas;
- Supporting seedling prices for farmers in desert areas and newly-reclaimed valleys, for encouraging farmers to grow such varieties;
- Providing credit facilities and technical support, training and extension in the different stages of processing these kinds of fruits (dates, olive, fig and pomegranate), to encourage rural people to establish small scale agro-industries; and
- Establishing linkages between the producers and processors of these kinds of fruits and marketing channels to local and export markets.

4.4 Sub-program to develop production and processing of medicinal and aromatic plants

A. Main objectives

- Increasing production and productivity of medicinal and aromatic plants;
- Expanding areas planted to medicinal and aromatic plants from around 70,000 feddans at present to 200,000 feddans by the year 2030, in order to increase exports and benefit from increased demand on such products;
- Breeding new, genetically-improved and high-yielding varieties of medicinal and aromatic plants that contain higher percentages of essential ingredients; and
- Promoting the acquisition, importation and cultivation of varieties for which there is high demand in international markets;
- Improving products quality according to world standards and the requirements of export markets.

B. Main components

- Using bio-techniques particularly in high-yielding varieties' breeding programs;
- Encouraging organic cultivation;
- Improving agricultural practices to achieve productive efficiency and improving product quality;
- Improving harvesting, packaging and processing techniques using modern drying, and processing technologies appropriate for local and export marketing;
- Improving pre- and post-harvest practices;
- Developing improved seed and seedling production techniques;
- Improving extension and training programs, particularly in the field of pre- and post-harvest field practices; and
- Reducing pesticide application and encouraging integrated pest control practices.

4.5 Sub-program to developing ornamental production and cut flowers

A. Main objectives

- Increasing the areas planted to cut flowers and ornamental plants using improved agricultural practices;
- Increasing the productivity and improving the quality of ornamental plants and cut flowers; and
- Increasing exports of cut flowers and ornamental plants due to their being one of the most promising exports.

B. Main components

- Introducing kinds of varieties required for exportation;
- Improving and developing agricultural practices;
- Improving cutting, marketing and exportation practices, particularly pre- and post-harvest practices;
- Developing extension and training programs; and
- Improving the production of cuttings, seeds and seedlings.

5. Major program to develop animal production

Animal production is one of the main components of agriculture based on mixed plant and animal production. Animal production constitutes around 43% of total agricultural products, and constituted approximately 27% of net agricultural income in 2007. Animal products constitute the major source of basic body amino acids, hence the importance of raising consumption rates of animal products considered a measure for social welfare. Comparing average *per capita* consumption of animal protein in Egypt, estimated at 21 g/day with the level recommended by international organizations of 29 g/person/day, underlines the importance of exerting more efforts to develop animal production in order to meet the ever-increasing requirements of the Egyptian people. Demand is expected to increase with the increase in per capita income and the number of the population. Focusing increased efforts on the development of this sector would raise the welfare of the society and decrease dependence on importation.

Generally, the major program for the development of animal production aims at:

- Maximizing land and water returns;
- Raising integration levels between animal and plant production;
- Increasing average *per capita* daily consumption by about 4 g by the year 2030;
- Reconstructing the animal protein consumption in favor of less costly sources;
- Prioritizing development efforts for the different sources of animal protein on the basis of their economic efficiency, and development potential in the near future; and
- Concentrating of the development of the production of small and medium breeders (rural women, landless breeders, and youth graduates).

5.1 Sub-program to develop milk production

A. Main objectives

- Increasing average *per capita* consumption of locally-produced milk from 63 kg/year to 90 kg by the year 2030, and minimizing imports;
- Achieving the highest possible productivity of milk per head; and
- Providing high-quality milk in quantities enough to meet the requirements of dairy processing plants.

B. Main components

- Encouraging the establishment of an institutional entity grouping milk producers and dairy processors, to establish development policies, plans and projects and monitoring their execution. Such institution should include milk producers, dairy processors, research institutions, private sector and cooperatives;
- Establishing an integrated system for cattle registration, for identifying the genetically appropriate animals and expanding their breeding;
- Improving indigenous cattle herds, through crossing with Frisian cattle adapted to local conditions;
- Liberalizing artificial insemination services from the monopoly of the Veterinary Services Authority, restricting its role to registration and performance supervision and encouraging the private sector and cooperatives to undertake this responsibility;
- Adopting a long term national program for the genetic improvement of buffaloes, through selection, establishing nucleus herds at the level of governorates, artificial insemination with semen taken from males whose weight is not less than 2.4 tons, with the aim of inseminating 15% of the buffalo population in governorates of not less than 170,000 heads;
- Encouraging the establishment of small breeders associations and providing support to such associations;
- Developing a basic system for collecting, handling and processing milk at the level of small farmers;
- Improving the capabilities of the extension system of the animal sector; and
- Establishing incentives for investing in dairy processing and handling.

5.2 Sub-program to raise red meat productive capacity of milk producing herds

A. Main objectives

- Increasing red meat production from 670,000 tons/year at present to around one million tons/year by the year 2030;
- Reducing imports of red meat from around 330,000 tons/year at present to marginal quantities by the year 2030;
- Reducing per capita* red meat consumption by 0.5 kg every five years.

B. Main components

- Reducing the age and weight of fattening heifers;
- Raising the efficiency of feed sources used in fattening heifers, and increasing dependence on local sources particularly crop residues;
- Improving slaughterhouses and improve hygienic conditions;
- Improving live animals marketing operations;
- Improving red meat marketing and handling operations;
- Developing credit policies to enable small breeders expand the production of red meat; and
- Expanding the production of sheep and goats by small breeders and rural women.

5.3 Sub-program small ruminants to develop

A. Main objectives

- Developing sheep and goat production by small breeders and rural poor; and
- Developing sheep and camel husbandry in desert areas, for optimizing the use of natural resources in these marginal areas.

B. Main components

- Genetic improvement of indigenous and mixed sheep breeds to increase production;
- Developing household small ruminant production systems at the village level to increase household income;
- Developing goat milk production and processing goat milk as a nutritional source, particularly for babies and women; and
- Improving sheep, goat and camel husbandry in marginal desert areas (Matrouh, southern and northern Sinai, the Red Sea and the oasis) for optimizing the use of natural resources of these areas.

5.4 Sub-program to develop poultry production in rural areas

A. Main objectives

- Improving rural inhabitants income, particularly farmers and low income groups, through small low-capital intensive poultry projects for reducing rural poverty; and
- Developing rearing systems in the rural sector in order to maintain its role in achieving food security and meet the requirements of the poultry industry.

B. Main components

- Supporting the national project for improving local breeds;

- Improving rural poultry production systems for improving rural incomes;
- Improving handling and marketing system of rural poultry products; and
- Establishing an improved financial system for supporting small producers in improving rural rearing and production patterns.

5.5 Sub-program to develop commercial poultry production

A. Main objectives

- Increasing *per capita* share of poultry animal protein by one gram/day every ten years;
- Developing the institutional structure of the poultry industry.

B. Main components

- Expanding fattening broilers' production to 1073 m birds by the year 2017, and 1'300 m birds by the year 2030;
- Increasing table egg production to around 7.6 b eggs by the year 2017, and around 9.22 b eggs by the year 2030;
- Expanding the establishment of mechanical poultry slaughterhouses, in order to decrease handling of live poultry;
- Improving feed conversion ratio for fattening broilers to 1:1.9 by the year 2017 and about around 1:1.8 by the year 2030;
- Improving feed conversion ratio for egg layers to 1:2.7 by the year 2017 and about around 1:2.6 by the year 2030;
- Activating bio-safety procedures in the commercial poultry sector;
- Establishing a vocational training center to train technical cadres needed for the poultry industry in Egypt and the Arab countries;
- Developing poultry marketing information systems;
 - Expanding poultry products exports; and
- Developing the General Poultry Producers Association, increasing its membership and improving its finance and functions.

5.6 Sub-program to develop fisheries

A. Main objectives

- Raising *per capita* consumption of locally produced fish to approximately 18.5 kg by the year 2030; and
- Improving fisheries products quality from the different sources to be consistent with international requirements.

B. Main components

- Updating laws and regulations to prohibit illegal fishing particularly in shallow waters;
- Amending laws in order to expand fishing in the Mediterranean into the exclusive economic zone, extending to 200 nautical miles, instead of present regional waters extending to 12 nautical miles only;
- Signing fishing cooperation agreements with neighboring countries;
- Sustainably developing northern lakes and eliminating contamination sources;

- Encouraging investment in manufacturing fishing gear, refrigerated fish transportation and the production of fish feed;
- Developing sea fish farming, through identifying areas suitable for fish farming along the shores of the Red Sea and the Mediterranean, and providing incentives for the private sector to work in this field;
- Developing fish farming in brackish and fresh waters, as well as in desert areas;
- Amending land leasing regulations for areas used in fish farming;
- Developing technical recommendations for raising fish farming production to around 5 tons/feddan;
- Developing fish production and marketing information systems; and
- Restructuring the Public Authority for Fisheries to enable it to concentrate on policies required for organizing the fishing industry.

5.7 Sub-program to protect animal health

A. Main objectives

- Protecting livestock, poultry and fisheries against veterinary endemic and trans-boundary diseases;
- Protecting consumers against common diseases transmitted from animals to humans; and
- Maintaining the safety of animal products.

B. Main components

- Giving priority to the eradication of the Foot-and-Mouth, Brucellosis, Tuberculosis and *Avian* flu diseases;
- Establishing an early warning system for trans-boundary diseases;
- Generalizing the system of animal tagging for breeding and animal health purposes;
- Privatizing artificial insemination, veterinary and abattoir services;
- Updating veterinary regulations;
- Restructuring the General Authority for Veterinary Services, to be consistent with market forces and free economy, and in order to concentrate on regulations, reducing the spread of diseases and veterinary services;
- Encouraging investments in the field of veterinary medicine and the production of inoculants; and
- Establishing an educational and training system for assistant veterinarians.

5.8 Sub-program to develop feed

A. Main objectives

- Reducing dependence on conventional feed sources, as well as bridging the gap between available and required quantities of feed; and
- Improving the levels of animal and poultry feed in order to increase productivity.

B. Main components

- Improving clover productivity through developing improved clover varieties, expanding their cultivation, developing the seed industry and expanding the cultivation of multi-foliolate clover (Fahl cultivar) (as detailed under the field crops program);

- Expanding the production of maize silage;
- Expanding the cultivation of maize, as well as raising productivity;
- Establishing a plan for developing natural ranges, particularly in the northern coast and Sinai zones;
- Expanding the use of agricultural residues in producing unconventional feed and raising their nutritional value; and
- Improving the productivity of summer feed crops.

6. Major program for the socio-economic development of rural areas

Developing the socio-economic conditions of rural areas and improving the living conditions of rural inhabitants constitute a means and an end, particularly in the field of agricultural development. The poor living conditions of farmers are the main reason, as well as the natural result of the poor and underdeveloped conditions dominating rural areas. Agricultural development would not materialize unless there is a noticeable improvement in the socio-economic conditions of rural inhabitants and rural areas in general.

Achieving the desired socio-economic development constitutes a general national objective whose responsibility rests on the different political and executive entities, including entities concerned with agricultural development. This development covers several fields and activities, including fields and activities under the following sub-programs.

6.1 Sub-program to strengthen the role of women in rural development

A. Main objectives

- Improving the living conditions of rural women and enabling them to participate positively and actively in the different socio-economic activities; and
- Integrating women in the different agricultural and on-agricultural development and projects in rural areas, and reducing societal prejudice and discrimination against rural women.

B. Main components

- Giving greater attention to the qualitative improvement of rural women's conditions through educational and health services, and well as providing training in technical and administrative activities in which they take part;
- Providing financial and extension support for small rural projects suitable for women in east area, and enabling women to obtain concessional credit;
- Encouraging the establishment of women's civil society organizations in rural areas for supporting their role in achieving the socio-economic development in these areas; and
- Strengthening the policy and coordination unit for supporting rural women at the MALR, to be able to design rural women programs and projects at the different agro-ecologic zones even at the village level.

6.2 Sub-program to strengthen and develop small rural projects

A. Main objectives

- Diversifying income-generating rural agricultural activities and other related and complementary activities;
- Creating off-farm productive job opportunities in order to reduce unemployment and poverty levels, and support the productive and economic capabilities of the rural sector;
- Improving the quality of rural small industries, to increase their economic returns, marketing efficiency, and export potential; and
- Reviving rural industries and handicrafts and applying modern production systems that would help support and improve the productive capacities of rural villages.

B. Main components

- Providing concessional credit, training and technical support to small rural processing industries and handicrafts;
- Supporting suitable marketing systems for ensuring production inputs, as well as for marketing products; and
- Establishing extension programs for ensuring product quality and safety, and granting related certificates, in order to improve product competitiveness in domestic and foreign markets.

6.3 Sub-program to maximize farmers' utilization of agricultural residues

A. Main objectives

- Underlining the economic importance of agricultural residues, and popularizing ways and means to recycle them in producing fertilizers, animal feed and energy;
- Creating an added economic value through the economic utilization of agricultural residues for the benefit of farmers; and
- Contributing to reducing the negative environmental effects resulting from the neglect of agricultural residues and treating them as rubbish that has to be disposed of albeit by ways that are detrimental to the environment and human health.

B. Main components

- Providing extension, training and technical support in all fields related to the utilization of agricultural residues;
- Establishing pilot practical models to convince farmers to adopt the proposed practices;
- Providing concessional credit, as well as physical support in justifiable cases; and
- Intensifying information campaigns on the environmental and economic importance of the processing of agricultural residues and making use of them in traditional industries, as well as in producing fertilizers, animal feed and bio-energy;

7. Major program to develop and modernize agricultural marketing and agro-industries

The possibility of developing and improving the agricultural sector depends, to a great extent, on the development and modernization of marketing systems that would generate attractive financial returns and profits for farmers. They are still far from direct interaction and

communication with markets and market variables, and are subjected to unfair market systems and relations, and get a limited share of prices paid by consumers unlike traders and middlemen.

Agricultural perishable products are prone to high rates of losses and spoilage due to poor handling and malfunctioning of marketing services and the very low percentage that undergoes the different forms of agro-processing, hence the importance of this program that covers the following sub-programs:

7.1 Sub-program to improve pre- and post-harvest practices

A. Main objectives

- Reducing pre- and post-harvest losses and spoilage of agricultural products; and
- Improving the quality of agricultural products and preparing them for domestic and foreign markets, for improving their competitiveness.

B. Main components

- Providing extension services and specialized training for farmers;
- Developing encouraging marketing systems and policies, such as contract farming or marketing products through modern marketing channels that would give greater care to the development of pre- and post-harvest practices;
- Establishing standard specifications and quality standards for agricultural products, and determining farm-gate prices in accordance with product quality; and
- Supporting farmers' associations in establishing good pre- and post-harvest services and systems, such as milk refrigeration units, and refrigerated units for keeping vegetables and fruits, and other related handling services.

7.2 Sub-program to support small farmers' marketing associations

A. Main objectives

- Strengthening farmers' bargaining powers;
- Enhancing vertical integration linkages between production and marketing, as well as keeping farmers informed of market conditions and variables;
- Increasing farmers' abilities to participate in the processing and exportation of their products; and
- Developing agricultural systems, practices, and marketing channels.

B. Main components

- Providing technical support and concessional credit to establish or reactivate farmers' associations;
- Making use of successful internal and external experiences;
- Allocating some incentives to farmers' associations active in product marketing, such as their exemption from taxes and fees; and
- Establishing a simplified legal and procedural framework for the formation and registration of farmers' associations.

7.3 Sub-program to develop and modernize marketing information systems

A. Main objectives

- Providing a good information environment for all interested parties in all agriculture-related production, services, marketing, exportation and processing activities, within a transparent environment, equal rights as related to getting information and information flow for rationalizing decisions at all levels; and
- Paying greater attention to providing marketing extension services to small farmers and farmers' associations as beneficiaries of the agricultural information system, and improving their productive and marketing abilities.

B. Main components

- Developing and modernizing agricultural data collection, processing and dissemination;
- Developing and modernizing agricultural estimates' systems;
- Merging and strengthening entities responsible for agricultural data and databases collection;
- Developing needed staff skills;
- Securing technical and financial requisites to establish and operate a national interactive network for agricultural information based on modern communication and information techniques; and
- Training necessary technical cadres.

7.4 Sub-program to develop and modernize traditional agricultural processing units

A. Main objectives

- Supporting small and medium agro-industries most of which are found in rural areas for adopting technically and environmentally sound systems for raising their productive capabilities and product quality; and
- Eliminate unsafe production practices and promoting sound and safe products.

B. Main components

- Introducing a program to develop and modernize agro-industrial products, and including them under the industrial modernization program;
- Providing necessary technical support and credit facilities;
- Paying greater attention to product quality, specifications, and nutritional and hygienic safety;
- Establishing a system of trademarks for food products registered locally and internationally at all levels (products of rural industries, small and medium processing units, and large companies); and
- Encouraging investors and businessmen to establish economically viable industrial units in rural areas where raw materials and labor are available.

8. Major program for agricultural research, extension and technology transfer

Due to the scarcity of agricultural resources, particularly land and water, scientific and technological advances offer great hope to achieve development, hence the pivotal importance of agricultural research and related fields such as specialized extension services and the transfer of modern technology.

Based on this, the agricultural development strategy gives special attention to research and extension, technology transfer, and keeping abreast of world developments in these fields through which the country may achieve sustainable agricultural production and increased productivity, protect natural resources, maintain biodiversity, and develop improved agricultural practices. This will be based on several sub-programs, including:

8.1 Sub-program on research to improve natural resources' use efficiency

A. Main objectives

- Continuously improving land and water productivity;
- Keeping abreast of scientific applied research on integrated irrigation and drainage management systems to increase productivity of such systems and related economics; and
- Protecting the qualitative and quantitative characteristics of agricultural natural resources.

B. Main components

- Studies and research on integrated agricultural environmental
- Studies on factors leading to land degradation, including increased salinity and alkalinity, deficiency of soil nutrients and ways and means of addressing these problems;
- Research on maximizing water productivity, developing irrigation technology, increasing the rate of agricultural intensification and mechanical cultivation;
- Applying the latest technical methods to improve water delivery at the field level (remote sensing, neural networks, geographical information system, and expert systems), automatic operation of field irrigation and the use of computers in operating these systems;
- Engineering and biological studies on the use of chemical and biological fertilizers, pesticides through fertigation and soil amendments within a modern irrigation system and their environmental effects;
- Using the geographical information system techniques as well as satellite data in agricultural purposes, particularly in land classification, resource survey and cropping patterns; and
- Integrated management of land resources in some north coast valleys, and achieving integration between irrigated and rainfed agriculture in developing small ruminants.

8.2 Sub-program on research to develop field crops

A. Main objectives

- Raising production and productivity levels of field crops;
- Applying modern technology to the development of disease- and pest-resistant crop varieties, and climatic and environmental adverse conditions tolerant varieties (salinity, drought and temperature).

B. Main components

- Breeding and developing new early-maturing, high-yielding field crops, using biological techniques;
- Developing early-maturing crops; and
- Promoting the production of improved seeds and protecting genetic resources.

8.3 Sub-program on research to develop horticultural crops

A. Main objectives

- Raising production and productivity levels of horticultural crops;
- Improving product quality and traits, in accordance with consumer preferences, as well as processing and export requirements; and
- Supporting the development and diversification of horticultural exports, particularly of the non-traditional crops.

B. Main components

1. For fruits:

- Promoting fruit productivity through improving field applications of irrigation, fertilizing, pruning, and integrated pest control;
- Using new techniques in selecting new varieties and the propagation of fruit trees;
- Improving pre- and post-harvest practices to reduce losses and improving product quality and traits for domestic and foreign markets; and
- Introducing new kinds of fruits and evaluating their production under Egyptian conditions.

2. For vegetables and medicinal and aromatic plants:

- Applying modern technologies to improve cultural practices (irrigation, fertilizing, pruning, and integrated pest control);
- Improving product quality and developing new varieties and hybrids through breeding and selection, as well as testing and evaluating imported varieties under local environmental conditions;
- Using modern technology in the propagation of vegetable crops and medicinal plants, such as tissue culture, biotechnology and genetic engineering;
- Reducing environmental contamination through rationalizing agricultural chemicals and pesticides application, and promoting organic agriculture;
- Improving pre- and post-harvest practices for vegetable crops, and medicinal and aromatic plants; and
- Improving the production of basic and certified seeds of vegetable crops for domestic consumption and exportation.

3. For ornamental plants, botanical gardens, wood trees and flora

- Expanding the cultivation of man-made forests to lessen the effect of environmental problems;
- Promoting the cultivation of wood trees to increase domestic production of wood and wood-trees by-products; and
- Promoting the cultivation of ornamental plants and cut flowers suitable for exportation and used in tourist villages established under different environmental conditions.

8.4 Sub-program on research to develop animal, poultry and fisheries production

A. Main objectives

- Increasing and improving animal production to meet the needs of local and export markets; and
- Promoting the productive efficiency of livestock, poultry and fisheries.

1. For animal production:

- Developing high-yielding varieties of Egyptian clover, as a main source of green fodder;
- Using untraditional feed sources to reduce meat and milk prices;
- Undertaking studies on the microbiology of small ruminants to maximize the use of fibers in animal feed; and
- Undertaking studies on molecular genetics and gene expression in livestock.

2. For poultry production:

- Undertaking studies on *avian flu* prevention and control – studying the virus causing the disease and the possibilities of undergoing genetic modification;
- Using genetic engineering in controlling *avian flu* and improving virus detection capabilities and the production of preventive vaccines;
- Undertaking studies on improving meat quality and traits to meet consumer preferences; and
- Undertaking studies on feed conversion ratios.

3. For fisheries production:

- Studying sea fish farming systems to maximize production;
- Evaluating capture fisheries; and
- Using modern techniques and genetic engineering in fish improvement.

8.5 Sub-program on research to control animal diseases and improve animal health

A. Main objectives

- Control or complete eradication of contagious and trans-boundary diseases;
- Controlling endemic diseases (in animals, poultry and fish);
- Improving disease diagnostic techniques;
- Developing the production of veterinary vaccines; and
- Improving the reproductive efficiency of ruminants, particularly in buffaloes.

B. Main components

- Improving diagnostic techniques;
- Improving veterinary vaccine production techniques through the use of genetic engineering;
- Describing local disease causes;
- Developing artificial insemination operations and promoting the establishment of frozen semen banks; and
- Undertaking necessary research for improving ruminants' reproductive efficiency.

8.6 Sub-program for research in the fields of biotechnology, genomics, proteomics and bioinformatics

A. Main objectives

- Finding solutions for agricultural development problems related to increasing crop productivity and maximizing the use of natural resources, particularly land and water, as well as to respond to the probable adverse effects of the climate change on agricultural production; and
- Applying modern technology to the development of new crop varieties and lines, as well as reducing the period needed to develop new varieties.

B. Main components

- Using new technologies in developing new high-quality, early-maturing, fungal-, bacterial- and viral-disease-resistant and pest-resistant varieties; and
- Incorporating research in the fields of biotechnology, genomics, proteomics and bioinformatics in animal breeding programs.

8.7 Sub-program for research on utilization of agricultural residues

A. Main objectives

- Reducing the negative effects of agricultural residues;
- Creating an added-value through the economic utilization of agricultural residues; and
- Increasing farmers' awareness of the proper ways and means of handling agricultural residues.

B. Main components

- Undertaking applied research and studies on recycling agricultural residues for the production of energy, as well as organic fertilizers and the different sources of protein (e.g. animal feed, mushroom, etc.) in addition to reducing environmental pollution;
- Undertaking research on the use of new and renewable energy at the level of small farms; and
- Using primary agricultural products in producing bio-energy.

8.8 Sub-program for plant diseases and control research

A. Main objectives

- Establishing databases for agricultural pests, including establishing critical limits for the potential hazards and safety measures and the economic threshold for taking control measures; and
- Increasing the economic returns through remedying the damage caused by plant diseases and pests.

B. Main components

- Developing a program for predicting the spread of pests and diseases;
- Using biological preparations and plant extracts as clean and safe alternatives for chemicals;
- Propagating and encouraging the use of biological enemies, including parasites, predators, and specific insect pathogens taken from the local environment; and
 - Paying greater attention to recycling plant residues for getting rid of pests.

8.9 Sub-program for food processing technology research

A. Main objectives

- Producing safe and high-quality food in accordance with international standards, in order to promote product competitiveness in international markets and reduce the food gap;
- Optimizing the use of available food resources and reducing their contamination; and
- Promoting consumer nutritional knowledge.

B. Main components

- Improving bread, bakery, dairy, meat and fish products, as well as vegetable and fruit products;
- Evaluating the dietary pattern;
- Identifying untraditional food sources and reducing food losses;
- Protecting food from contamination; and
- Making use of agricultural, industrial and slaughterhouses residues in producing useful products and reducing environmental contamination.

8.10 Sub-program for agricultural expert systems research

A. Main objectives

- Developing agricultural expert systems' uses and applications in the fields that would support the achievement of agricultural development.

B. Main components

- Studies and research for developing technical methods used in agricultural expert systems;
- Strengthening cooperation and coordination between national institutions active in undertaking research and studies related to the development of expert systems; and
- Maximizing the benefits of international developments in the field of expert systems techniques and applications.

8.11 Sub-program on research to assess performance of agricultural research programs

A. Main objectives

- Continuously developing agricultural research institutions, system and practices for keeping abreast of global research activities.

B. Main components

- Identifying research programs that would reflect the real needs to use agricultural research in finding applied solutions to problems facing agricultural development;
- Involving research institutions, including universities and agricultural research centers and institutions in research programs within an integrated system under which research tasks are given to concerned entities; and
- Establishing a mechanism for following up research efforts and establishing coordination between the different research entities.

8.12 Sub-program for nanotechnology research

A. Main objectives

- Keeping abreast of global scientific research developments in the field of nanotechnology agricultural uses and applications.

B. Main components

- Supporting nanotechnology research due to its promising future in reaching results that would support applied scientific research; and
- Promoting nanotechnology agricultural research for keeping abreast of new discovering of this new vital field.

8.13 Sub-program for agricultural economics research

A. Main objectives

- Taking economic efficiency into consideration in all agricultural scientific programs and activities; and
- Monitoring and evaluating agricultural development performance in all sectors.

B. Main components

- Research studies on sampling systems and statistical estimates, as well as using related modern techniques;
- Promoting research studies related to food consumption levels and patterns;
- Developing sampling methods of estimating agricultural income;
- Research studies on strengthening agricultural products' competitiveness;
- Research studies on agricultural products' marketing;
- Research studies on assessing agricultural products' losses and damage;
- Periodical studies and reports on the status of the different crop and animal products and future outlook; and
- Paying greater attention to monitoring agricultural development performance at the national, sectoral and zonal levels, and preparing periodic reports.

8.14 Sub-program for agricultural extension and technology transfer research

A. Main objectives

- Undertaking extension activities in the field of agricultural production and environmental rural resources;
- Activating extension aids in support of agricultural extension and activating field schools in agricultural extension; and

- Strengthening the capabilities of local leaders in the fields of agricultural production, and the protection of environmental rural resources.

B. Main components

- Intensifying studies related to the use of information and communication technology in transferring accumulated knowledge and experiences to farmers;
- Applying modern agricultural practices in the different fields of plant, animal, poultry and fisheries production;
- Studying women's role in the production and marketing of plant and animal products in rural areas, and the requirements of rural and Bedouin women participation in producing clean, healthy and safe food; and
- Developing extension activities for supporting extension services provided to farmers and their families, in order to maximize agricultural production through the dissemination and application of modern agricultural practices.

8.15 Sub-program for research on climate change and the alleviation of its probable effects on agriculture

A. Main objectives

- Studying the effects of present and expected climate problems and variables on agricultural performance and preparing a plan to address such problems and reduce their negative effects;
- Evaluating and reducing the negative effects of agricultural activities on the climate regime; and
- Raising the capability of the agricultural sector to adapt to climate change, concentrating on the most fragile agricultural zones.

B. Main components

- Studying the different causes of the fragility of agricultural zones in facing climate change, and identifying the most fragile zones to be given highest priority of acclimatization efforts;
- Assessing the quantitative effect of the probable climate change on crop and animal productivity, water requirements, and animal and plant diseases and pest;
- Establishing scenarios for the possible acclimatization procedures for facing the problem of rising sea level and its effect on the Delta area;
- Promoting the different arrangements to reduce methane emissions from rice fields;
- Developing animal production systems to reduce the emissions of methane and nitrate; and
- Developing agricultural techniques to reduce nitrate emission.

8.16 Sub-program for agricultural mechanization research

A. Main objectives

- Raising agricultural productivity and reducing losses;
- Improving domestic production of agricultural machinery suitable for local conditions for reducing imports of agricultural machinery; and
- Strengthening cooperation between agricultural machinery production in Egypt and meeting standards of international organizations.

B. Main components

- Undertaking applied research studies on the full mechanization of agricultural production (field and horticultural crops, animal and fisheries production) in old and new lands;
- Undertaking applied research studies on the different uses of laser technology (land leveling, identifying maturity levels of the different crops, tree pruning and fruit tree grafting);
- Studying the engineering standards of mechanical transplantation and harvesting, as well as pre- and post-harvest losses, and field and horticultural crops transportation and shipping;
- Undertaking research on new technologies of storing cereal;
- Studying ways and means of promoting the establishment of research and development units at the factories producing agricultural machinery; and
- Establishing extension programs for acquainting farmers with modern technical applications.

9. National program for settlement and encouraging investments in agriculture and agriculture-related projects

Based on the present conditions of weak and limited public and private investments in agricultural development fields and the limited investors readiness and willingness to invest in agricultural projects compared to projects in the other sectors, the agricultural development strategy is based on securing sufficient private investments – domestic and foreign – in agricultural projects. This would include direct investment in agricultural projects or agriculture-related and complimentary projects, e.g. projects to produce agricultural machinery and inputs, product processing projects, as well as service and marketing projects. This is closely related to the incentives and rewards provided by the investment climate, as well as the supporting infrastructure and basic services established in the areas in which such projects are to be established. Supporting the competitiveness of agricultural products in domestic and international markets is one of the main objectives of this strategy. Although competitiveness can be strengthened through several means and arrangements, policies for improving investment climate play a fundamental part in this connection. The strategy contains the following sub-programs.

9.1 Sub-program for settlement in agricultural investment areas

A. Main objectives

- Establishing the necessary physical foundations in areas intended for settlement and agricultural investment, including infrastructures and services; and
- Promoting complementarity between infrastructures, services and supporting facilities for the success of settlement projects in the newly developed areas.

B. Main components

- Developing infrastructures and basic services in areas intended to establish agricultural development projects and agriculture-related and complementary projects, including roads, irrigation and drinking water, electric power, fuel, as well as communication and transportation facilities;
- Establishing coordination and complementarity between government projects in the fields of infrastructure and basic services on the one hand, and agricultural investments and supporting projects on the other; and
- Reconsidering for policies settlement, and distribution of newly-reclaimed areas, as means to promote success of the settlement program.

9.2 Sub-program for identifying and promoting investment opportunities

A. Main objectives

- Popularizing investment opportunities, providing data and information, and carrying out basic studies that would help investors and businessmen in decision-taking; and
- Popularizing advantages and facilities provided by the government for encouraging investments in agriculture and agriculture related and complementary activities.

B. Main components

- Commissioning a specialized entity for preparing preliminary feasibility studies on investment opportunities and fields in agriculture and agriculture-related and complimentary activities, and establishing an integrated map for agricultural investments;
- Putting this agricultural investment map at the disposal of investors and businessmen, as well as regional and international funds and agencies, and applying the best modalities to promote such projects; and
- Provide businessmen and investors with necessary databases and information through electronic means, including information on incentives and agricultural investment climate, as well as related laws, regulations and procedures.

10. Major program to increase the competitiveness of Egyptian agricultural products in domestic and foreign markets

Strengthening agricultural product competitiveness in domestic and international markets constitutes one of the main priority areas of this strategy.

10.1 Sub-program to establish and apply quality standards for agricultural products

A. Main objectives

- Keeping abreast of international development in this connection;
- Promoting exports through strengthening competitiveness based on quality standards, as well as sanitary and phytosanitary standards;
- Developing product marketing and contract farming systems; and
- Establishing agricultural products quality and safety guarantees.

B. Main components

- Coordination and cooperation with other concerned ministries and institutions in establishing a framework for standard specifications and grades for plant and animal products;
- Benefitting from international agencies and from the experiences of other countries with similar circumstances;
- Establishing a legal framework for applying technical and quality standards; and
- Implementing mass media programs for educating and guiding all concerned parties (producers, marketers, exporters, consumers, and processors) in the application of established standards.

10.2 Sub-program to monitor international and regional variables

A. Main objectives

- Rationalizing production, exportation and importation decisions and practices, in light of relevant international trends and variables; and
- Reducing the negative effects of the risk factors related to international conditions and markets.

B. Main components

- Establishing a specialized unit (in cooperation with the private sector) within the agricultural information system, and providing it with the necessary modern equipment and information and communication software, as well as with skilled manpower; and
- Monitoring and analyzing related domestic variables and concerns, and issuing periodical reports to be available to all concerned entities and institutions.

10.3 Sub-program to promote agricultural products in foreign markets

A. Main objectives

- Promoting the presence of Egyptian agricultural products and exporters in international events (marketing events and fairs, etc...) in order to increase exports.

B. Main components

- Promoting the participation of companies and concerned entities in domestic and international marketing events and fairs of agricultural commodities and products; and
- Supporting the promotion of agricultural products, and exploring export opportunities through the commercial representation offices.

11. National program for capacity building of agricultural human resources

The absence of trained and skilled human resources would hamper agricultural development efforts and expectations. Therefore it is important to develop knowledge and skills, and build capacities of human resources active in agricultural development fields. Agriculture lacks the availability of enough skilled manpower and availability of trained and skilled staff. Hence, the importance of establishing a vocational institutional framework to upgrade skills to meet needs of human resources in the agricultural sector. The proposed framework should establish the program necessary to achieve its goals. These programs include the following sub-programs:

11.1 Sub-program for training staff active in the fields of research, extension and technology transfer

A. Main objectives

- Upgrading the scientific and technical skills of staff active in the fields of research, extension and technology transfer.

B. Main components

- Providing external scholarships to obtain scientific degrees;
- Expanding internal and external visits and missions;
- Participating in domestic and international symposia, conferences, workshops and training programs; and
- Activating cooperation protocols in research fields with international institutions and other countries.

11.2 Sub-program to upgrade the skills of staff working in the fields of agricultural policy designing, analysis, monitoring and evaluation

A. Main objectives

- Upgrading the scientific skills and technical experiences and practices of staff working in the fields of agricultural policies designing, analysis, monitoring and evaluation.

B. Main components

- Scholarships for obtaining scientific degrees;
- Visits and internal and external scientific and training missions;
- Participation in related internal and external events and conferences; and
- On-the-job training and training courses for technical cadres.

11.3 Sub-program to develop agricultural education

A. Main objectives

- Modernizing agricultural education programs in all educational institutions and at all levels to achieve complementarity between academic formation and practical application, in light of international scientific developments;
- Strengthening linkages between agricultural education programs and graduates, and the requirements of the labor market;
- Expanding the application of Mubarak-Kohl program in establishing agricultural technical schools and selecting appropriate specializations meeting the requirements of the labor market.

B. Main components

- Strengthening coordination and complementarity between concerned ministries;
- Cross-representation of educational institutions and executive agencies in counterpart councils and committees related to their activities;
- Providing practical training for agricultural schools, institutes, faculty and students; and
- Establishing effective exchange programs.

11.4 Sub-program for building the capacities of rural leaders

A. Main objectives

- Raising the awareness of leading farmers of agricultural technical developments and help them acquire new knowledge and experiences; and
- Encouraging leading farmers to disseminate their new knowledge and experiences among their wider groups.

B. Main components

- Organizing specialized training courses, symposia and workshops for selected leading farmers;
- Expanding visits to modern farms and agricultural companies to keep abreast of improved systems and practices;
- Organizing external visits to gain new knowledge and experiences in emerging fields;
- Expanding farmers' schools for training and introducing new modernized practices; and
- Benefiting from other countries' experiences in training and upgrading farmers' knowledge and skills.

12. National program to promote the role of communications and information technology in agricultural development

The agricultural development strategy gives great attention to strengthening the role of information and communication technology due to its important and increasing role in upgrading performance in the different economic, production and services fields. This includes developing information and its dissemination thus making it available to all concerned parties, including producers, marketers, exporters, consumers, researchers and decision-makers, at all levels (central, regional and village levels), through modern interactive communication systems. This major program covers strengthening the different material, organizational and administrative aspects of information and communication, in addition to upgrading the skills of human resources active in this field.

12.1 Sub-program to strengthen agricultural information systems' infrastructure

A. Main objectives

- Strengthening information infrastructure of the MALR to link all sectors and individuals at all levels.

B. Main components

- Strengthening the local area network in all the ministry's sectors, institutions, research centers, agricultural directorates at the governorate level, and supplying them with computers and hardware connected through the internet;
- Providing agricultural directorates at the level of extension centers and offices and cooperatives with personal computers and connecting PCs through the internet; and
- Establishing an institutional wide area network to connect local area networks and ensure connectivity to remote areas.

12.2 Sub-program to develop agricultural information systems and databases

A. Main objectives

- Strengthening agricultural information and data production and compilation systems in all related fields, reorganizing entities active in these fields, as well as identifying the responsibilities of all sectors, institutions and centers in data and information compilation, updating and storage; and
- Establishing information systems to be made available to all concerned entities, for rationalizing decision-making and upgrading performance of different activities.

B. Main components

- Promoting remote sensing applications in the different fields of agricultural development, including crop survey and agricultural statistics, monitoring encroachment on agricultural land, as well as monitoring fishing grounds;
- Using the geographical information system in establishing natural resources' maps (land, water and climate) at the national level;
- Establishing / developing databases on new land areas, rainfed areas and farms using modern irrigation techniques, in addition to crop, livestock and research statistics at the national level, and developing the Rural and Agricultural Development Communication Network (RADCON), in addition to E-trade and data and agricultural products' marketing, and for enabling rural women;
- Developing and modernizing expert systems in the different agricultural fields;
- Providing necessary data for the automation of the different tasks at the MALR, to streamline research and development programs; and
- Introducing modern software for helping policy- and decision makers.

12.3 Sub-programs for human resources' capacity building in the field of agricultural information and communication system management and operation

A. Main objectives

- Raising agricultural information and communication system efficiency and operation; and
- Keeping abreast of world developments in the fields of agricultural information and communication.

B. Main components

- Designing specialized training programs for staff active in the fields of information and communication systems in the different agricultural fields at the central and regional levels;
- Training trainers in the different agricultural sectors at the central and regional levels; and
- Applying modern systems in the fields of training human resources, as in the case of electronic training systems.

ANNEX III

THE DISTINGUISHING FEATURES OF THE DIFFERENT REGIONS

1. Upper Egypt region

1.1 Demographic features

- Population number of this region is approximately 12 m people, representing around 16.5% of the total population of Egypt's total population around 72.5 m;
- Population density is around 24.2 people/square kilometer, while population density of agricultural areas is around 10.57 persons/feddan;
- Population density is at its highest in Souhag and Qena governorates, estimated at around 342 and 316 person/square kilometer respectively, and its lowest in the New Valley governorate, estimated at around 0.5 person/square kilometer;
- Illiteracy rate in this region is the highest in Egypt, estimated at around 47% of total population, and around 55% among women;
- Women's participation in the working force is the lowest in the country, estimated at around 18.4% of total working force; and
- Poor families represent around 45.8%, the highest among other regions.

1.2 Resource characteristics

- Total area of the region is estimated at 495,000 square kilometers, representing 49% of the total area of Egypt, as the region includes the new valley governorate whose area is estimated at 440,000 square kilometers;
- Agricultural areas are estimated at around 1.13 m feddans, representing around 14% of total agricultural area in Egypt; and
- The region includes the largest lake behind the High Dam. Huge quantities of ground water are also available in different areas of this region, particularly in east Owainat and the New Valley areas.

1.3 Distinguishing features

- Water resources in the region are of high quality, and contamination is the lowest in most of its lands, a situation that enables the expansion of clean agricultural products that can be exported;
- Agr0climatic conditions in the region help in reducing the spread of fungal diseases, and the production of early-maturing crops, particularly vegetables that can be produced at times suitable for European markets;
- The region is known for the production of dry dates;
- There are great potential for horizontal expansion in Toshka, east Owainat and the New Valley areas.
- The potential to produce high quality products gives the region high comparative advantages vis-à-vis other regions, such as the Mahogany and Getrova trees that flourish easily in Luxor and Qena governorate;

- There exists a state of stable social texture that allows the success of the different forms of social work, and ensures higher advantages for small farmers, in light of successful development programs such as Al-Shams project that links small farmers with exporters, as well as the establishment of an institutional structure capable of providing producers with market information that would enable them produce according to market needs and standards;
- This region is characterized with high returns gained by its citizens working in other regions of the country and abroad, therefore capital shortage does not constitute a problem but the problem is how to explore and benefit from available investment opportunities; and
- A great part of the Egypt's heritage is concentrated in this region, consequently tourist activities, hence the possibility of linking touristic development with agricultural development.

1.4 Development determinants and constraints

- Fragmentation of agricultural holdings. The number of agricultural holdings amounts to approximately 795 holdings, with an average area of 1.86 feddan/holding, distributed in 1509 holdings with an average area of 0.98 feddan. There is no institutional framework to address this problem;
- There is an agricultural drainage problem in most of the lands of the region due to the lack of an open or tile drainage system in around 645,000 feddans, representing around 47% of total agricultural areas of the region, in addition to problems facing the existing drainage network;
- Areas suitable for reclamation and horizontal expansion are far from populated areas. In addition, services necessary to establish viable communities in horizontal expansion areas are lacking;
- Agricultural extension workers' capabilities are low. In addition, around 75% of extension workers are approaching their pension age, a situation that threatens extension performance in the region;
- Youth of the region avoid working in agriculture, many of them migrate to cities or travel abroad seeking better working opportunities, and there is a serious shortage of skilled labor in addition to the lack of training centers;
- Decision-making is centralized and local institutions are bureaucratic, hence their inability of quick and effective action;
- Poor capital available to cooperatives, consequently their inability to function on economic basis, and shortage of administrative and technical skills of the administrative machinery as well as of the elected boards of cooperatives;
- Lack of specialized agricultural marketing companies, lack of sorting, grading and packaging stations, as well as poor availability of marketing information for farmers and their inability to benefit from available information; and
- Inability to use land as collateral to obtain medium- and short-term credit, due to problems in obtaining title deeds.

2. Middle Egypt region

2.1 Demographic features

- Population number of this region is approximately 15.3 m people, representing around 21% of the total population in Egypt, while population density of agricultural areas is around 10.2 persons/feddan;
- Population density in agricultural areas is at its highest in Giza governorate (21.2 persons/feddan), as it is an urban governorate and part of the greater Cairo region, while it is at its lowest level in Al-Fayoum governorate (5,84 persons/feddan);
- Illiteracy rate in the governorates of this region ranges between 48% and 52%, with the exception of Giza governorate where it is 28.8%, and Illiteracy rate of women is estimated at 50%;
- The percentage of poor families varies between 44% in Bani-Sweif, and between 14% and 15% in Fayoum and Giza governorates, against 38% in Minya governorate;
- Women's participation in the working force varies between governorates of the region and is estimated at 13-14% in Giza and Fayoum, 28% in Bani-Sweif and around 45% in Minya.

2.2 Resource characteristics

- Total area of the region is estimated at 54,000 square kilometers, and Minya governorate is the largest governorate with 23,000 square kilometers, while Fayoum governorate is the smallest with an area of around 6,000 square kilometers;
- Agricultural areas are estimated at 1.5 m feddans;
- The Nile River is the only source of water for the region; and
- The region encompasses two depressions used in storing agricultural drainage water, namely Karoon Lake and El-Rayyan depression in Al-Fayoum governorate.

2.3 Distinguishing features

- Water resources of the region are of high quality with a low contamination level;
- The region is dominated by varying climatic regimes, with a continental climate in Minya and Fayoum governorates. While Minya governorate is subject to frosty weather during winter, both Giza and Bani-Sweif governorates enjoy a relatively moderate weather with low humidity level, hence the diversity of its production;
- Climatic conditions help the region to specialize in the production of tomatoes between seasons;
- Most of the areas of the region (with the exception of Fayoum) are of the first and second grades;
- Garlic production is concentrated in this region, where areas planted to garlic is estimated at 73% of the total garlic growing areas in the country;
- The region is highly specialized in the production of medicinal and aromatic plants, with such areas representing 84% of medicinal and aromatic plants growing areas in the country;
- The region enjoys wide experiences in processing medicinal and aromatic plants, and there are specialized industries with high technical standard;

- The region is close to the Greater Cairo region which is the greatest consumer market, with highways connecting the governorates of the region and the Greater Cairo region;
- Agricultural intensification is high in the region compared to the general average in the country; it ranges between 200% in Giza and Bani-Sweif, 180% in Fayoum and 170% in Minya; and
- The region has received the greatest number of externally-financed agricultural and rural development projects through which several modalities of pooling local resources and upgrading human resources' capabilities through technology transfer have been applied, leading to the accumulation of technical and organizational skills that can be used in supporting development programs in the region.

2.4 Development determinants and bottlenecks

- Fragmentation of agricultural holdings. The number of agricultural holdings amounts to approximately 768,000 holdings, with an average area of 2 feddan/holding, distributed in 1.25 m holdings with an average area of 1.28 feddan;
- Some parts of the region suffer from drainage problems, either due to the absence of a drainage network (in around 25% of the region) or the damage of the existing network because of the lack of maintenance;
- Degraded agricultural extension capabilities due to the high percentage of old extension staff. Staff of over 45 years of age is estimated at 82%. All extension staff in Giza governorate exceed 50 years of age;
- Possibilities of horizontal expansion in the region are limited;
- Shortage of skilled and trained manpower, and specialized training centers;
- Lack of specialized marketing institutions that would provide extension recommendations to medical and aromatic plants growers in accordance with market requirements, leading to unstable producers' income and experiencing severe shocks and price fluctuations;
- Cooperatives limited capital of as low as EGP 3,000 in Giza governorate and around EGP 5,000 in Fayoum governorate, in addition to poor administrative and technical skills of cooperatives' staff and elected boards;
- Economic activities in the region are not diversified and are concentrated on agricultural activities, leading to gaining no off-farm income;
- Weak relations between production and contractual marketing, limited in some cases to green beans and green onion;
- Shortage of civil society institutions active in the field of agriculture, and an institutional framework regulating the relation between the existing non-governmental organizations and agricultural directorates in the region; and
- Shortage of financial resources and rigidity of credit facilities, with most of the medium-term credit concentrated in livestock production without due regard to other areas that would promote development.

3. Eastern Delta region

3.1 Demographic features

- Population number of this region is approximately 8 m people, representing around 10.9% of the total population of Egypt;
- Population density is low, estimated at around 100 persons/square kilometer, and greatly varies between the different governorates of the region, with around 1093 persons/square kilometer in Al-Sharkeya governorate and no more than 5 persons/ square kilometer in South Sinai;
- Population density is estimated at around 6.5 person/square kilometer, and reaches its highest level (52 persons/feddan) in Suez governorate, and its lowest (2 persons/feddan) in North Sinai;
- Illiteracy rate in this region is the lowest in Egypt, estimated at around 33%, and reaches its lowest level (16.7%) in Port Said governorate, and its highest level (37.6%) in Al-Sharkeya governorate. Illiteracy rate among women is estimated at 43%, i.e. around its level in Middle Delta and Western Delta;
- Women's participation in the working force is estimated at around 29% of total working force in the region. It reaches its highest level in Port Said governorate (32.6%), and its lowest level (18%) in South Sinai;
- Poor families are estimated at 23.5% of the total population of the region. This percentage reaches its highest level (29%) in Al-Sharkeya governorate, and is estimated to be around 8% in Port Said and Suez governorates.

3.2 Resource characteristics

- Total area of the region is estimated at 79,000 square kilometers, while agricultural land are estimated at around 1.2 m feddan, representing 15% of the total area of agricultural land, around 63% of which are in Sharkeya governorate;
- Wealth resources cover both agricultural land and mining; and
- There is great potential for horizontal expansion in the region, both in north and middle Sinai. Over 400,000 feddans are expected to be added to agricultural areas, irrigated from Al-Salaam Canal.

3.3 Distinguishing features

- Climatic conditions vary in respect to rainfall and relative humidity, leading to diverse production patterns;
- The land area is spacious, allowing for diverse cropping patterns. Field crops are grown in Sharkeya governorate, while vegetable and fruit crops dominate north Sinai and Ismailia governorate;
- There are great potentialities for horizontal expansion both in the west and east of the Suez Canal. Reclaimed areas are estimated at 220,000 feddans, and 200,000 feddans in the west and east of the Suez Canal, respectively;
- There is a possibility of reclaiming over 250,000 feddans in middle Sinai;
- There is a variety of economic activities in the region: agriculture in El-Sharkeya governorate, north Sinai and Ismailia governorate, industrial and services activities in Port Said and Suez governorates, and promising tourist activities in south Sinai, mining activities in south and middle Sinai, in addition to activities related to the Suez Canal.

- Average agricultural holdings differ greatly between the different governorates of the region: less than 2 feddans in El-Sharkeya, around 5 feddans in Ismailia, and over 10 feddans in north Sinai. There are great numbers of large holdings that allow for introducing modern technologies and expanding the use of agricultural mechanization;
- Historically, the region is characterized with the production of certain kinds of high-quality crops: mango, strawberry, green beans in Ismailia, and peach, olives and cantaloupe in north Sinai. As a result, the region has specialized in exporting certain agricultural products: mango, citrus, green beans, cantaloupe and strawberry;
- There are pioneering examples of the use of modern techniques in large agricultural companies: protected cultivation, organic farming, and products for processing and exportation;
- There are some large companies specializing in collecting and grading horticultural crops for exportation, in addition to companies specialized in agro-industries in the Tenth-of-Ramadan, Al-Obour, and Ismailia;
- There are vast sea water bodies along the northern coast of the region and two lakes: Bardaweel and Manzalah lakes; and
- The region has all infrastructure facilities necessary for agricultural development: roads, electricity and water, in addition to the different services: health and education.

3.4 Development determinants and bottlenecks

- Lack of a legal framework for securing the rights of land holders who reclaimed land on their own account in Sinai. On the other hand, holders of reclaimed land in Al-Husainiya plain have not been given title deeds. Both groups cannot use their holdings as bank collaterals to obtain medium- and long-term credit for developing their lands;
- Basic and internal infrastructure in areas that are being developed through the use of Al-Salam canal east of the Suez Canal have not been completed. The modality of distributing these areas is not yet clear;
- Fragmented holdings in Al-Sharkeya governorate, with an average of 2.2 feddans. Around 56% of these holdings are distributed between more than one plot, hence the difficulty of developing such holding and applying a viable agricultural rotation;
- Poor quality of irrigation water mixed with agricultural drainage water. Some areas suffer from shortage of irrigation water and use drainage water in covering their requirements. Areas that depend completely on drainage water are estimated at 50,000 feddans;
- Growing rice in excess of the areas determined for each governorate. Areas planted to rice in Al-Sharkeya governorate are estimated at 321,000 feddans, representing 35% of the total agricultural area of the governorate, and exceed the determined area by around 50%;
- Some areas in the region suffer from drainage problems, either because of the lack of a drainage system or because the existing drainage network needs replacement of innovation. Areas which has no drainage system are estimated at 545,000 feddans, representing around 32% of cultivated areas. Fifty percent of these areas are in Al-Sharkeya governorate, and the other fifty percent are equally divided between Ismailia and north Sinai governorates;
- The percentage of old extension workers is high, with around 81% of them over 45 years of age. On the other hand, the number of extension workers is not proportionate with the area of the region estimate at 1.4 m feddans, while the number of extension workers stands at 900 persons;

- Horizontal expansion areas, particularly east of the Suez Canal, do not constitute a center of attraction for settlers, due to the shortage of basic infrastructure needed to establish viable communities;
- There is no clear policy for the integrated development of reclaimed lands;
- Shortage of small farmers' associations that would allow consolidation of their efforts, to provide marketing information, and establish collaboration between small farmers and large companies active in the fields of product processing and exportation; and
- Poor capital available for cooperatives. Average capital available for each cooperative is EGP4,000 – 5,000. Administrative and technical capabilities of staff and elected members are also poor.

4. Western Delta region

4.1 Demographic features

- Population number of this region is approximately 12.6 m people, representing around 17.5% of the total population in Egypt of around 72.5 m;
- Population density is one of the lowest densities, estimated at 51.2 persons/square kilometer, with wide disparity between governorates. Population density in Alexandria is estimated at 1'800 persons/square kilometer, around 1.7 persons/square kilometer in Matrouh governorate, and 479 persons/square kilometer in Al-Beherah governorate that includes Al-Nubareyah zone;
- Population agricultural density is at its lowest about 5.2/feddan with variability between governorates e.g. 17 persons/feddan in Alexandria and decreases to 0.86 persons/feddan in Matrouh;
- Women's participation in the working force is estimated at 27.5%. This percentage reaches around 41% in Al-Beherah governorate and goes down to 12% in Alexandria governorate. This reflects the role of women in agricultural production, due to the fact that Al-Beherah is a rural governorate while Alexandria is an urban governorate; and
- Poor families represent around 15.6% of the population of the region and are estimated at 9.5% in Alexandria, 15% in Matrouh and 21% in Al-Beherah.

4.2 Resource characteristics

- Total area of the region is estimated at 179,000 square kilometers, representing 17.7% of the total area of Egypt. Agricultural areas are estimated at around 1'758 thousand feddans, representing around 22% of total agricultural area in Egypt. Agricultural areas in Al-Beherah governorate represent more than two thirds of total agricultural areas in the region;
- There is great potential for horizontal expansion in the region, particularly parallel to the North West coast extending from Hammam Township to Marsa Matrouh. Due to the availability of wide rangelands, around 20% of the sheep and goat population are concentrated in this region;
- The region has diverse water sources: Nile water, ground water and rainfall particularly in the northern areas where rainfall is enough for agricultural production.

4.3 Distinguishing features

- Climatic conditions are relatively mild in respect of temperature, allowing for diversified agricultural products;
- Rainfall in both Matrouh and Alexandria governorates during the period from October to February is enough for agricultural activities;
- Ground water is of high quality and at low depth, thus providing supplementary irrigation;
- Economic activities in the region are diversified (agriculture, industry, trade and services), ensuring great possibilities for integration between economic activities;
- The region has the greatest concentration of tourist resorts on the north west coast which has witnessed an unprecedented increase in the number of summer tourists, a situation that underlines the importance of developing agricultural marketing services for meeting the needs of this category of consumers capable of paying higher prices for quality products;
- The region has good naval and air transport facilities, thanks to the presence of Alexandria port and two airports in Nozha and Burg-el-Arab, a situation that would facilitate the transportation of fresh products to export ports and reduce internal transportation costs;
- There exists in the region a large number of specialized agricultural marketing units (sorting, grading and packaging). There exist in Al-Beherah governorate and Al-Nubareyah zone around 158 specialized units in preparing and processing agricultural products. Agro-industrial units also exist in Burg-el-Arab and Al-Nubareyah townships and in Alexandria;
- The region is geographically close to densely populated zones in Al-Beherah governorate and middle Delta governorates that constitute markets for its products and provide labor to carry out agricultural activities;
- This region utilizes modern agricultural techniques in farm management, irrigation systems and the use of excellent plant varieties and animal breeds. Areas under modern irrigation systems are estimated at 415,000 feddans in Al-Nubareyah, and 100,000 feddans in Al-Beherah governorate;
- This region incorporates the most important experiences in the fields of horizontal agricultural expansion and the establishment of settlements, as it includes projects to establish settlements for small farmers, young graduates, and different types of farms (small, medium and large, as well as individual or family and large companies);
- The region is distinguished for high-quality sheep;
- The region incorporates vast water bodies: Idco Lake, Mariot Lake and in-shore north west coast of the Mediterranean, allowing for fisheries development, particularly sea fish farming;
- The region contributes to agricultural exports of traditional field crops (cotton and rice) and non-traditional crops (potatoes, citrus and grapes); and
- The region is historically known for certain field crops including long stable cotton (Giza-30) and rice, in addition to the production of date palm seedlings, as well as some other non-traditional crops such as artichoke, green peas, asparagus, and other vegetable crops.

4.4 Development determinants and constraints

- Fragmentation of holdings is prevalent in old lands in both Al-Beherah and Alexandria governorates. Estimated average plot size is 4.2 feddans in Al-Beherah against 5.9 feddans in Alexandria;

- Low water use efficiency. Areas irrigated through gravity amount to around 1,152 thousand feddans, representing around 65% of total agricultural areas;
- Some areas in the region suffer from agricultural drainage problems. Areas short of agricultural drainage amount to around 512,000 feddans, representing 30% of the region's total areas. Most of the existing drainage network needs maintenance. Lack of drainage led to high levels of ground water in some the reclaimed areas of Al-Nubareyah zone, as well as in Siwa Oasis;
- Unsustainable use of ground water, leading to raising salinity in some wells and digging new deeper well as in Wadi Al-Natroon. Areas cultivated on ground water amount to around 200,000 feddans;
- The area from Al-Alamein to Marsa Matrooh contains explosive mines from World War II, hindering development. These areas can be cultivated if mines are removed.
- Sand storms inflict the region from time to time during the period from April to may, leading to great agricultural losses and destroying structures of protected cultivation;
- Scarcity of skilled labor capable of handling agricultural operations for export, such as pruning, biological pest control and pre- and post-harvest operations;
- Lack of government extension services, consequently small and medium farmers in these newly reclaimed areas depend on trial and error, while large farmers and farming companies are assisted by local or foreign experts, hence the disparity between the productivity of small and large farmers;
- The absence of contract farming relations between small and medium farmers and marketing companies. This relation exists only between large farmers and marketing companies; and
- The absence of title deeds for newly reclaimed lands given to new graduates in Al-Nubareyah zone, hence their inability to obtain medium- and long-term credit facilities.

5. Middle Delta region

5.1 Demographic features

- Population number of this region is approximately 20.2 m people, representing around 27.8% of the total population of Egypt;
- Population density is at its highest among Egypt's agricultural areas, estimated at around 1,450 person/square kilometer. Al-Qaliobeya is the most densely populated governorate due to its proximity to Cairo and the presence of so many industrial units, while Kafr-el-Sheikh has the lowest density, estimated at 700 person/square kilometer;
- Population density in agricultural areas is estimated at 8.7 person/square kilometer, and reaches its lowest level in Kafr-el-Sheikh (4.3 persons/feddan) and its highest level in Al-Qaliobeya governorate (22 person/feddan);
- Illiteracy rate in this region is estimated at around 32% of total population, and reaches its lowest level (11.8%) in Domyat governorate and its highest level in Kafr-el-Sheikh governorate (43%);
- Illiteracy rate among women is estimated at 42%, with its lowest level (16%) in Domyat governorate, and its highest level in Kafr-el-Sheikh governorate (52%);
- Women's participation in the working force is estimated at 24.5%, with its highest level (28%) in Al-Menoufeya governorate and its lowest level in Domyat governorate;

- Poor families represent around 8.7%, the lowest in the country, with the lowest level (4.4% in Domyat governorate, and its highest level (15%) in Al-Menoufeya governorate.

5.2 Resource characteristics

- Total area of the region is estimated at 139,000 square kilometers, representing 1.4% of the total area of Egypt;
- Agricultural areas are estimated at 2.3 m feddans, representing 28.7% of the total area of Egypt. Kafr-el-Sheikh and Al-Daqahleya governorates are two of the largest governorates, as it reached 609 thousand feddans in the first and 636 thousand feddans in the second. Domyat governorate is the smallest with about 105 thousand feddans;
- The region has vast sea resources due to Al-Manzalah and Al-brollus lakes; and
- The region totally depends on the Nile source irrigation

5.3 Distinguishing features

- Moderate climatic condition in all the governorates of the region, with limited rainfall during the period from November to February, hence the diversity of production patterns;
- Most of the lands are of high quality: first and second grade lands constitute around 50% of the total area of the region;
- The region includes the rice, sugar beet, long-staple cotton, as well as the milk producing belts;
- The region specialized in producing the seedlings of fruit and leguminous trees', as well as ornamental plants, particularly in Al-Menoufeya governorate;
- Production of flax concentrates in this region, particularly in Al-Gharbeya governorate;
- Both Al-Qaliobeya and Al-Menoufeya governorates are two of the main citrus producing governorates;
- Fifty percent of fattening broiler production and 40% of table eggs are produced in this region;
- The region has great potential to develop fisheries in Al-Manzalah and Al-brollus lakes. Fish farming flourishes in Kafr-el-Sheikh, Domyat and Al-Daqahleya governorates;
- Many agro-industries and agricultural-related industries exist in the region: spinning and weaving in Al-Mahallah Al-Kubra, rice milling in Al-Daqahleya, Al-Gharbeya and Domyat governorates, fishing boats and fishing gear in Domyat governorate, agricultural machinery and equipment in Al-Gharbeya and Al-Daqahleya governorates, and the extraction of sugar from sugar beet in Kafr-el-Sheikh governorate;
- There is a variety of economic activities including industrial, trade and services activities, allowing for complementarity between these activities and agricultural activities;
- There are several packing stations active in the fields of vegetable and fruit sorting, grading and packaging, as well as canning and freezing vegetables and the production of juices, jams, and dairy products. The region has the largest agricultural research stations, in Sakha, Mahlat-Mousa, and Al-Gemmeza. It also has five agricultural faculties and three veterinary Science faculties; and
- The region has all infrastructure facilities necessary for agricultural development: roads, electricity and services. This is reflected in the high index of human development in the governorates of the region and the low percentage of poor families.

5.4 Development determinants and bottlenecks

- Fragmented and small agricultural holdings: the lowest average size of holdings is 1.3 feddans in Al-Qaliobeya governorate, and the highest is 3 feddans in Kafr-el-Sheikh governorate;
- The lack of desert area to allow horizontal expansion, hence the necessity of vertical expansion and maximizing the productivity of both land and water resources of the region;
- Continued over encroachment on agricultural land as a result of the ever increasing population numbers, as well as to cater for the needs of urban development;
- Low quality of irrigation water in some parts of the region due to mixing irrigation and drainage water, as in some parts of Al-Gharbeya and Kafr-el-Sheikh governorates;
- High levels of ground water table in the northern parts of the region, leading to increased salinity and soil degradation;
- Degraded state of tile drainage network in large parts of the region, and the lack of any open or tile drainage system in an area of around 125,000 feddans, negatively affecting the fertility of these areas;
- Contradicting land use policies. While farmers have established fish farms in several parts of Kafr-el-Sheikh, Al-Daqahleya and Domyat governorates, the Ministry of Irrigation and Water Resources refuses to provide them with water for feeding such farms. Another constraint is that land-protection agencies of the MALR fines this activity as it is considered illegal and land should be used in plant production;
- Increasing shortage of extension workers. Some villages do not have any extension workers. There is a high percentage of old extension staff. Staff of over 45 years of age is estimated at 88%;
- In spite of the fact that the region has the largest agricultural research stations, and five agricultural faculties some of which have been established in early 1900s, there are no training centers on modern agricultural technology, and consequently available skills and experiences are inherited. Therefore, agricultural development projects suffer from the shortage of skilled and trained manpower;
- In spite of the presence of a cooperative in each village of the region, such cooperatives are poor and short of capital. Average capital is estimated at EGP9700. A situation that does not enable cooperatives meet the needs of their members. Moreover, the technical and administrative machinery of these cooperatives is weak. The present cooperative law is one of the main causes behind the weak cooperative performance;
- Due to land fragmentation, many of the agricultural holdings are communal holdings held by more than one person without a clear definition of what each holder owns. Consequently, these lands cannot be used as bank collaterals for obtaining loans;
- Credit policies applied by village banks are the main determinants of development. Decisions are rigid and concentrate on short-term crop loans, and short- and medium-term livestock loans, without attention to other types of credit facilities;
- In spite of the presence of specialized agro-industrial units in the region, such units do not sign advance contracts with farmers, hence sharp price fluctuations;
- In spite of the fact that the region contributes around 50% of poultry production, the region lacks mechanical slaughterhouses and most of birds are sold alive, reflecting passively on public health and leading to sharp price fluctuations;

- In spite of the fact that the region contributes around 25% of cow milk, and around 35% of buffalo milk, and in spite of the fact that dairy production has been localized in the region, there is no institutional framework for milk collection in the region;
- Agricultural residues, particularly rice straw, constitute a major problem facing the region, causing negative environmental effects.
