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Arab Republic of Egypt
An Agricultural Strategy for the 1990s

December 11, 1992

Agriculture Operations Division
Country Department II
Middle East and North Africa Region

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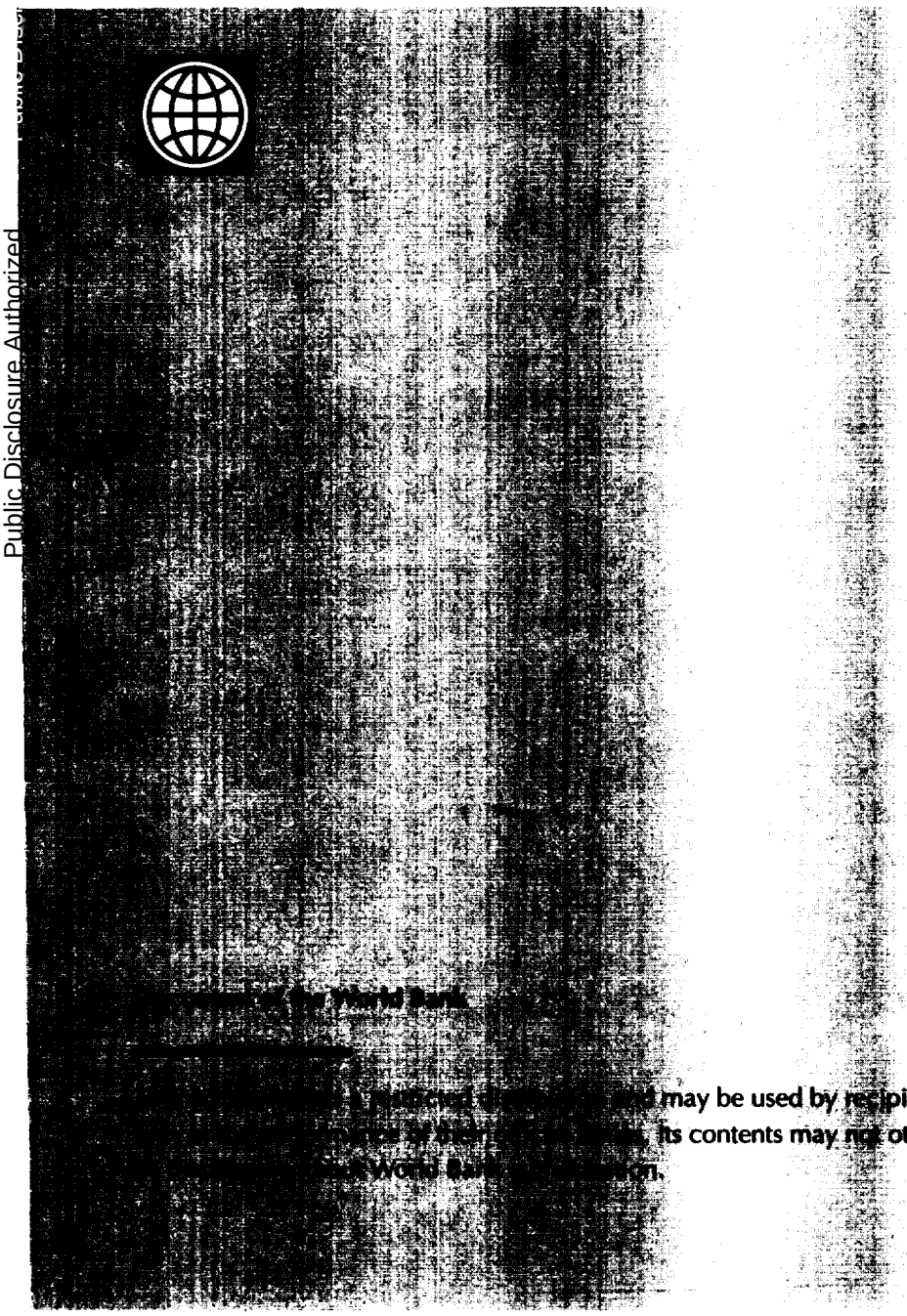

CURRENCY EQUIVALENTS
(As of November 1992)

US$1.00	=	3.30 Egyptian Pounds (L.E.)
L.E. 1.00	=	US$ 0.3

WEIGHTS AND MEASURES

1 centimeter (cm)	=	0.394 inches
1 meter (m)	=	39.370 inches
1 kilometer (km)	=	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

PRINCIPAL ABBREVIATIONS AND ACRONYMS USED

ARC	Agricultural Research Centre
BCM	Billion Cubic Meters
CAS	Central Administration for Seeds
ELS	Extra Long Staple
EPADP	Egyptian Public Authority for Drainage Projects
FAO	Food and Agriculture Organization
GARPAD	General Authority for Rehabilitation Projects and Agricultural Development
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
MALR	Ministry of Agriculture and Land Reclamation
MPWWR	Ministry of Public Works and Water Resources
O&M	Operation and Maintenance
PBDAC	Principal Bank for Development and Agriculture Credit
SMS	Subject Mater Specialist
UNDP	United National Development Program
UNEP	United Nations Environment Program

GOVERNMENT OF THE ARAB REPUBLIC OF EGYPT

FISCAL YEAR

July 1 - June 30

ARAB REPUBLIC OF EGYPT

An Agricultural Strategy for the 1990s

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ARAB REPUBLIC OF EGYPT

An Agricultural Strategy for the 1990s

FOREWORD

This is the report of a government and interagency mission which took place in Cairo during February 1992 to develop a strategy for the agricultural sector for the 1990s. It sets out key issues, strategic directions and recommendations intended to serve as a framework for guiding the Government in undertaking measures for the development of the agriculture sector during the 1990s; it is set within the overall framework of the structural adjustment program on which the Government has embarked. The mission wishes to thank their excellencies Dr. Youssef Wally, Deputy Prime Minister and Minister of Agriculture and Land Reclamation and Engineer Essam Rady, Minister of Public Works and Water Resources for their support during all stages of the mission's work.

The mission worked under the overall leadership of a government team (Ministry of Agriculture and Land Reclamation) led by Prof. Adel El-Beltagy and Prof. Saad Nassar and comprising Prof. Osman El Kholei, Prof. Ahmed F. El-Sahrigi, Dr. A. M. Aboul Naga, Dr. Kamla Mansour, Dr. Abdel Salam Gomaa, Eng. Mahmoud Nour, Dr. Ahmed Taher Moustafa, Dr. Abdel Ghani El-Gendi, Dr. Mohammed El-Eraky and Dr. Nadia Atif. Papers prepared by members of this team as well as comments on earlier drafts of this report have contributed in crystalising and better articulating the overall strategy set out in this report. Other MALR Staff, in particular Eng. Adel H. Ezzy of PBDAC, Dr. Hassan Khedr of the Economics Sector and Dr. Yasin Osman of the Services Sector were most helpful in discussing key issues related to the sector. Within the Ministry of Public Works and Water Resources (MPWWR), the mission received guidance from Eng. Gamil Mahmoud El Syed, Eng. Gamal El Fadl, and Dr. Mohamed Abdel Hady Rady in articulating key issues related to the water resources sector of the country. During various meetings, H.E. Dr. Wally had extensive discussions and exchange of views with the mission, which guided the overall deliberations and provided a basis for outlining the strategy for the sector. Similar meetings were held with H.E. Eng. Rady, for issues dealing with the irrigation sector. As part of the Strategy exercise, the government organized two workshops on agricultural strategy, the first from January 12-15, 1992 supported by the FAO and the second from February 16-18 sponsored by MALR.

The UNDP coordinated the mission with the FAO, World Bank, UNEP and World Food Program as other multilateral agency participants. At the Government's request, the World Bank provided the technical leadership of the mission. Mission members were as follows:

World Bank Staff

Ngozi Okonjo-Iweala, Division Chief, MN2AG, Mission Leader
Rahul Raturi, Senior Agricultural Economist, Deputy Mission Leader
Takamasa Akiyama, Principal Trade Economist
Hamdy M. Eisa, Principal Agriculturalist
Ihab Gamaleldin, Privatization Specialist
Orlando Sacay, Senior Agricultural Credit Specialist
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Jim Brown, Agro-Industry Specialist
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Joachim von Amsberg, Economist

Food and Agriculture Organization of the United Nations

Zohair Abdalla, Marketing and Credit Officer
Dyaa K. Abdou, Senior Economist
T. Abu Khaled, On-Farm Water Management Specialist
Nadia Makram Ebeid, Women in Development Specialist

United Nations Environmental Programme

Asit K. Biswas, Environment Consultant

In addition to the above mission members, other staff of the World Bank have contributed in the preparation of the report. Mr. Youssef Fuleihan, Senior Agricultural Economist, MN2AG, wrote the working paper on Agriculture in the Macroeconomy and provided support in the preparation of the report; support in reviewing the report and making recommendations for improving the technical content was provided at various stages by Mr. Prem Garg, Division Chief, EMTAG, Mr. K. S. Venkatraman, Senior Operations Officer, MN2AG and Ms. Joanne Salop, Economic Adviser, Central Operations Department. Mr. Rahul Raturi took the lead in drafting the report, which was prepared under the supervision of Mrs. Ngozi Okonjo-Iweala (Division Chief, MN2AG) and approved by Mr. Ram K. Chopra, Director (MN2) and Mr. Caio Koch-Weser, Vice President, Middle East and North Africa Region.

ARAB REPUBLIC OF EGYPT

AN AGRICULTURAL STRATEGY FOR THE 1990s

EXECUTIVE SUMMARY

Introduction

1. In March 1990, the Government of Egypt launched a comprehensive economic and social reform program, to strengthen Egypt's ongoing adjustment program; it constitutes a major break from the policies pursued in the past, and is aimed at modernizing the country and significantly improving living standards. Underlying the program measures, which are being backed by unprecedented support from the international community, is the Government's intention to make the transition from a highly interventionist centrally planned economy to one that is decentralized and market oriented. The foundations for growth being put into place would inevitably rely on the three main pillars of the economy -the agriculture, industry and tourism sectors - to provide the engine for growth. The agriculture sector of the country, which has been at the forefront of the reform process, provides a potentially important vehicle for contributing towards reaching the Government's objectives of achieving balanced growth in the rural economy of the country.

2. In outlining an agricultural strategy for the 1990s, the underlying focus is to build on the momentum created by the reforms initiated by Government. In a period of worldwide change, measures are increasingly being adopted in numerous countries, including Egypt, which emphasize the need for revisiting earlier held views on the role of the Government in managing economic decision making, without compromising the underlying tenets of Government responsibility for ensuring growth and the basic needs of the people. While clearly the Government has an important role to play in national economic management, what is necessary is a clear definition of this role, and implementation of measures necessary for it to fulfil this role without undermining incentives for the other participants of the economy who would ensure growth.

Sectoral Performance and Potential

3. The Egyptian economy has traditionally relied heavily on the agriculture sector as a source for growth. This central role was reinforced by the strong performance of the sector in the 1960s and 1970s. While this dominance has declined in recent years, the agriculture sector still accounts for about 20 percent of both GDP and total exports, and about 36 percent of employment. The relative decline in the role of agriculture partly reflects the strong growth in other sectors, particularly oil (and to a smaller extent services and construction). In addition, prior to the initiation of the sector policy reforms in the 1980s, the agriculture sector was subject to various distortions which impacted negatively on the development of the sector; it also received a declining share of the total public sector investment during the last 25 years, which in turn was not always optimally allocated between the different subsectors. While the challenges facing the sector are significant, Egypt's agriculture possesses many positive characteristics and potentials.

4. The policy framework within which the agriculture sector operated until the mid-1980s, was heavily influenced by Government, and was closed and inward looking. Significant reforms of these past agricultural policies began to be introduced in the 1980s, within the framework of an agriculture sector strategy

for the 1980s outlined by Dr. Youssef Wally; since then agriculture has clearly been at the forefront of other sectors in initiating reforms, as evidenced by, among others, the process of liberalizing input and output prices and eliminating crop area controls. While the recorded average growth rates for the sector have been modest during the last decade, more recent indicators point towards progress in certain areas. For example, the production of wheat, maize, beans, fruits and vegetables has recorded significant increases; cotton production has, however, significantly declined. Most important, however, the reforms of 1986 have sensitized the farmers to taking market induced decisions and there are signs of increasing competition in the agricultural markets; consequently, given the correct policy environment, farmers should respond to the opportunities which are available for growth. However, the sector faces important resource constraints and needs the satisfactory resolution of remaining key issues in order to tap this potential.

5. On a per caput basis, Egypt's present area of cultivable land, at 0.13 feddan per head, is among the lowest in the world. At the same time, Egypt has only one main source of water supply, the Nile river, which represents the ultimate limiting factor on the country's ability to expand agriculture horizontally. Consequently, future growth in agricultural production will need to come from a more efficient utilization of the country's limited water and land resources. Potentials do exist for better using these resources, in particular:

- While the overall efficiency of water use from the river Nile is quite high, there is potential for better managing this very valuable resource, thereby increasing overall water availability;

- There is considerable potential for increasing yields in the old lands, through the wider adoption of improved technologies and cultural practices;

- The reclaimed lands (1.9 million fed), including those presently managed by the public sector, are producing at levels far below potential; representing nearly 25 percent of total agricultural lands, they present an important growth point for the agricultural sector in the coming decade;

- With liberalization, farmers have shown a propensity to select cropping patterns which use the limited land resource of the country better than when these decisions were directed by the Government; further gains can be expected from farmer's response to the completion of price liberalization;

6. While the sector reforms introduced considerable changes to the policy environment within which the agriculture sector operates, there remain a few issues which militate against the sector's ability to meet the targets set for its future growth. The key remaining ones include the following:

- Measures are necessary for ensuring the efficient use of the sector's single most important limiting factor of production - water, and to enable financially sustainable programs for maintaining the irrigation and drainage network of the country.

- Cotton and sugarcane remain the two most important crops on which price controls and area allotments remain, which militate against more

efficient use of water and land resources and impose limitations on farmer's choice of cropping patterns.

- In order to complete the ongoing process of agricultural price liberalization, farm input subsidies dealing with fertilizers and pesticides should be removed, which should go hand-in-hand with the process of Government divestiture and liberalization of marketing.

Measures for addressing the above policy issues need to be complemented by steps aimed at streamlining the agricultural institutions, including those presently involved in agricultural research and extension.

Objectives and Broad Strategy for the 1990s

7. The overarching objective of the agricultural strategy for the 1990s is to complete the policy reform program which has already been initiated for the sector, to increase agricultural production and incomes, taking into consideration the overall changes taking place within both the Egyptian and international economy and the linkages between the agricultural sector and the other sectors of the economy. Within this context, the objectives are to increase agricultural productivity per unit of land and water, through more efficient use of these limited resources, reduce unit costs of production, and thereby increase national output and farmers' incomes. This drive for efficiency should move forward in the context of equity and take into account issues of poverty alleviation, as well as ecological sustainability of the overall agricultural development process. Growth in the agriculture sector, combined with programs for targeting particularly women and the landless, would positively contribute towards the overall poverty alleviation strategy of the Government. In addition, growth in production and increased exports within a strongly liberalized environment is expected to contribute to the overall food security of the country. The targeted growth for agriculture is projected at an average of around 3.0 percent per annum for the 1990s. This would allow for realizing national GDP growth targets of between 4 - 5 percent by the end of the decade, and for positive per capita agricultural growth given a population growth rate of around 2.5 percent. The underlying focus of the strategy is to build on the momentum already created by the reforms initiated by MALR for the agriculture sector, and by the comprehensive economic reform program adopted by the Government. This would need to be complemented by strong national population policies aimed at reducing the overall rate of population growth.

8. A process of change has been initiated over the last few years, which needs to be fostered and reinforced through a combination of policy and institutional reforms. Certain key themes underlie the strategy articulated in this report; the principal ones include the following:

- need for measures aimed at ensuring efficiency and environmental sustainability in the management of the most important natural resources of the country, i.e. water and arable land;

- emphasis on using free market considerations, in particular the promotion of the private sector, in resource allocations;

- the need for implementing an agriculture sector strategy within the context of overall rural development, which should encompass within it better involvement of rural women in the development process,

diversification of rural activities and provision of essential social programs for health and education;

- recognition of the social and political issues, and the need for social safety nets to assist in absorbing some of the potential dislocations which will inevitably accrue through the implementation of the comprehensive reform program; and

- initiating a program of institutional reforms, so as to streamline the array of institutions presently serving the agriculture sector, and make them more responsive to its needs.

Subsectoral Strategies

9. Water and Land Resources. Significant benefits are to be had from a variety of improvements in land and water use. The underlying need is to safeguard the capabilities of the existing infrastructure and improve overall system efficiency. While the overall efficiency of water use from the Nile river is quite high, location specific problems do exist. Consequently, it is necessary to undertake a review of the overall system efficiency, as well as of irrigation water use efficiency on the basis of the major canal commands, expanding the work on irrigation improvement already initiated by the Government. The installation of improved water saving irrigation technologies needs to be pursued, within the limits of technical and economic feasibility. In addition, the promotion of a farmer level institutional framework for improving the system for better sharing of water and for improving on-farm water management, including the introduction of a system for providing to farmers an efficient irrigation advisory service, is particularly important. Within the context of its responsibility for extension/transfer of technology and for improving on-farm water management, the Ministry of Agriculture and Land Reclamation (MALR) has to take the lead in initiating programs and in strengthening its own technical capabilities in this regard, particularly in irrigation agronomy and related skills. This recommendation takes on greater urgency in the context of complementing the measures already approved by the Government which enable farmers to independently decide their respective cropping patterns.

10. The increased capital intensity of the irrigation and drainage system requires higher real levels of maintenance funding as well as appropriate techniques in order to avoid system deterioration. There is, thus, a need to ensure that maintenance funding is given high priority. Given the limitations on the Government's ability to meet fully the O&M costs, it is important that the farmers contribute more towards meeting these costs, particularly since the implicit taxation of agriculture has been significantly reduced. It is worth noting that the scale of fees needed to recover O&M costs would not have a significant impact on net farm incomes. For example, analysis done shows that a fee covering present O&M costs only would imply an annual payment, for representative farms of 3.5 fed and 2.2 fed in the Delta and Upper Egypt respectively, equivalent to only 1-2 percent of gross farm revenue and 3-4 percent of total costs. A fee covering present O&M and capital costs (as defined in the ongoing cost recovery study) imposed as a flat charge would imply a payment equivalent to 3 percent of gross revenues or 6-7 percent of total costs. While such cost increases are not insignificant, they appear to lie within a bearable range from the perspective of farmers' ability to pay, especially considering that real net farm incomes have risen by about 40 percent since 1984. The concept of cost recovery is accepted for the new lands; its wider application

continues to attract social and political opposition due to a variety of cultural factors. However, recognizing that Government will have to proceed bearing in mind the social and political ramifications of the program, it is clear that for the future viability of the system, Government will need to consider options whereby farmers can contribute towards the irrigation and drainage costs presently borne by it.

- Consequently, for improving overall water resources management, there is need for a two pronged approach: firstly, water saving irrigation technologies which are technically and economically feasible need to be encouraged, complemented by a strengthened program of on-farm water management; and secondly, cost recovery of the O&M costs of the irrigation network, leading eventually to price incentives for more efficient use of water, also have to be introduced.

The Government is presently conducting a comprehensive study on the issue of cost recovery for the irrigation and drainage system; the study would identify options for implementing a phased medium to long term program for levying irrigation fees, and should provide the basis for Government decisions on introducing a system for recovering irrigation and drainage costs. Specific options would be reviewed on the basis of the study's findings and conclusions.

11. The old lands have good soils with potential for further increasing productivity. However, more intensive research and extension efforts and measures relating to better land and soil management in order to sustain the productivity of the soils need to be emphasized. In the context of horizontal expansion, the new lands are viewed as an opportunity for increasing production. Given limitations on water availability, and in the context of the reform program which calls for an early supply response from agriculture, the first priority must be given to maximizing returns from the already reclaimed lands on which major investments have already been completed. The principal focus of the strategy should be on providing improved support services to the newly settled farmers, the lack of which has been one of the most important contributory factors for realized benefits not matching expectations, and better selection criteria for settlers, particularly graduates. Programs for additional land reclamation need to be seriously examined both from a financial and economic perspective (first undertaking investments which yield higher and quicker returns), and from a technical perspective (looking at long range water availability issues).

12. Underlying the above strategy, concerns of environmental sustainability must underpin the use of land and water resources; key among these from the perspective of sustainable agricultural development is the need for taking all possible measures to induce a more economic use of water. A related aspect is that of water quality; in this context, the impact of pollution on water availability cannot be over emphasized. Reliable data on the quality of surface and ground water are limited. Options for cleaning up of polluted drainage water should be examined, as should the introduction of such practices in agriculture as integrated pest management to reduce pesticide use, and the use of crop byproducts and improved cultural practices to reduce fertilizer use. In the case of land resources, measures aimed at maintaining soil fertility, reducing salinity and waterlogging and better soil conservation measures need to be emphasized. In the context of water related and land reclamation projects, there is need to adopt a mandatory policy of requiring environmental assessments to be

carried out, to ensure the overall environmental sustainability of such investments.

13. Crop and Livestock Strategy. There remains considerable potential for both increasing agricultural value added and saving irrigation water by means of further changes in the cropping patterns. While market signals provide the required incentives to increase production of the competitive products, incentives also remain high to produce non-competitive crops, such as sugar cane in particular, due to the absence of mechanisms for taking account of the financial and economic cost of water used. Analysis done shows that Egypt has a strong comparative advantage for horticulture products (fruits and vegetables), cotton and wheat, is moderately competitive in several relatively low water consuming crops (maize, beans, potatoes, long berseem and oil seeds), and has a disadvantage in producing the water intensive crops rice and sugar cane. A comparison of national value added from each crop with their respective use of the key natural resources (water and land) of the country shows that wheat, cotton and maize produce most of the value added in agriculture; most land is occupied by wheat, berseem and maize; most water, on the other hand, is consumed by rice, maize and sugar cane. The comparison shows the relatively high demand on water of sugar cane and rice and the high demand on land of berseem. Cotton, wheat and vegetables make an economic contribution relatively high compared to their resource use. In order to ensure an optimal allocation of resources for increasing agricultural production and incomes, the focus of the strategy should consequently be on removal of the remaining distortions. For promoting desirable production shifts, there are essentially three crops for which removal of remaining distortions or additional policy measures to alleviate distortions are required.

- The present procurement price for cotton is still insufficient to provide the necessary incentives for farmers to increase the area planted to cotton; therefore, the complete liberalization of the cotton subsector is crucial for Egypt to be able to exploit its significant cost advantage.

- In economic terms, rice production using existing technology is competitive only under special circumstances, i.e. when it is produced in the context of a reclamation crop in areas near the coast where the average water quality is generally much poorer, and the potential for diverting it to other areas is limited. In other areas, where greater potential for crop substitution exists and the possible environmental benefits from growing rice are not forthcoming, the price liberalization of rice leads to high financial attractiveness of rice to farmers, well in excess of its economic value, due to the absence of water charges.

- Sugar cane is financially attractive to farmers even though its production is uncompetitive due to high water consumption. Since there are large Government investments in industrial infrastructure to process the sugar, an action plan needs to be drawn up of measures needed to: (a) look at the possibility of substitutability of other crops such as sugarbeet, and (b) achieve the Government's objective to eliminate all controls on sugarcane within a three-year time frame. In the interim, the sugarcane price should be brought in line with its estimated border price.

14. For the livestock subsector, the emphasis should be on measures for improving livestock productivity on small farms and more efficient use of fodder crops as well as crop residues produced on the farm, as livestock compete directly with food crops for the use of the scarce land and water resources of the country. Improvements in animal production can be achieved if some of the major constraints on the sub-sector are removed, such as low yield of fodder crops, low genetic potential of the existing animal population, insufficiencies in nutrition, shortcomings in the control and treatment of diseases and infertility, and a weak livestock extension service. There should be better use of crop byproducts, and yields of fodder crops should be optimized through new high-yielding berseem varieties, use of berseem mixed with legumes and nontraditional feed. Overall Government priorities are to meet the increased protein demand through the supply of white meat, such as fish and poultry; these priorities should be supported in the nineties.

15. Trade, Marketing and Agroindustrial Development. The projected increase in domestic demand has the capacity to absorb the expected increase in domestic production; however, the strategic requirements of the economy need a thrust for larger export markets. As Egypt has a history of inward looking policies, numerous impediments to trade remain, and it will take concerted effort to ensure that the export potential is realized. A number of actions can be taken to increase exports and improve market efficiency.

- The complete liberalization of the production, export and marketing of cotton is a priority. Cotton imports from pest free countries should be liberalized, subject to quarantine regulations; similarly, the imports of agricultural equipment and other inputs should also be liberalized.

- With increasingly competitive commodity markets, it is critical that adequate and timely information on trade is available to existing and potential exporters.

- Research and extension activities in the past have concentrated on domestically consumed commodities and cotton; there is need to strengthen their focus on other potential exportable commodities.

In terms of export markets, while Egypt has advantages in terms of locations and climate, virtually all of the country's agricultural exports must compete with other suppliers for a share of the most likely markets -the EC, Eastern Europe and the Gulf States. The European Community is the most important export market for Egypt; however, its trade restrictions render most of Egypt's beyond-quota outside-period exports to the EC unprofitable. It is consequently, particularly important to initiate negotiations aimed at getting better access to the Community market for Egyptian products, and to take measures which would facilitate investor response to the policy changes being put into effect in Egypt. One would also expect that the successful conclusion of the presently ongoing GATT Uruguay round talks, will favorably impact on Egypt's ability to exploit the world markets.

- As a complement to the international trade negotiations presently ongoing, it is important for the Government to negotiate with major importing nations, such as the European Community, to reduce tariffs and increase access to markets; in return, privileged access to the Egyptian economy may need to be granted to EC products.

It is necessary that Egyptian suppliers also monitor market developments in Eastern Europe, and establish relations on which future sales would be based. During this period of change in Europe, new systems are being formed, and a new generation of clients is emerging which will need sources of supply in the future.

16. With regard to marketing, key impediments at the rural level have included: the absence of adequate infrastructure; a marked lack of storage facilities, as well as collection/grading centers; a severe shortage of refrigerated storage for perishable products; poor quality of packaging materials and containers; and inadequacies in the transport system. A major effort to reduce the inefficiencies and losses in the marketing chain provide a significant source for increasing marketed production and overall food availability in the country. While there is considerable need for additional investment, the underlying requirement is to develop effective farm level organizations, which would have available to them the necessary market information to which they are able to react. Regulatory and institutional impediments to active private sector involvement in post harvest enterprises need to be aggressively removed.

17. For sustainable rural transformation to take place, it is important that the linkages between agriculture and the overall rural economy are further strengthened. In order to respond to the reforms, the private sector, which is crucial for agro-industry development, must see that the reforms introduced have effectively been translated into reduced regulation at the operational level. The lag in policy implementation at the working level means that many growers and entrepreneurs continue to face the same regulations and restrictions that prevailed before the change in policy.

18. Agricultural Research Strategy. Research efforts are presently dispersed across a number of institutes and agencies, some of which are doing excellent work. However, the work of the institutes in different ministries is not adequately integrated within the framework of a national research program, leading to overlapping efforts. As long as most research is funded by the public sector, there is need to establish a more focussed institutional mechanism for preparing and reviewing agricultural research programs of the various agencies, supported by a core group of eminent international scientists and strengthened links with the international research network in carrying out this function. These constraints can be addressed through the formation of an Agricultural Research Council, with the primary responsibility to prepare a comprehensive national agricultural research policy, with a view to enhancing the planning and coordination of research activities of the different agencies involved. In addition, it is necessary to establish monitoring and evaluation units for coordinating the implementation of the research programs, as well as to liaise with the private sector with a view to contracting out relevant research work. For this the design and implementation of an accurate and a widely accessible database is a prerequisite. Finally, in line with liberalization, the research system has to adjust in order to better serve the needs of the private sector, and of potential export oriented activities. This can be best achieved by the active participation of the private sector in the development and implementation of research programs; for this purpose, there is need for incentives to be provided to the private sector to undertake research. In articulating a long term research strategy, it is therefore important to recognize that, while the public sector all over the world is involved in research, many agencies extend their research activities into areas where private research organizations could be expected to work well if given a chance (and do work well in some developed

countries), since the resulting products could be patented and privately marketed (such as hybrid seeds). There is a need in the medium to long term to explore such possibilities in the Egyptian context.

19. Agricultural Extension Strategy. The extension function of MALR is presently weak. The principal issue which needs to be addressed is that of a clear division of responsibilities at the different levels of national administration. Set out below is a proposed approach in this regard.

- At the central level, the responsibility within MALR for planning and outlining strategies for extension, developing extension methodologies, providing training and ensuring linkages between research and extension, should be clearly designated. Part of the terms of reference of this Ministry service should be to vigorously pursue more private sector approaches for extension.

- Integration of all field level extension services at the Governorate level. Staffing levels and training programs should be drawn up for each governorate in accordance with its needs and agricultural plans; emphasis should be given to recruiting skilled female extension agents and to foster programs relevant for the development of rural women.

- The cadre of subject matter specialists should be strengthened, who should be stationed at the different levels (central, governorate and district) of the system. An intensive training program for SMSs in fields other than just production oriented technologies is necessary, to ensure downstream linkages aimed at increasing value added from processing and exports.

The development of private extension services by consultants to medium and large scale growers is already taking place; these developments should be further encouraged. This can be done in various ways, including the promotion of advisory services, encouraging contract extension services, and by devising cost sharing arrangements within local communities. The above framework is intended as a broad institutional framework, within the context of which more work is necessary in order to articulate more detailed arrangements for defining the overall structure and approach for organizing extension.

20. Privatization. The MALR had adopted a progressive approach on privatization, even prior to the enactment of Law 203 of 1991. More recently, and in line with Law 203, holding companies have been transferred to the jurisdiction of the new Public Enterprise Office (PEO); the steps for the implementation of this law are currently underway. As is the case for the overall privatization efforts in Egypt, privatization in agriculture is also facing important generic problems. Concerted efforts are needed to remove the bottlenecks to competition and transparency of the privatization efforts, and establishment of a level playing field between the public and private sectors, with a view to expediting the program of privatization. There also remain various commercial activities which are within MALR; their privatization needs to be pursued under a specific MALR managed program.

21. Strategy for Rural Finance. The Principal Bank for Development and Agricultural Credit has played a dominant role in providing credit to the agricultural sector; in 1991 it provided 75 percent of total lending to

agriculture. However, PBDAC's lending operations as well as its deposit mobilization is primarily concentrated on the farming community; lending to agro-based businesses is limited, and to non-agricultural rural based enterprises insignificant; it also needs to improve its coverage of disadvantaged groups such as women and the landless. Consequently, in the context of promoting broad based rural development, there is scope to improve the financial services provided by the bank to the rural population.

- PBDAC's long term objective is to divest itself of its non-banking activities. A phased program for redeploying existing staff should be undertaken, through appropriate incentive schemes.

- The capital base of PBDAC needs to be strengthened, combined with measures aimed at increasing deposit mobilization from the entire rural community and rationalizing the interest rate structure, so as to put the bank on a sound financial footing.

- Activities should be diversified from largely agricultural lending to overall rural lending; lending terms and conditions should be reviewed, so as not to inhibit lending for long term purposes.

While there are no restrictions on other banks to operate in rural areas, their involvement in providing agricultural credit has so far been minimal. The establishment of new banks, however, is curtailed in the present regulatory environment. Within the context of the reform program, particularly the proposed financial sector and regulatory reforms, it is anticipated, and hoped, that private sector banks will increase their involvement in the rural areas, thereby creating a more competitive environment in rural financial markets.

22. Voluntary Farmer Organizations. The cooperative system presently in place was largely organized and controlled by the government; membership was mandatory. Consequently, the existing cooperative law is restrictive, with little flexibility for cooperatives to develop self-reliance and pursue initiatives. Furthermore, savings cooperatives were not encouraged. Within the context of rural development, cooperatives could play a very significant role in providing services to farmers in the areas of input distribution and marketing, and in promoting initiatives for rural diversification. For revitalizing the cooperative system on the basis of efficiency and truly private initiatives, the following actions are proposed:

- The introduction of new cooperative legislation which will permit flexibility for cooperatives to react to market forces and take advantage of business opportunities.

- Based on a detailed review, a program for restructuring and strengthening the overall cooperative system, supported by education and training programs, should be initiated.

- While cooperatives should have free access to financing, this must be made available within the context of financially viable ventures combined with an effective auditing system. The organization of savings cooperatives should be encouraged.

23. The Agricultural Administration. Without a significant restructuring of the agricultural administration, i.e. those public agencies presently working

in the agricultural sector, agricultural reform is very likely to be only partially successful. The problems of the agricultural administration are well known. There is need to streamline the multiplicity of organizations, reduce staffing, further decentralize the administrative structure, and reform legislative regulations which limit flexibility to make significant changes. Given the magnitude of the problem, and the fact that various socio-political considerations will have to be taken into account, it is recognized that this is a difficult area. Some internal reorganization within both MALR and MPWWR has been initiated; however, bold visions are required to address the key issues and various options need to be considered for streamlining the structure. In the context of the reform program, the need for and the terms of reference of the various agencies should be reexamined; new regulatory functions have to be accommodated, while some former administrative or implementation functions may have to be dropped. To enable decision making, a detailed study should be undertaken as soon as possible to identify options.

Investment Program

24. To support the program of policy reforms and institutional upgrading, a well defined public investment program is essential to ensure that the expected supply response from the sector is generated. At the same time it is important to recognize that although the level of public investment directly affects economic activity, it is the subsectoral distribution of investments and the quality of the project implementation within each subsector, that influences the rate of growth of the sector; in addition, there is need to promote private sector investment. The World Bank has recently carried out a detailed review of the Government's proposed Public Sector Investment Program for the Third Five Year Plan, which provides a detailed assessment of priorities in the context of specific projects as proposed by the Government. Allocations for public sector investment during the Third Plan indicate an allocation of about 13.5 percent of the total proposed outlays for the agriculture sector; this compares with an allocation of only 6.9 percent during the Second Plan. To complement the findings of this review, and going beyond the proposals and the time frame of the Third Plan, broad themes are discussed for public investment programming in the medium term future, with a view to providing a framework for Government decisions in this regard; this is set within the context of the role foreseen for the Government in the future.

25. Program for Improved Water Resources Utilization/On Farm Water Management. The major limiting factor to agricultural growth is water; consequently, the most important investments should be those that raise the rate of return to water use. Briefly, the program should include the following elements:

- Investments for improved O&M of the irrigation and drainage system;
- The case for rehabilitating in-channel structures and pumping stations is compelling to keep the system operating efficiently;
- There is clear priority for continuing, and to the extent feasible, accelerating the drainage program;
- There is sufficient evidence to indicate that irrigation improvements in the old lands enhance system efficiency and increase crop production; studies are needed to identify priority areas and

to justify the technical and economic viability of an enlarged irrigation improvement program;

- There is a pressing need for undertaking a phased program for supporting developments aimed at improving on-farm water management.

26. Program for the New and Old-New Lands. While land reclamation is a priority from the Government's perspective, the basic issues are of ensuring balance between investments in creating new agricultural lands and as opposed to those for agricultural intensification in the already cultivated areas, and ensuring the investments undertaken are technically feasible and economically viable. Given the need for quick yielding investments at this time of reform, the medium term investment program should adopt the following approach:

- Priority should be given to intensifying agriculture on the already reclaimed areas, through a series of area specific investments projects targeted in the already reclaimed new lands;

- In the old-new lands there is need for investment in drainage, rehabilitation of water control structures, and for improvements to on-farm irrigation systems, through which high returns can be expected in a relatively short time and at low unit costs;

- Within the above context, a more modest new lands reclamation program should be undertaken, within the limits of assured water supplies, selectively based on identified high potential schemes which are technically feasible and economically viable.

27. Agricultural Research and Extension. The ongoing externally financed national program to strengthen agricultural research and extension is expected to come to an end in 1994. Improved agricultural research is a critical input to increased agricultural productivity; successes in Egypt and elsewhere have already borne out this fact. This needs to be complemented by a strengthened extension service that Egypt needs to face the technological challenges of the 1990s. The implementation of a well defined follow on program is consequently of high priority.

28. Agricultural Marketing and Export Promotion. Initiatives to improve the marketing system are a clear priority, if the benefits from increased agricultural production are to be fully realized. However, the long term program for marketing development should be centered around promoting private sector initiatives and strengthening cooperatives and farmer groups. Other than further liberalizing the regulatory environment within which the private sector has been operating, there is need for the financial system to be strengthened in order that it can be more responsive to specific private sector needs. The public sector should refrain from direct intervention in marketing; emphasis on public investments should be in areas where the Government can perform a catalytic role in encouraging private sector participation.

29. Potential Studies. The agriculture sector is going through a period of change, which is accompanied by a re-evaluation of the future role of the Government. In order to provide the Government with meaningful options and alternatives for taking investment programming decisions, there are various potential areas which lend themselves to detailed studies or grant financed

technical assistance operations. Set out below are certain areas which merit priority attention in this context:

- In view of the present lack of knowledge and data on rural financial markets, a rural financial market study should be undertaken to assess the presently available sources of credit in rural areas, prospective demand for credit and investment opportunities, including for rural based enterprises, and of sources of savings. In this context, the rural land markets should also be reviewed to assess the linkage of land issues with rural credit markets;

- Steps for improving the overall water resources management in Egypt is a critical part of the development strategy for the sector. Consequently, a technical assistance program is needed for preparing a 10 year program for nationwide irrigation improvement;

- A detailed fisheries sub-sector study, with a view to outlining the potentials and constraints, as well as a strategy for the development of the subsector;

- Formulation of an action plan for implementing measures aimed at liberalizing the sugar subsector, based on past and ongoing studies;

- A study of the public agencies involved in agriculture and food related issues, in order to draw up a phased program for restructuring and strengthening them. Given the magnitude of the issues involved, and that various socio-political considerations will need to be taken into account, it is recognized that this is a difficult area; consequently, a long term program needs to be articulated, which should provide the basis for a phased program for change;

- A technical assistance program for strengthening the planning, policy analysis and monitoring capabilities of both MALR and MPWWR;

- Technical assistance for strengthening the environmental assessment capabilities of agencies involved in preparing and implementing investment projects, including a program of training;

- Rural women are involved in numerous agricultural activities, employment in which may be influenced in the future by the secondary effects of agricultural modernization; there is a need for a study to identify innovative approaches for addressing potential negative effects from such changes in the rural economy;

- A technical assistance program to strengthen policy analysis and planning related to the integration of women's issues into the mainstream activities at the Ministry and Governorate level;

- A technical assistance program to review in detail the existing cooperative system, with a view to outlining a phased program aimed at restructuring and strengthening it.

ARAB REPUBLIC OF EGYPT

AN AGRICULTURAL STRATEGY FOR THE 1990s

I. EGYPTIAN ECONOMY IN TRANSITION

1.01 This report defines an agricultural strategy for the 1990s, which is formulated in the context of the new economic environment brought about by the introduction of wide ranging economic reforms by the Government of Egypt. As a result, it differs from the strategy of the 1980s. The strategy is articulated around the basic theme of ensuring the most efficient use, in an environmentally sustainable manner, of the two most important limiting factors for the country as a whole, and for agriculture in particular -- water and land resources.

1.02 Initiatives launched by the Government of Egypt during the last two years have embarked the Egyptian economy into a period of fundamental change. In March 1990, the Government of Egypt launched a comprehensive economic and social reform program, to strengthen Egypt's ongoing adjustment program; it constitutes a major break from the policies pursued in the past, and has the underlying objective of modernizing the country and significantly improving living standards. The reform program addresses the key structural weaknesses underlying the Egyptian economy within the context of an overall stabilization effort; it is aimed at ensuring a steady recovery of economic growth and reducing the inequities among the population. The program represents a systematic and comprehensive effort to accelerate, strengthen and broaden the pace of change within the context of a coherent macroeconomic framework. With a view to completely restructuring the economic activities in Egypt in line with free market principles, the program has three main objectives:

- achieve rapidly, a sustainable macroeconomic equilibrium;
- lay the foundation for renewed economic growth in the medium and long term through a fundamental restructuring of the economy;
- minimize the negative effects of economic reforms on the poor, through improvements in social policies.

1.03 Underlying the program measures is the Government's intention to make the transition from a highly interventionist centrally planned economy with significant price distortions to one that is decentralized, market based, and more outward oriented. These efforts of the Government are being backed by unprecedented support from the international community, including exceptional debt relief from the Paris Club (May 1991) and other creditors. With the reform process presently in progress, the Egyptian economy is going through a period of transition; the foundations for growth being put into place, supported by essential developments in the social sectors, would inevitably rely on the three main pillars of the economy - the agriculture, industry and tourism sectors - to provide the engine for growth. The challenges are enormous; they will call upon a continuous commitment of the Government to the process of change, which has significant political and social ramifications. At the same time, the international donor community has committed itself to support the Government in its endeavors in this period of transition.

1.04 Past Policies in Perspective. Historically, Egypt pursued a public-sector-led and inward-looking development strategy stressing social welfare objectives. As a result, state-owned enterprises played an important role in the economy, accounting for one of the largest shares of gross national output and employment among the developing countries. Over one half of total GDP and about two thirds of nonagricultural GDP are still produced by the public sector; in manufacturing, the public sector's production share is 75 percent. The Open-Door Policy initiated in 1974 by President Sadat brought about a partial liberalization of Egypt's economy. The underlying development strategy, however, remained one of import substitution financed by large inflows of foreign exchange from foreign assistance and borrowing, oil-related exports, workers' remittances, tourism, Suez canal revenue and direct foreign investment. Egypt's economy grew at unusually high rates during 1974-85, averaging about 8.5 percent a year, and accompanied by significant social progress. However, despite its rapid growth, the economy provided insufficient employment opportunities as two of the most important activities (oil production and the Suez Canal), representing about 16 percent of GDP, employed less than 1 percent of the labor force. Over half of the additional labor force was hired by the Government, contributing heavily to the increasing budget deficit.

1.05 When oil-related foreign exchange revenues began to decline in 1982, the Government was still able to maintain its public-sector-led growth strategy, but with a growing participation of foreign borrowing to finance it. At 6-7 percent per annum through the mid-1980s, the growth performance was still impressive. Worsening credit-worthiness brought this growth strategy to a halt in the late 1980s, when imports and investments were further cut, and growth slowed down sharply to about 2.5 percent per annum. However, public sector expenditures increased faster than revenues and the economy was not adjusting adequately to the negative external shocks. The resulting massive fiscal and current account deficits were in turn financed through the large inflows of foreign assistance, foreign debt accumulation, surplus from the social insurance system, and domestic borrowing. Egypt became unable to service its debts, triggering a substantial reduction in gross capital inflows causing negative net transfers of capital and an accumulation of arrears resulting in a heavy external debt overhang.

1.06 Potential for Growth. Egypt has the potential to renew sustainable economic growth because it has a good size domestic market, a diversified industrial base, favorable agro-climatic conditions and geographical location, a rich cultural heritage, good tourism potential, and a large and relatively cheap skilled labor force. In response to the deteriorating economic conditions, the Government of President Mubarak began implementing a bold and comprehensive economic reform and structural adjustment program in the Spring of 1990. In support of the program, the Government is receiving substantial financial support from the international community, including generous debt relief, and has succeeded in introducing a large number of reform measures in a relatively short period of time. The first stage of the Government's program aims at: (i) curtailing inflation, the current account and budget deficits, and restoring creditworthiness; (ii) strengthening banks' solvency and prudential regulations, and liberalizing interest rates; (iii) privatizing and restructuring public enterprises, and reforming their financial relationships with banks and the Government; (iv) liberalizing most prices in agriculture and manufacturing, while prices in transport and energy would be raised to long-term marginal cost or international levels; (v) phasing out most non-tariff barriers to imports and

exports, and reducing import tariffs dispersion; (vi) encouraging private enterprise development through abolishing investment and production controls, dismantling government monopolies, and phasing out private sector discrimination; and (vii) minimizing the effects of these reforms on the poor through implementing safety net mechanisms.

1.07 Significant measures have been taken to initiate implementation of the reform program. These include starting the decontrol of industrial prices, increasing energy, transport and cotton prices, abolishing investment licensing requirements, except for a short negative list, dismantling of quantity restrictions on international trade, reducing tariff dispersion, approval of a new public enterprise law, establishment of the Public Enterprise Office, initiation of a program of privatization, liberalization and unification of the foreign exchange market, introduction of a new sales tax, recapitalization of public sector banks, removal of interest rate ceilings and credit controls, and organization of a treasury bill market. In addition, the earlier policy of guaranteeing Government employment to graduates has been largely effectively halted. While the pace of public enterprise and privatization reforms has been slow, the implementation of the overall program has been brisk and is already beginning to bear results. In the agriculture sector, significant changes have already taken place under a sectoral reform program initiated towards the end of 1986, which were set within the context of Minister Wally's strategy for the 1980s.

1.08 Egypt's macroeconomic situation is better than what was earlier envisaged, with real GDP growth of about 0.5 percent achieved in FY92, as opposed to the decline of about 3 percent which had been earlier projected. This is largely on account of the increase in construction activity, tourism, Suez Canal receipts and worker's remmittances; in addition, there has been a delay in the implementation of the public enterprise reforms, which were expected to initially impact negatively on short term growth. At the same time, actual inflation at around 17-18 percent is lower than was expected (and reported to be falling further), and the balance of payments performance has been significantly stronger. The current account balance has moved from a deficit of about US$2.6 billion in FY90 to a surplus of US$2.4 billion in FY91 and US$2.6 billion in FY92. The level of gross international reserves, which was about US$2.5 billion in FY90, has increased to around US$10.0 billion in FY92 (about ten months imports). On the fiscal side, preliminary data for FY91 indicate that current expenditures were kept under tight control, except for food subsidies, and a decisive effort was made to raise tax revenues; the fiscal deficit has come down from around 20 percent of GDP in FY91 to about 7.5 percent in FY92. Assuming that the pace of reforms is continued, and in the absence of major adverse shocks, growth is expected to accelerate to 4-4.5 percent with consumption per capita growing between 1-2 percent through the end of the decade.

1.09 As a result of the Paris Club and other debt agreements during FY91, Egypt's external debt, outstanding and disbursed, dropped from US$51.1 billion in FY90 to US$39.0 billion in FY92, or from almost 400 to about 240 percent of exports, and from 144 to 112 percent of GDP. Egypt's debt service dropped to 21 percent of exports (from 40 percent in FY91) and to under 10 percent of GDP; interest payments dropped to 11 percent of exports (from 21 percent) and about 5 percent of GDP (from about 9 percent). The creditworthiness picture is thus vastly improved. However, a large element of this improvement has come from a one-shot benefit from the debt reliefs; furthermore, with the intense

international competition for access to the industrial countries' limited official financial assistance, Egypt may find it difficult to maintain the high level of financial support it has been receiving over the past decade.

1.10 It is clear that significant changes are taking place in the economy, and a historic opportunity is available to the Government to reverse a period of declining growth into a future of higher and sustainable growth, brought about by engendering confidence in the private sector, and by a progressive dismantling of the system of controls which have accumulated during decades of heavy Government involvement in economic decision making. While performance so far in implementing the stabilization program has been good, much remains to be done to improve macro-management and to deepen implementation of the structural reform program, in order to attain sustainable growth and to bring inflation under control. Egypt now enjoys a balance of payments/reserves cushion which offers the Government an unprecedented opportunity to deepen and accelerate the pace of reforms. The agriculture sector of the country, already significantly regenerated from the substantial reforms initiated in 1986, provides a potentially important vehicle for contributing towards reaching the Government's objectives of achieving balanced growth in the rural economy of the country.

1.11 However, for realizing this potential growth in the agriculture sector, the more efficient use of the limited water and land resources is most critical; this objective provides the central theme for the proposed strategy for the agricultural sector. In outlining the strategy for the sector, which is also set within the context of promoting overall rural development, Chapter II of the report initially provides a brief overview of the macroeconomic context of Egyptian agriculture and highlights the reforms which have already taken place in the sector and their initial impact, which have clearly put the sector at the forefront of the overall reform process. Recognizing the underlying objective of achieving more efficient utilization of Egypt's land and water resources, and of generating and sustaining a supply response from the sector, Chapter III assesses the potential sources for growth and outlines the key obstacles and policy issues which need to be addressed to realize this potential. Set against the framework outlined earlier, Chapter IV focusses on the water and land resources available, and reviews measures and policies needed for their more efficient utilization in an environmentally sound manner, while Chapter V reviews the production and market prospects for crop and livestock products and identifies measures for maximizing sectoral value added. Chapter VI reviews the underlying enabling environment which needs to be assured, in the form of a responsive institutional and regulatory framework, in order that the targeted growth for the sector can be achieved. Finally, Chapter VII summarizes salient features of a strategy for the sector, based on the recommendations made through the entire report.

II. MACROECONOMIC CONTEXT OF EGYPTIAN AGRICULTURE

A. Agriculture in the Egyptian Economy

2.01 The Egyptian economy has traditionally relied heavily on the agriculture sector as a source for growth, both in terms of contribution to GDP as well as a source of employment for a significant part of the Egyptian labor

force. This central role was reinforced by the strong performance of the sector initiated by the reforms following the 1952 revolution, and further supported by the completion of the High Aswan Dam in 1968, which allowed for a significant increase in the cultivated area and provided assured perennial irrigation to the entire Nile Valley and Delta areas. In 1974, agriculture accounted for 30 percent of GDP, 25 percent of export earnings and 47 percent of employment. However, this dominance has declined over the years as shown below.

Table 2.1: Share of Agriculture in Economy

	1980	1985	1990
Share of Agriculture in GDP a/	25.4	19.3	19.9
Share of Agr. in Exports b/	22.5	17.7	20.3
Share of Agr. in Employment	36.7	35.8	n.a.

a/ In 1987 constant prices, at factor cost.
b/ Data relates to 1981, 1985 and 1989, respectively

There are conflicting data on number of households directly supported by the sector; the 1990 agriculture census estimates that there are around 3.0 million land holdings, which if each is held by one family, suggests direct support to an estimated 17 million individuals. In addition, the sector provides employment to landless labor in the rural areas. Despite the decline in the share of the sector's contribution to national GDP, which to a large extent also reflects the relatively stronger growth in other sectors (particularly, oil, and also services and construction), the agriculture sector nevertheless remains important for the future growth of the economy. With the cotton subsector beginning to show signs of revival, and horticultural production having increased significantly over the last few years, the sector will continue to support industrial/agro-industrial growth in the country; in addition, developments in the agricultural sector are expected to lead the Government's efforts to achieve equitable and balanced growth in the rural economy.

2.02 Agricultural GDP grew in real terms at average annual rates of 2.7 percent in the 1960s, 3.5 percent in the 1970s (reflecting the beneficial xxeffects from the High Aswan Dam) and 2.5 percent in the 1980s. Overall, these data indicate that if the contributions from the High Dam are excluded, agricultural growth rates have been modest. However, while recorded growth rates have been modest during the last decade, more recent indicators point towards progress in certain areas. For example, the production of wheat, maize, beans, fruits and vegetables has recorded significant increases over the past decade; cotton production has, however, declined. The modest overall performance during the last decade can be attributed to the disincentive effects on farmer decisions of the remaining policy distortions, and the effects of the declining share of agriculture in total public investments during the last 25 years. After separating out the cost of the High Dam, agriculture's share of public investment declined from 14 percent in 1962-66, to only 7 percent during the second plan period (1988-92). Furthermore, the Government emphasized land reclamation programs within the agriculture sector, with a concomitant bias towards it in the allocation of investment funds (40 percent of the total funds earmarked for the agriculture sector were allocated to horizontal expansion); however, these investments have so far failed to generate returns on the scale expected from it. An estimated 1.9 million feddans have been reclaimed, representing about 25 percent of the cultivable land: however, their contribution to the total gross value of agricultural production is estimated to be only about 7 percent.

Resource Base

2.03 On a per caput basis, Egypt's area of cultivable land at 0.13 feddan per head is among the lowest in the world. At the same time, Egypt has only one main source of water supply, the Nile river. The availability of reliable water supply from the High Aswan Dam is governed by the existing water sharing agreement with Sudan, under which 55.5 BCM are allocated to Egypt; this represents the ultimate limiting factor on the country's ability to expand agriculture horizontally. Given the increasing demands on this secure source of water supply from other sectors, the pressing need for the country is to maximize the returns to this valuable resource in an environmentally sound manner. Recent work carried out to assess the land resources of the country show that potentially suitable soils for further development outside of the already cultivated areas do exist; however, the ability of the nation to tap this potential is wholly governed by the limitations on the water resources available for undertaking such development.

2.04 Agriculture in Egypt is almost entirely dependent on irrigation; the country has no effective rainfall except in a narrow band along the northern coastal areas. Consequently, agricultural development is closely linked to the Nile River and its management. Its flows are dependent entirely on river systems outside Egypt, largely influenced by the climate and terrain in the Central African Plateau and the Ethiopian highlands. Appropriate strategies for overall water resources management, including attention to regional dimensions and cooperation, therefore assume significant importance for sustainable agricultural development in Egypt. To ensure greater reliability and better overall efficiency, there is potential for regional projects, which would attract donor interest in financing.

2.05 The agricultural land base of Egypt totalling about 7.5 million feddans, consists of some 7.3 million feddans (about 3.0 million ha) lying within the Nile basin and delta, and about 200,000 feddans (80,000 ha) of agricultural land elsewhere (rainfed and in oases). Of the total area in the Nile basin and delta, some 5.4 million fed are "old" lands, and the remaining 1.9 million fed are "new" lands, reclaimed since 1952. With the continuing loss of agricultural lands to village/urban encroachment, and given the limitation of water availability for irrigated agriculture, the potential for significantly increasing the available agricultural land base from its present level is limited. Consequently, the future growth in agricultural production will need to come from more efficient utilization of the existing land and water resources of the country.

2.06 Egypt's agricultural land is on average highly productive and ideally suited to intensive agriculture. With good climatic conditions, including maximum sunlight and a perennial source of irrigation water, agriculture is provided with excellent growing conditions, resulting in high crop yields. The total cropped area in 1990 was estimated at about 12.1 million fed, giving a cropping intensity of around 180 percent for the country as a whole, after taking into account perennial crops. The major crops are wheat, maize, rice, berseem, cotton, broad beans, sugarcane, vegetables and fruits. Most crops are grown in both the Delta and the Valley, with the exception of rice (Delta) and sugarcane (Valley). In the "new lands", groundnuts, fruits and vegetables are particularly important.

2.07 It is presently estimated that cotton, wheat, rice, maize and berseem together account for 80 percent of the cropped area. Wheat and berseem are the principal winter crops; in summer, cotton and rice are important cash crops, while maize and sorghum are major subsistence crops. Livestock is an important and integral part of the agricultural production system, as 85 percent of all livestock are found on small farms. Since natural pastures are only confined to the northern coastal areas, livestock is seldom raised in herds, and animals compete directly through their demand for fodder crops with the other field crops for scarce irrigated land. Generally, each farmer owns several animals. These are usually confined and fed green berseem clover during the winter months; a variety of other feeds are used during the rest of the year, including wheat straw, green corn, sorghum, barley, wheat, feed concentrates, and other agro-industrial byproducts such as cotton meal cake and sugarcane bagasse.

B. Structural Adjustment and the Rural Economy

2.08 The rural population of Egypt in 1990 was estimated to represent 53 percent of the country's total population; it has declined from about 59 percent in 1965. Recent years have seen a trend towards increasing urbanization; most recent estimates show urban population growing at about 3.1 percent per annum, as compared to the national population growth rate of around 2.6 percent per annum. The inability of the rural economy to meet the increasing demands for employment is an important determinant of the migration which has occurred. Given the social effects of increasing population pressure and congestion in the urban areas, it is clear that the rural economy of the country, including agriculture, has to be revitalized in order to ensure social and economic equilibrium; such a program has to be part of the overall reform process presently ongoing. In this context, various characteristics of the rural economy need to be taken into account. Firstly, while agriculture dominates the rural economy, a large number of farming households derive a significant part of their annual incomes from non-farming activities; most recent estimates show that on average, 38 percent of the average rural household income is derived from activities outside of agriculture. This high level of non-farming activities within an agricultural household represents an important structural characteristic of the rural population; with the right environment, this offers the possibility of more rapid development of private initiatives and investments, both in terms of upstream sectors that sell to or service agriculture and in downstream sectors that buy from it. Secondly, it is necessary to recognize that Egyptian women are prominent in the agricultural development process; close to 47 percent of the active female population in Egypt is engaged in agricultural work. Due to male out-migration to seek urban or regional job opportunities, many women are head of households, who have to make the daily farming decisions. Women participate in all facets of agricultural activities, from planting to weeding, irrigating and harvesting. They are also involved heavily in other activities in the rural areas, in particular livestock. Consequently, they are extremely important for bringing about change in the rural areas of the country.

2.09 Another characteristic which is important in the context of designing an agricultural strategy for Egypt, is the average size of farms. Under the various land reforms since the 1950s, about 900,000 fed were redistributed to those having little or no land, and farm sizes were limited to 50 fed per individual and 100 fed per family. However, these limits are seldom reached and

farm sizes in Egypt are generally small, averaging less than 2 fed. It is estimated that nearly 50 percent of the farms are less than one fed each, and 84 percent of small farmers hold only 50 percent of the total area; fragmentation is common, though leasing does play an important role in consolidating fragmented holdings. Agricultural land is generally privately owned, though an estimated 250,000 fed of the reclaimed "new" lands are owned and operated by public sector companies; the Government is presently in the process of selling the publicly owned lands to private farmers and investors.

Table 2.2: Distribution of Land Ownership

Ownership Size	Percent of Land Owners	Percent of Area Owned
Less than 5 feddan	95.5	53.9
5 to 10 feddan	2.4	10.5
10 to 20 feddan	1.2	10.2
20 to 50 feddan	0.7	11.5
50 to 100 feddan	0.2	7.4
More than 100 feddan	0.1	6.5

Source: CAPMAS, Statistical Yearbook, 1985 Data

2.10 The policy framework within which the agriculture sector operated until the mid-1980s, was heavily influenced by Government, and was closed and inward looking. It was characterized by heavy government intervention in production, pricing, and marketing of major crops and inputs. The objective of this intervention was to attain a high level of self sufficiency in basic food products, provision of basic food-stuffs to consumers at low prices, provision of a basic source of employment for the fast expanding labor force in the country and the implicit taxation of agriculture to finance industrial growth and generate government revenue. To achieve these objectives, prices were manipulated, subsidies were given, crop area targets were established and enforced, and imports and exports were controlled with little consideration to economic efficiency; in addition, the farmers were almost entirely dependent on Government agencies and the public sector supported cooperative structure for input purchases and for the sale of their products. Since prices were not allowed to reflect scarcity, central allocation had to be used, resulting in large distortions and waste; at the same time, overall institutional performance was weak. Consequently, with growth in agricultural production failing to keep pace with the increasing population of the country, overall food production in Egypt has failed to keep pace with consumption and the country has become increasingly dependent on imports of foodgrains, pulses, edible oils, sugar, meat and milk products to meet its needs; in 1989, food items represented 29 percent of total merchandise imports.

2.11 Significant reforms of these past agricultural policies began to be introduced in the 1980s, within the framework of an agriculture sector strategy for the 1980s; since then agriculture has clearly been at the forefront of other sectors in initiating reforms, as evidenced by the process of liberalizing input and output prices and eliminating crop area controls. The key measures which have been implemented within the context of the reform process initiated in the agriculture sector since 1986, include the following:

- Crop area allotments, with delivery quotas at fixed procurement prices, have been removed for all major crops with the exception of cotton and sugarcane;

- Agricultural producer prices for all products, except cotton and sugarcane, have been completely liberalized; cotton prices paid to farmers have been raised to 66 percent of their border price equivalents for the 1992/93 growing season; subsidies on fertilizers and pesticides have been significantly reduced and are expected to be completely phased out over the next two years;

- Private sector processing and marketing of agricultural products, as well as in the delivery of agricultural inputs, is being encouraged; restrictions on private sector rice processing and on inter-governorate transportation of milled rice have been liberalized; a program for divesting lands held by public sector companies has been initiated, albeit progress in implementation has so far been slow;

- Import/export constraints are being reduced, and the foreign trade of agricultural goods was shifted to the free foreign exchange market.

The sector is now in a period of transition with action on some policy measures having been completed, some initiated recently, and some on which there is a debate ongoing with the approach to be adopted not yet fully articulated.

2.12 Price liberalization was introduced during a period of declining world market prices for the major grain crops. As a result of liberalization, the gap between domestic and world market prices for these commodities has been closed. However, due to the concurrent sharp decline in world market prices for most commodities during this period, real domestic prices remained largely stable. Technological progress has led to significantly increasing yields for grains during the 1980s. So far, the main benefit from liberalization has been that farmers could flexibly respond to such yield increases by changing cropping patterns quite drastically as evidenced in area increases of 65 percent, 12 percent and 11 percent for wheat, rice and maize respectively from 1985-90. As a result, production increased by 128 percent for wheat and 30 percent for rice as well as maize over the same five year period. As a result of the sharp increase in domestic production, imports of wheat and wheat flour have declined in recent years, and maize imports remained largely unchanged since the mid 1980s in spite of a growing population. At the same time, the berseem area declined by 13 percent resulting from the relatively reduced profitability of livestock activities due to liberalization. Policy changes with respect to the exchange rate and foreign exchange transactions, and the liberalized marketing and export of most agricultural commodities have encouraged exports and increased production of horticulture products.

2.13 Table 2.3 shows the cropping pattern changes as a result of the partially completed reforms. It also shows the significant yield increase achieved particularly from 1985-90. Analysis of potential yields under Egyptian conditions, as presented in various reports, demonstrates a considerable potential for further raising agricultural production. On the negative side, there has been a steep decline in both the area planted to cotton and the average cotton yields obtained. From 1980-85, the cotton area declined by 12 percent and yields fell by 6 percent; the still incomplete reforms have not been able to prevent a further decline in areas by 8 percent and yields by a significant 23 percent between 1985-90. Profitability of cotton remains low and a reversal in the area decline has not yet occurred in aggregate cropping patterns.

Table 2.3: Summary of Area, Yield and Production Changes 1980-90

	Area			Yield			Production		
	1980 '000fd	1985 Index	1990 Index	1980 ton/fd	1985 Index	1990 Index	1980 '000t	1985 Index	1990 Index
Sugar Cane	253	99	108	34.2	110	119	8653	109	129
Gardens	361	127	183	6.1	109	102	2218	133	186
Vegetables	880	105	107	6.4	140	144	5675	147	154
Wheat	1326	89	147	1.3	117	162	1790	105	239
L Berseem	1722	112	96						
Sh Berseem	990	93	80						
Beans	276	123	125	0.9	122	142	240	150	178
Maize	1905	100	104	1.7	114	144	3227	115	149
Rice	972	95	107	2.4	100	116	2379	96	124
Cotton	1245	87	80	1.1	94	73	1408	82	58
Sorghum	398	83	78	1.6	103	127	642	85	99
Potatoes	167	106	113	7.3	115	119	1214	122	135

Source: CAPMAS, Statistical Yearbooks; Index: 1980=100

2.14 Clearly the changes introduced over the past few years to the agriculture sector mark a fundamental departure from the policies of the past. The Government is committed to take this process further, and consolidate on the gains made. With broad based reforms underway, this is an opportune moment to implement additional measures necessary for achieving further growth in the rural economy of the country. While Egypt faces a limited natural resource base, which will eventually set the limits to future agricultural growth, it nevertheless has at present potentials which have not been fully tapped, which present significant prospects for growth in the medium term future. Set against clearly defined objectives, and given a commitment to address the remaining key obstacles to growth, the agriculture sector has the potential for being the engine for rural economic growth. In this context, developments in the international economy, in particular, the eventual prospects of new markets in Eastern Europe and the new Commonwealth of Independent States, as well as a hoped for successful conclusions of the Uruguay Round Talks also offer new opportunities.

III. PROSPECTS FOR AGRICULTURAL GROWTH

A. Underlying Objectives for the Coming Decade

3.01 The overarching objective of the agricultural strategy for the 1990s is to increase agricultural productivity per unit of land and water, through a more efficient use of these limited resources, reduce unit costs of production, and thereby increase national output and farmers' incomes. Within this context, the underlying objectives of the agricultural strategy for the 1990s follow very much the principles outlined by Dr. Youssef Wally for the 1980s, which emphasized the importance of correcting the prevailing macroeconomic and sectoral inefficiencies in order to maximize the returns from the country's limited resource base. This drive for efficiency should move forward in the context of

equity, take into account issues of poverty alleviation, development of a social safety net and human resource development, and ensure ecological and inter-generational sustainability of the overall agricultural development process. Within these broad objectives, there are several specific objectives:

- Given the underlying natural resource constraints facing Egypt, the conservation of water and land resources remains the most important objective for the country;

- Along with conservation, an important objective is the need for measures which are technically feasible, economically viable and environmentally sustainable, to expand land and water resources availability;

- Ensuring food security for a rapidly growing population is an objective of major concern to the Government;

- The agriculture sector has been the biggest source of rural employment, and is viewed by Government as important for generating increased rural employment;

- Through improvements in trade, the sector is expected to contribute towards improving the country's foreign exchange balance.

The underpinnings for achieving these objectives would be support for accelerating technological developments and their wide adoption, the further liberalization of the economy and strengthening measures for promoting increased private sector involvement; these measures would need to be supported by actions which would streamline the overall institutional framework supporting the agriculture sector, making it more responsive to the sector's needs.

3.02 It is recognized that for the agricultural sector to achieve productivity gains, increase output and incomes, and serve as an engine for increased rural employment and growth, sectoral performance will have to improve over the average 2.5 percent per annum growth rate achieved through most of the 1980s, a rate that was somewhat below the average yearly population growth rate of about 2.6 percent. The targeted growth for agriculture is projected at an average of around 3.0 percent per annum for the 1990s. This would allow for realizing national GDP growth targets of between 4 - 5 percent by the end of the decade. Furthermore, given the high growth in population, a growth of 3.0 percent in agriculture would allow for positive per capita agricultural growth. While this is a realizable target, it will clearly pose a challenge for the sector; however, in the context of realizable annual growth rates in the medium term, there remain significant untapped potentials, which should contribute towards increasing the growth of the sector. In this context it is important to emphasize that while in the immediate future there needs to be continued focus on production related issues, it is also necessary that post-harvest issues related to marketing and processing get the attention they deserve to ensure that post harvest losses are reduced and the potential growth in value added from the sector can be realized.

3.03 The strategy for the agricultural sector must take a broad view, recognizing that to a large measure, agriculture presently dominates the rural sector. Given the close linkage between agriculture and the rural economy, it

is necessary to develop close linkages with similar strategies proposed for other sectors in the context of overall rural development. For success, the rural sector needs to be dynamic, providing diverse sources of income by creating further employment outside of the farming sector; holistic rural development should thus be a priority goal to help create employment in the rural areas, outside of but connected to agriculture. An increase in rural incomes and employment cannot come from primary agricultural activities alone; there will be a need to push for diversification in the rural areas into small scale industries, services and other activities, many based on agriculture. These need to be complemented by intensifying the required social programs, in order to better provide education, health and other social services which are essential for sustaining growth in the rural economy.

3.04 At the same time, the ongoing economy-wide adjustment process will necessarily imply economic dislocations normally associated with periods of transition. Consequently, there is also an immediate objective of seeking out short to medium term productivity increases which will generate the needed supply response. Given the advanced stage of policy reforms already initiated in Egypt, the sector is well placed to respond quickly as long as the process of change is consolidated. This is already evidenced by the increasing wheat and corn production, expansion in horticultural production, and a generally more buoyant market environment for agricultural products. Nevertheless, there is the danger of the supply response exhausting itself on account of institutional bottlenecks and the remaining policy distortions. Consequently, in a period in which the economy is undergoing structural change, it is important that two broad areas are given particular consideration by the Government in order to consolidate and further expedite the supply response.

- Persevering with policy changes with a view to introducing an efficient environment for overall sector development; to achieve the above objectives, there must be a clear and continuing commitment of government to push through the ongoing price, trade, and other policy reforms, and a willingness to address institutional issues and constraints which may be restricting the sector's ability to fully respond to the changed policy environment.

- An effective allocation of public sector expenditure funds, which should emphasize measures which would generate an early supply response; such an approach implies the initial targeting of programs on areas with the maximum potential externalities, i.e. where significant increase in production can be generated reasonably quickly, and which require minimum further investments.

B. Potential Sources for Growth

3.05 While the challenges facing the agriculture sector are significant, Egypt's agriculture possesses many positive characteristics and potentials not yet fully tapped. Most important, the reforms of 1986 have sensitized the farmers to taking market induced decisions and there are signs of increasing competition in the agricultural markets; consequently, given the correct policy environment, farmers should respond to the opportunities which are available for growth. For the sector to increase its average annual growth rate to 3 percent

in the 1990s, there are certain key areas which offer potential, and on which Government action should be focussed.

- While the overall efficiency of water use from the river Nile is quite high, there is potential for better managing this very valuable resource, through appropriate conservation and water management measures, thereby increasing overall water resource availability;

- There is considerable potential for increasing agricultural value added from increasing yields in the old lands through the wider adoption of improved technologies and cultural practices; this needs more focussed research efforts and improved extension and other support services;

- The 1.9 million fed of reclaimed lands (including those presently managed by the public sector) are presently producing at levels far below potential; representing nearly 25 percent of total agricultural lands, they present an important potential growth point for the agricultural sector in the coming decade;

- With liberalization, farmers have shown a propensity to select cropping patterns which from an economic perspective, use the limited land resource of the country better than when these decisions were directed by the Government; further gains can be expected from farmer's response to the completion of price liberalization;

- with a reliable marketing infrastructure and a favorable policy environment, farmers can be further encouraged to successfully grow high value horticultural crops;

- finally, possible agro-industry (particularly food processing) and trade developments provide potential for increasing the value added from the agricultural sector.

Results from preliminary analysis carried out indicate that upto 40 percent of the projected average annual growth rate can be realised from tapping the potential for increasing crop yields in the old lands; the other principal sources of sector growth would be from intensification of agriculture in the new and old-new lands and from shifts in cropping patterns. What the analysis indicates is that the focus of attention during the 1990s will need to be on undertaking measures and investments which will facilitate realization of these these growth rates, i.e. on completing the process of liberalization to encourage the needed farmer response, strengthening the research and extension capabilities in both the old and new lands, emphasizing programs for irrigation improvement, and streamlining the institutions supporting agriculture in Egypt to enhance efficiency in the use of public resources. Unlike many developing countries, Egypt has the basic resources, both in terms of good technological capabilities for economic development as well as the necessary human resources in the rural economy, the needed rural infrastructure and the political commitment necessary for meeting the challenge. The underlying requirement for tapping the above potential sources of growth would be concerted Government action for removing the

remaining obstacles for promoting incentives and opportunity, by creating the necessary enabling environment for accelerated growth to take place.

C. Obstacles to Growth

3.06 Policy. While there have been considerable changes made over the last few years in the policy environment within which the agriculture sector operates, there remain a few lingering issues linked to the reforms which militate against the sector's ability to meet the objectives articulated above. Overall, the strategy of the Government to fully liberalize the agricultural sector, and to remove all controls and Government interference in commodity pricing within the next two to three years needs to be re-emphasized. The key remaining areas on which Government action needs to be taken within this subset of issues include the following:

- Fundamental to the overall strategy is the need to take all measures necessary for ensuring the efficient use of the sector's single most important limiting factor of production - water. This requires both the wider application of improved water saving technologies for irrigation, as well as measures aimed at increasing farmer contribution towards the cost of delivering water for irrigation.

- In the case of cotton, there is need to completely liberalize the production, export and marketing of the crop. Government procurement should be discontinued, public sector cotton export companies should be required to operate in a competitive environment alongside private sector companies and competition in marketing introduced, including the setting up of a "cotton exchange". With regard to the latter, consideration should be given to adopting new technologies, using an electronic tender system. In the interim, i.e., before a satisfactory cotton exchange is functioning, farmgate prices should go beyond the 66 percent of border prices presently being paid to farmers.[1]

- For sugarcane, the Government intends to eliminate all controls within a three year time frame. The issues revolving around the sugarcane subsector are complex, including pricing, efficiency and institutional issues, as well as the issue of how to deal with the significant investment which has been made by Government in industrial infrastructure, and which is totally dependent on locally produced sugarcane. The findings of earlier studies, as well as the one presently underway need to be consolidated, with a view to identifying options including substitutes for sugarcane and the costs of processing these substitutes, on the basis of which an action plan be drawn up. At the same time the subsidy provided by the Government to the sugar industry and farmers needs to be identified and made transparent. It is important to recognize that sugarcane is a very high water consuming crop (around 12,000 m^3/

1/ For a more detailed analysis of the issues related to the cotton sub-sector, see World Bank, "Arab Republic Egypt - Cotton and Textile Sector Study", November, 1991

fed); clearly, from an efficient resource use perspective, the long-term strategy must aim to move away from sugarcane production. If an imputed value of water is taken into consideration, efficiency measures clearly show that the growing of sugarcane is a most inefficient use of domestic resources, and that farmers continue to grow the crop on account of high subsidies (including free provision of water) and the protection provided to the sugar industry.

- In order to complete the ongoing process of agricultural price liberalization, farm input subsidies dealing with fertilizers and pesticides should be removed, which should go hand-in-hand with the process of Government divestiture and liberalization of marketing.

3.07 Technology Issues. The generation of appropriate technology and its effective dissemination among the potential users is essential if the objectives for the 1990s are to be met. There is a pressing need for streamlining the institutions presently involved in agricultural research and extension, as well as the manner in which their work programs are formulated and monitored; presently, the responsibilities are dispersed among many institutions, and not effectively coordinated, leading to duplication of efforts. The more important technology constraints which need to be addressed include the need for: improved water quality monitoring, combined with measures for better managing the natural resources from an environmental perspective; on-site adaptation and dissemination of relevant technologies for the new lands, as well as those specially relevant for small farmers; strengthening work on seed technology, particularly with a view developing high yielding and short duration varieties. Given the importance attached to exports, and the need for appropriate technology in this context, there is also a need for a strong linkage between research and an analysis of future market prospects for potential crops; present research on the export crops is limited. While much research work has been done in Egypt, the absence of a widely accessible and reliable data base is an important constraint.

3.08 Implementation Capacity. To derive the benefits from the Government's investment programs, there is need for strong planning and implementation capacities in both MALR and MPWWR; particular emphasis is necessary on ensuring timely execution and on the monitoring and evaluation of public investment activities. While project preparation capacity does exist in MPWWR and for land reclamation, the economic aspects are not sufficiently emphasized, particularly for the non-donor supported activities; for agriculture, there is virtually no project preparation capability. Implementation experience shows that projects invariably take longer to implement than originally anticipated, resulting in increased costs and reduced net benefits; a strong monitoring function is virtually absent. Special attention needs to be given to setting up a well defined monitoring and evaluation structure which reports regularly on the actual experience of implementation.

3.09 Institutional Issues. To achieve the objectives set for the sector, an efficient agricultural administration and better focussed support services are needed, with improved coordination between the agencies dealing with agriculture; these should emphasize decentralization in decision making and implementation responsibility, which should go hand in hand with the related aspects of authority and accountability. There is now recognition of the importance of these issues. Yet, due to existing restrictive civil service and other legislation, to inertia in the system and to social and political implications,

it is difficult to move forward on a clear definition of roles and on restructuring the agricultural administration to perform these roles. MALR has begun the process by defining what the government foresees as the future role of the Ministry, principally in the areas of research, extension, regulation, and agricultural economics/policy. In addition, various other Ministries are involved in the rural sector. These include, among others, the Ministry of Housing and New Communities in the context of land reclamation; and the Ministry of Supplies in the context of procuring, importing and retailing food commodities. There is clearly a need for closely reviewing their present activities, both on the context of ensuring better coordination, and assessing whether some of their present functions are expected to continue in the future, for example import and retailing of food commodities.

3.10 At the same time, the rural sector has in the past been heavily dependent on the state, including the Government supported cooperative sector, for the procurement of all inputs and services and for marketing of products. Particularly for the latter, significant changes have been introduced, and other than for cotton and sugarcane, the marketing system has been liberalized; there are weaknesses, nevertheless, in the agribusiness subsector, the development of which is presently constrained by inhibiting administrative and legislative requirements. Also, liberalization of the input supply system is only just beginning - presently, an estimated 25 percent of fertilizers are being marketed by the private sector. It is important that this period of transition is carefully managed, to ensure that the timely and efficient provision of services to the farmers is not disrupted.

D. Key Policy Issues

3.11 In addition to the underlying objectives and the prevailing potentials and obstacles to growth outlined above, there are certain key issues on which there must be policy consensus, in order that a long term sector strategy can be clearly articulated. These are briefly discussed below.

Food Security

3.12 The issue of food security is important both from a strategic perspective, as well as in the context of poverty. While there is emerging consensus on the definition of food security as aiming to assure the country adequate access to food, both internally and externally generated, there is still reference to the need to grow certain strategic crops. Furthermore, there is a desire to achieve a measure of stabilization in producer and consumer prices through the development of buffer stocks. In the strategic context, there are various options available to the Government, each of which have costs and benefits related to them.

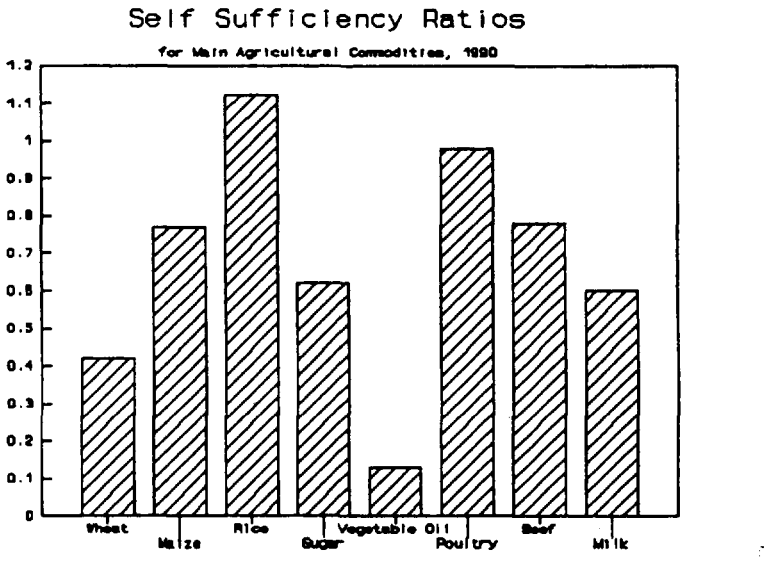

Figure 3.1

- If policies were to emphasize a high level of national risk aversion (self insurance by growing all crops), the cropping patterns would tend towards subsistence crops. While such an approach may generate greater production of crops viewed as strategic by the Government, it is likely to result in poor economic returns to the main limiting factors of production and to the economy as a whole.

- Alternatively, policies which pursue efficiency pricing based on free market operations, would result in crops being grown in which Egypt has a comparative advantage and whose cultivation will therefore not result in a misallocation of resources. For example, through expansion of wheat production it was possible to increase self-sufficiency for wheat from 31 to 40 percent during the 1980s in an efficient manner. On the other hand, the domestic production of rice and sugar cane leads to the misallocation of resources.

3.13 The present concern for food security stems from the risks which the Government perceives, vis-a-vis the agriculture sector's ability to protect both producers and consumers from the income/consumption effects arising from price variations. Price stabilization programs often include an array of objectives, including policies aimed at raising price levels for producers, lowering price levels for consumers, or reducing nominal price variability. Given the varying objectives of such programs, three issues need to be closely examined. Firstly, the negative effects on welfare from policies targeting absolute price levels usually outweigh the gains from reducing price variability. If both absolute price levels and price stability are policy goals, policy instruments need to be

flexible enough to target both levels and variability independently. Also, the sustainability of the policy must be considered; otherwise, uncertainty over government policies substitutes for price uncertainty with no welfare gains. Secondly, regarding the risks related to price variability, the underlying issue is the trade off between the gains from trade using efficiency criteria and the uncertainty arising from possible changes in the terms of trade. It must be recognized that within the context of a diversified agriculture sector such as Egypt has, and the fact that farmers have significant sources of non-farm income, one would expect such risks to be low. Generally, within such diversity and in the absence of absolute poverty, both producers and consumers are good at managing risks themselves without Government intervention, through effective substitution in crops grown or in the basket of commodities consumed. Finally, a related risk from the Government's perspective is the potential variability in the foreign exchange outlays which the country may need to make as a result of changing terms of trade. Various options are available to the Government in this regard.

- The use of buffer stocks operated by governments is often viewed as a means of minimizing risks. However, efforts to manage buffer stocks, such as in Bangladesh with jute, in Australia with wool, among others, as well as in international agreements such as that for cocoa, have shown that they are extremely complex to handle from an institutional perspective and are an expensive and inadequate mechanism for reaching stated objectives. The experiences elsewhere, as well as theoretical work carried out, indicate that one of the main difficulties in managing a buffer stock is the extreme difficulty of projecting the mean price which the buffer stock program should aim for in the context of price stabilization.[2]

- Within the context of free trade, several studies undertaken, including those by the World Bank, suggest that the short term risks which exist can be better managed through use of such mechanisms as futures, options and forward contracts, rather than through use of buffer stocks.[3] Longer term price variability can also be managed with flexible tariffs without the need for government intervention in domestic marketing. In this context, strengthening the Government's analytical capabilities for better risk management could be considered.

In designing a program to stabilize the prices of food commodities there are a number of factors to be examined, which include: (a) the main objective of the program, as the appropriate mechanism critically depends on it; (b) the market-conditions under which the program will operate, as an effective program cannot be designed unless it is clear whether or not it is to operate under free-market conditions; (c) the role of the private sector - under liberalized market

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2/ See, for example, C.L. Gilbert, Department of Economics, Queen Mary and Westfield College, London, Paper No. 231 "Domestic Price Stabilization Policies for Developing Countries," April 1991.

3/ J.R. Coleman and D.F. Larson, World Bank, PRE Working Papers Series, No. 611 "Tariff-based Commodity Price Stabilization Schemes in Venezuela," March 1991, and D.F. Larson and J.R. Coleman, World Bank PRE Working Papers Series No. 653 "The Effects of Option-Hedging on the Costs of Domestic Price Stabilization Schemes", April 1991.

conditions and no government intervention, recent studies[4] suggest that the private sector will hold adequate stocks to stabilize prices in the most efficient manner, when it is allowed to operate them in a profit-maximizing way; (d) degree of stabilization intended - the most appropriate mechanism and concomitant cost depend critically on the degree of price stabilization a program is designed to achieve; if run by the government, then the narrower the price band, the higher the cost; (e) own and cross price elasticities and price variations of food commodities; these should be estimated in order to identify the food commodities or combinations to be stabilized. Clearly, Government managed price stabilization which can be sustained is a complex operation; costs are likely to be high, without an assurance that the desired objectives would be met in the end.

3.14 Finally, food security issues are also a matter of concern in the context of poverty and within that of ensuring basic food availability. This is clearly important for ensuring equity and an effective safety net during the transition period following the reforms, and can be best addressed through a program of targetted subsidies. There is a case for looking at possibilities of better targeting support programs, so that the most needy among the population derive the maximum benefits. In this context, there is need for better focussing on poverty and food security issues while designing potential investment projects, and ensuring that service oriented projects address the interests of the poor, including developing strong links between extension and research for the poor farmers. These should be complemented by appropriately designed food-for-work programs which would target those in the population who are in need of work.

Poverty and Human Resources

3.15 In the context of the overall reform program, issues relating to poverty and their impact on the human resources of the country are of particular significance. The potential impact of growing poverty on social progress and equity poses a major challenge for the Government, in its resolve to sustain the program of reforms and consolidate the process of growth. Recent analysis indicates that poor households still represent between 20 to 25 percent of the Egyptian population, with women and children among the most vulnerable groups.[5] In the rural areas, the poor are either farmers with little or no land and agricultural laborers, while in the cities, poverty is associated with the unemployed and fixed income groups.

3.16 Available data indicate that both nominal and real wages in agriculture increased significantly between 1970 and 1985, primarily through labor outmigration following the oil price increase and the subsequent economic boom, as well as through increased labor absorption by the Government, leading to a decrease in labor supply to agriculture. However, since 1985, a combination of declining oil prices and diminishing Government employment, resulted in nominal agricultural wages remaining largely unchanged. The high inflation since 1985, consequently resulted in an estimated 60 percent drop in real wages between 1985

4/ See for example, B.D. Wright and J.C. Williams, "Storage and Commodity Markets", 1991.

5/ World Bank Country Study, "Egypt - Alleviating Poverty During Structural Adjustment", July 1991.

and 1991, as shown in the figure below[6]. The decline in real wages must have impacted on rural income distribution. While the increasing real wage from 1970-85 allocated an increasing share of income to wage laborers, a redistribution of income from landless laborers to land holders is taking place since 1985 through decreasing real wages and relatively increasing returns to the land holder. Consequently, land owning families have gained at the expense of the landless families during the last six years.

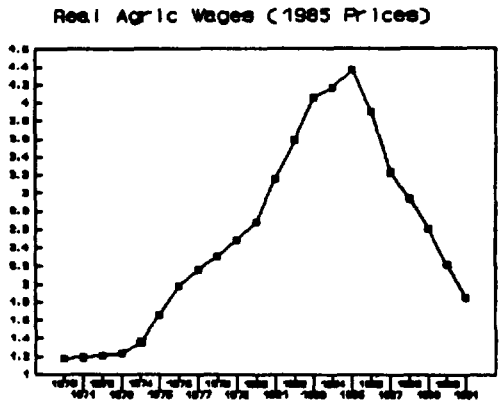

Figure 3.2

3.17 While the past policies of the Government have contributed to marked improvements in standards of living and welfare enjoyed by the bulk of the population, they have been unsuccessful in eliminating poverty. Available evidence[7] suggests that sustainable progress on poverty in other parts of the world has been achieved by pursuing a strategy that has two equally important objectives: (a) broad based economic growth to generate efficient income earning opportunities for the poor, and (b) improved access to education, nutrition, health care and other social services - to ensure human capital formation, improve welfare directly and to enhance the ability of the poor to take advantage of the opportunities which become available. The burden of poverty most often falls disproportionately on women, and in the rural environment, on the landless. Growth in the agriculture sector, combined with programs for targeting particularly women and the landless, would positively contribute towards the overall poverty alleviation strategy of the Government. At the same time, there are many complementarities between poverty reduction and the other aspects of the reform program being pursued by the Government. Private sector development, for example, promotes growth and income-earning opportunities for the poor. Maintaining the environment is critical if gains in poverty reduction are to be sustained and if future increases in poverty are to be avoided. Given that the agriculture sector forms the backbone of the rural economy, steps to enhance equitable and rapid development of this sector would directly contribute to overall poverty alleviation.

Employment

3.18 Employment promotion is necessary to reduce the social costs of economic reforms. However, this needs to be pursued in the broader context of the economy as a whole, through appropriate reforms to the financial and labor markets, emphasis on technology and productivity, support for small and medium sized enterprises, and direct expenditures on transitional employment for specific groups of the work force which are the hardest hit by the reforms. In certain quarters, the agriculture sector is still viewed as an important area for absorbing the increasing labor force. While there is scope to provide

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6/ Based on MALR data, and also see Richards, Alan, "The Behaviour of LDC Farm Labor Markets: The Case of Egypt", January 1992 (Draft).

7/ See World Bank, "World Development Report 1990", World Bank.

employment for graduates and others through efficient land reclamation policies, agriculture should not be viewed as a final repository for the excess labor force. As is witnessed in many countries which are at a similar stage of development as Egypt, the share of agriculture in total employment should be expected to decline. However, while primary agricultural employment declines, employment in downstream activities in processing and increasing value added increase.

- Through appropriate Government policies, and within the context of overall rural development, measures are needed to encourage the diversification of rural activities, so as to provide increasing employment in rural industry, processing activities, construction, services, etc., and away from employment in primary agricultural production; in agriculture itself, more emphasis needs to be given to encouraging the various post production/harvest activities, which are expected to contribute towards increasing value added from the sector and creating further employment.

The process of liberalization, and more efficient and better structured Government services in key areas, should create an environment for resources to flow into inherently profitable areas. These areas may also be outside agriculture, in services and manufacturing.

Taxation of the Agriculture Sector

3.19 The government has been moving away from the implicit taxation of agriculture through the price mechanism, which was not only distortionary but also extremely expensive in terms of maintaining a public sector enforcement system. As Figure 3.3 shows, the implicit taxation of major agricultural crops has been reduced from above LE 5.5 billion in 1985[8] to about LE 1 billion in 1991 with cotton remaining as the principal taxed crop. With price liberalization progressing, the implicit taxation is expected to be lower in 1992. The remaining implicit taxation will disappear shortly with the completion of price liberalization, and most crops will become net recipients of subsidies through the provision of irrigation and drainage services free of charge. The issue is

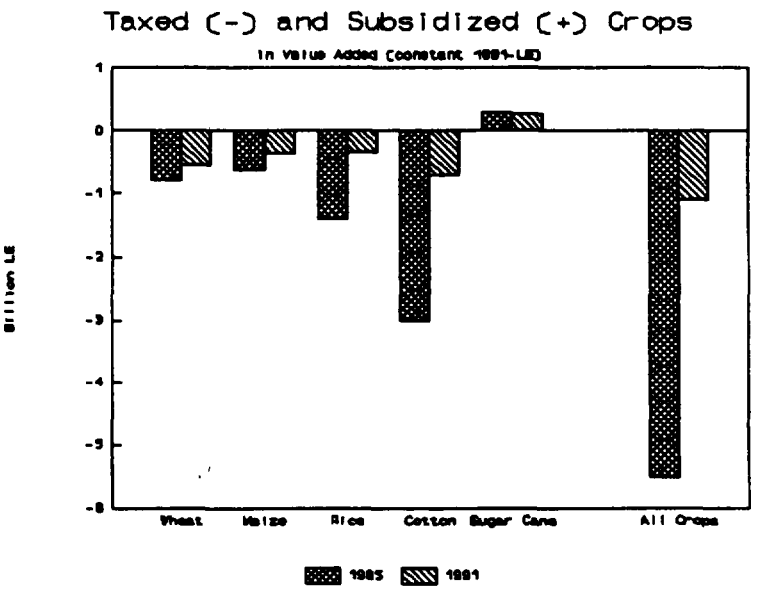


Figure 3.3

8/ Dethier, J.J., 1989, "Trade, Exchange Rate and Agricultural Pricing Policies in Egypt". The calculations of Dethier are based on value-added, and have been inflated to 1991 Prices using the IMF Consumer Price Index for Egypt.

to develop more direct, efficient, equitable and administratively simple means of taxing agriculture that do not result in a net capital outflow from the sector to support others as was the case in the past. This is particularly important in the context of a declining share of the agriculture sector in total public investment. Regarding taxation mechanisms, there is scope for improving the present land tax and exploring other options. Similarly, the approach towards subsidies needs to be clearly articulated. Essentially, subsidies that are distortionary should be removed, and direct subsidies provided on a selective basis. What is essential is that such subsidies should be transparent, with the actual fiscal burden on the treasury identified.

3.20 From a macroeconomic perspective, the reforms already undertaken for the agricultural sector as well as those proposed in this report, will reduce the fiscal burden on account of the progressive removal of input and feed subsidies and the revision of sugarcane prices to bring them in line with economic prices. A revision of the interest rate structure of PBDAC's financial services would reduce credit subsidies. In addition, the reduction in the size of the public sector in managing the sector as well as in undertaking production activities, through privatization, would also have a favorable fiscal effect. On the other hand, the implicit taxation of agricultural crops through distorted pricing will disappear. Finally, the wider implementation of a cost recovery mechanism whereby farmers would increase their contribution towards the irrigation and drainage investment and O&M costs will ease the fiscal burden. With regard to potential balance of payments effects, the reforms supported by the application of improved technologies should yield higher production with consequent beneficial effects on the balance of payments.

IV. WATER AND LAND RESOURCES

4.01 As mentioned earlier, the key elements of the strategy for increasing total value added from agriculture need to be aimed at efficiency enhancement to ensure better water resource use, and increasing the value of crop production per unit of water consumed; this would be complemented by measures needed to ensure the efficient utilization and improvement of the already developed land resources. Given the limitations on the Government's ability to continue to finance fully the improvement of the irrigation and drainage system of the country, and recognizing the critical importance of the investments made by the nation in these assets, the strategy also needs to emphasize mechanisms for reducing Government budgetary outlays towards meeting the operation and maintenance costs of the system, with a corresponding increase in private sector responsibility for bearing these costs.

A. Water Resources

4.02 The construction of the High Aswan Dam in 1968 allowed for storing the Nile's average annual inflow of 84 BCM; after allowing for average annual evaporation and other losses in Lake Nasser, it left an annual net utilizable flow of 74 BCM. The Nile Waters Agreement between Egypt and Sudan in 1959 allocated this resource in proportion of their respective populations, giving Egypt 55.5 BCM; these represent more than 95 percent of the total developed water

resources of the country. There is modest potential for increasing the resources available at Aswan by canalization of the White Nile in the Sudd region, thereby reducing losses occurring in marshes. However, work on the Jonglei Phase I canal has been discontinued on account of security problems in southern Sudan, and it is uncertain when work will be resumed; completion of this work could make an additional 2 BCM available to Egypt.

4.03 The characteristics of the Nile system are determined by the High Dam, which captures the source flow and regulates flow patterns to serve specific demands. The Nile system has a single input from the dam and only two outputs: drainage to the sea and evapotranspiration. The only true losses from the system, of any significance, are discharges to the sea or terminal lakes through the drainage system, or through the Edfina barrage at the tail of the Rosetta Branch of the Nile. The total net effective rainfall is insignificant to be taken into account; and in the context of the Nile basin, groundwater is not an additional resource since it is recharged from the Nile water. Outside the Nile basin, the few oases in the western desert and some other areas are capable of economically providing only limited supplies of usable water (mostly non-renewable groundwater); though not significant in total volume terms, they are important from a local standpoint.

4.04 Given the significance of water from the point of view of planning for overall national development, several attempts have been made in recent years to prepare water balances of the Nile basin below Aswan. Based on the most recent available data, Table 4.1 shows the Nile water balance for the period 1980 to 1990/91.

Table 4.1: Historical Nile Water Balance
(in Bm^3/annum)

	1980/86 (Average)	1987/88	1988/89	1989/90	1990/91
I. INFLOW					
1. Release at Aswan	57.67	52.98	53.34	54.00	53.80
II. OUTFLOW AND USE					
1. At Edfina and Nubariya	5.18	2.68	2.77	1.84	1.48
2. Drainage to the sea	14.00	12.39	11.97	12.88	12.82
3. Municipal & industrial use	2.31	2.77	2.94	3.11	3.29
4. Evaporation from system	2.00	2.00	2.00	2.00	2.00
5. Crop - consumptive use a/	34.18	33.14	33.65	34.16	34.21
TOTAL	57.67	52.98	53.34	53.79	53.80

Source: MPWWR.
a/ Includes outflows at "other canal tails" (roughly estimated as being around 1.3 Bm^3.

Water balances have been prepared for the future; however, these should be considered tentative, as several key inputs such as present outflows at canal tails, minimum drainage outflows required to maintain the salt balance and projections for municipal and industrial water demand are still under study. The UNDP financed Water Security Project is designed to develop realistic projections

of water availability and demands for the next 20 years, and program developments in a manner which will optimize resource allocations. The review of the land reclamation sub-sector carried out by the World Bank in 1989/90[9] concluded tentatively that sufficient water may be available to reclaim between 800,000 to 1.0 million feddan of land, which included lands for which water was already committed, provided that outflows to the sea could be significantly reduced through improved system operations (probably requiring additional investments) and additional drainage reuse.

4.05 Projections for three possible climate cycles of typical, drought and extreme drought conditions, indicate that during periods of normal flow (the "typical" scenario), there would be shortages in the range of 2 to 6 percent of total water requirements if the proposed land reclamation program were to be implemented at the presently proposed scale of about 1.4 million feddan; the shortages would be far more severe under drought (14 to 18 percent) and extreme drought (22 to 27 percent) conditions. In periods of adequate water availability, the system works well; however, in periods of water shortages, the problem would be concentrated at the tail ends of canals. A program of land reclamation which is not consistent with future water scenarios, would ultimately be at the expense of production in the old lands. While there are uncertainties in estimating water availability scenarios for the future, it is clear that there are limitations on the ability of the Government to base its strategy for increasing agriculture production principally on horizontal expansion; presently, a disproportionate share of investment resources are allocated for new land reclamation (about 55 percent of planned third plan outlays for the agriculture sector). It also highlights the need for a concerted strategy for conserving this valuable national resource.

4.06 Additional water resources could become available from the completion of the Jonglei canal, more effective on-farm irrigation practices, changes in cropping patterns toward less water consuming crops and the introduction of improved irrigation systems in the old lands. Corresponding reductions in water availability could result from continuing industrial pollution and possibly increased cropping in the old lands. The more widespread use of modern irrigation technologies in the Delta is often viewed as an important potential water saver. Given the fairly extensive reuse of drainage water, the average basin efficiency is already quite high; the introduction of localized irrigation on-farm would most likely save about 15 percent. At the same time, given soil conditions and cropping pattern constraints, there are limitations on how much area can be converted. In order to justify the allocation of larger investments for this purpose, and to confirm the financial and economic viability of such investments, it is necessary to undertake a study to prepare a long term development program, to complement the work already ongoing.

4.07 Based on recorded data on total releases from the High Dam and the volume of water discharged into the sea, the overall efficiency of water use from the Nile river is quite high; however, problems exist within the system, to varying degrees, depending on location, which lead to location specific inefficiencies in water use.

9/ World Bank, "Arab Republic of Egypt: Land Reclamation Sub-Sector Review", February 1990.

- Consequently, it is necessary to undertake a review of the overall system efficiency, as well as of irrigation water use efficiency on the basis of the major canal commands, expanding on the work already initiated by the Ministry of Public Works and Water Resources. This would enable the identification of actions necessary for addressing existing problems.

Important canals which lend themselves for initiating work on a command basis include the Nubariya canal (commanding an area of about 500,000 fed at present), Ismailia canal (300,000 fed) and the Riyah Tawfiki (over 600,000 fed). Such studies should lead to a program of investments aimed at improving irrigation water management, both at the farm level (which, among others, would include the conversion of flood irrigated areas to piped/improved irrigation systems, wherever it is feasible) as well as for the water delivery systems (both branch/secondary canals and pumping stations).

4.08 Significant benefits are to be had from the old and old-new lands, where a variety of improvements in land and water use are possible. While drainage, rehabilitation of pumping stations, renovation of water control structures and improvements in irrigation techniques offer the highest returns, safeguarding the capabilities of the existing infrastructure (through timely maintenance activities) or its renewal and improving system efficiency must be given high priority. The increased capital intensity of the system requires higher real levels of maintenance funding as well as appropriate techniques and scheduling in order to avoid system deterioration. Inadequate maintenance not only lowers the system's water use efficiency, but also eventually ends up requiring much higher rehabilitation expenditures. There is, thus, a need to ensure that maintenance funding is given high priority and that maintenance is carried out in accordance with acceptable technical standards.

On-Farm Water Management

4.09 Promotion of a farmer level institutional framework (either through establishing water user associations, or through farmer organized cooperatives) for improving the system for better sharing of water (with a view to reducing the tail-end problems and water wastage) and for improving on-farm water management is particularly important. This would include aspects relating to both ensuring better operation and maintenance of the tertiary level irrigation systems by the farmers, as well as the introduction of new technologies for improved water use at the farm level. Initiatives to achieve these objectives require both institutional development and investments at the tertiary level. This recommendation takes on greater urgency in the context of complementing the measures already approved by the Government which enable farmers to independently decide their respective cropping patterns, taking into account the need to harmonize farmer decisions with the inherent rigidities in the physical capabilities of the irrigation system to deliver varying amounts of irrigation water.

- The introduction of an institutional system for providing to farmers an efficient irrigation advisory service is of high priority; in this regard, thought should also be given to encourage private sector initiatives in this area.

Presently, the MPWWR is implementing an irrigation improvement project with external assistance which is reviewing alternative means of addressing water management issues. MALR has also been working to address weaknesses in on farm water management, and in this context is also taking steps to build up its capacity in irrigation agronomy. However, much more needs to be done; the work involved and the amount of coverage necessary is extremely large, and the issues need to be addressed urgently.

4.10 In the context of a long term strategy, responsibility for addressing issues of on-farm management lies with MALR, since it fits in naturally within the context of its extension and transfer of technology functions. However, it is important that MALR's technical capabilities in irrigation agronomy and related skills are strengthened, and steps taken to develop a viable institutional framework which is strongly integrated within its field extension activities. Complementary initiatives which emphasize irrigation agronomy in agricultural college's curricula, and to develop and strengthen local farmer groupings, which would provide the vehicle for ensuring that cropping decisions by farmers and measures for more efficient on-farm water use are in line with the capabilities of the system, are essential to ensure a self sustaining framework.

Irrigation and Drainage Service Fee

4.11 Given the pre-eminence of water as a limiting factor in the agriculture sector, it is necessary that the above steps be complemented by measures which ensure that farmer decisions on water use are primarily governed by economic considerations regarding both its real value and the cost of delivering this valuable resource to enable agricultural production. While there is a consensus emerging on the economic need to levy some sort of charge on the use of water in agriculture, its political, cultural and social acceptability remains critical. The concept of irrigation cost recovery in the new lands is fully accepted by the Government where all tertiary level O&M costs would be recovered from the farmers; in addition, farmers also make a contribution towards the capital costs of on-farm works, with the real level of contribution varying between smallholders, graduates and private investors. Farmers are also contributing towards meeting the capital costs of installing tile drainage; however, since the costs are recovered over 20 years with no interest, in real terms the recovery of costs is nominal. The difficulty is with irrigation systems in the old lands, where the introduction of a cost recovery mechanism is regarded as both socially and politically difficult. In these areas the Government would like to give pre-eminence to introducing water saving techniques, improving approaches to on-farm water management, and substituting high water use crops and varieties with those that are water saving. While taking the above into account, it is nevertheless important that the following two issues are taken into consideration while further deliberating on this issue.

4.12 Firstly, the irrigation and drainage infrastructure financed by the Government is a national asset of significant importance that needs to be properly maintained. The system provides an important service to the farmer, for which a service fee is in order. Based on the preliminary findings of the ongoing cost recovery study, the budgetary allocations for the irrigation and drainage system O&M costs are clearly inadequate to ensure optimum maintenance standards, as evidenced by the significant deferred maintenance costs which need to be incurred periodically; the latter are in many instances being processed as investment projects. The increasing capital intensity of the system requires

higher real levels of maintenance funding as well as appropriate techniques and scheduling in order to avoid system deterioration. Inadequate maintenance not only lowers the system efficiency, but also eventually leads to excessive rehabilitation expenditures. At the same time, while maintenance funding needs to be given high priority, the Government is seriously constrained in its ability to significantly increase its budgetary allocations for this purpose. Until recently, it could be argued that the high level of indirect taxation levied on the agriculture sector contributed towards recovering these costs; this, however, is no longer true. For the future sustainability of the irrigation and drainage system of the country, and given the limitations on the Government's ability to meet fully the O&M costs, it is critical that the farmers contribute more towards meeting these costs, particularly since the implicit taxation of agriculture through low procurement prices has been largely removed, with the principal exception of cotton. In the context of a long term strategy, it is clearly not sustainable to plan on meeting these costs through continued external support; instead, there is need to develop viable approaches which would enable a judicious sharing of these costs with farmers. The Government has adopted this principle for the new lands, where the farmers are already contributing towards meeting these costs; the applicability of this principle now needs to be broadened. A comprehensive study on the issue of cost recovery for the irrigation and drainage system is presently ongoing, which should provide the basis for introducing water charges. While the recovery of O&M costs is vital, consideration should also be given to the issue of recovering a contribution towards investment costs.

4.13 Secondly, in the new liberalized environment, where farmers can independently take decisions on cropping patterns, the absence of a proper valuation of water creates a distortion in the decision making process, leading to decisions which in the long term would reduce national welfare. Based on preliminary estimates, about 35 percent of the total water is used by sugarcane and rice which together account for roughly 12 percent of the total cropped area and 13 percent of agricultural value added. While there are technical limitations on the extent to which the existing pattern of water use can be significantly changed in the short term, it is necessary that in the new environment farmers recognize the value and cost of water, and take these into consideration while making cropping decisions. Therefore, while the initial focus of policy changes needs to be on devising an acceptable cost recovery mechanism, it is also desirable to consider the efficiency aspects of on-farm water use, so that the real value of water is taken into account in making cropping decisions. As Table 4.2 shows, there are significant differences in the net returns per m^3 of water (excluding the cost of water) from rice and sugarcane as compared with returns per m^3 for the other crops. As analyzed in the next Chapter, the allocation of the key water and land resources of the country when the real value of water is not taken into account in making cropping pattern choices, results in the suboptimal allocation of these resources; it results in the full potential economic contribution from the use of these resources not being realised. Various scenarios of changes in cropping patterns can be reviewed, keeping in mind the technical limitations of the system, leading to significant water savings <u>combined</u> with a net increase in agricultural value added.

4.14 It is no doubt a major challenge for the Government to devise a phased program which is both politically and socially acceptable, and at the same time meets the above objectives. Several constraints have inhibited the government

in the past from implementing an irrigation service charge. These constraints need to be considered in subsequent attempts to design and introduce such charges. The dominant constraint on any service charge scheme is socio-political resistance, due to a variety of cultural factors. Free water is generally considered to be an inherited right of farmers. Therefore, political resistance runs high against any attempt of the government to charge for water itself. Major political resistance is rooted in concerns about changes in wealth distribution resulting from the levying of such a charge. However, it is also important to recognize that the scale of charges needed to recover O&M costs would not have a significant impact on net farm incomes. For example, analysis done shows that a fee covering present O&M costs only (estimated at about LE 0.007/m^3 water, based on preliminary data) would imply an annual payment of LE 172 and 89 for representative farms of 3.5 fed and 2.2 fed in the Delta and Upper Egypt respectively. This is equivalent to 1-2 percent of gross farm revenue, 3 percent of net farm revenue (including return to family labor) and 3-4 percent of total costs. A fee covering present O&M and capital costs, as defined in the cost recovery study, imposed as a flat charge of LE 76 per feddan annually or LE 0.013/m^3, would imply a payment equivalent to 3 percent of gross revenues, 5-6 percent of net revenues or 6-7 percent of total costs. While such cost increases are not insignificant, they appear to lie within a bearable range from the perspective of farmers' ability to pay, especially considering that real net farm incomes have risen by about 40% since 1984.

Table 4.2: Return to Water for Main Crops

Crop	Water m^3 per feddan	Value Added LE/feddan	Value Added per m^3 Water
Sugar Cane	12,000	1,552.0	0.1
Rice	8,800	1,362.9	0.2
Short Berseem	1,060	330.9	0.3
Sugar Beet	2,700	953.5	0.4
Maize	2,700	1,033.5	0.4
Potatoes	2,700	1,177.2	0.4
Long Berseem	1,640	849.2	0.5
Oranges	3,310	1,459.3	0.5
Beans	1,350	903.0	0.7
Cotton	3,180	2,073.0	0.7
Wheat	1,590	1,289.0	0.8
Tomatoes	3,260	2,682.0	0.8

4.15 The issue is how to initiate the service fee scheme in a manner which would be acceptable from a socio-political perspective.

- A two pronged approach needs to be pursued. Firstly, water saving irrigation technologies which are technically and economically feasible need to be encouraged. Secondly, cost recovery of the O&M costs of the irrigation network, leading eventually to price incentives for more efficient use of water, also have to be introduced.

A comprehensive study on the issue of cost recovery for the irrigation and drainage system is presently ongoing, which should provide the basis for Government decisions on introducing a system for recovering costs, within the context of a medium to long term program. Specific options, which would need to be reviewed on the basis of the study's findings and conclusions, could include the introduction of a phased program based on firstly, the recovery of pumping costs of pumped irrigation schemes in the old lands; followed by an average water charge levied on all crops (or flat fee per feddan), based on the average consumption of water per feddan, with a surcharge on the rice and sugarcane areas

(fee per cropped feddan), in view of their relatively higher level of water consumption per feddan. The underlying consideration while instituting a cost recovery mechanism would have to be simplicity in establishing charges per farm, collection and enforcement, with the overriding consideration being one of equity (and transparency). Consideration could be given to depositing the funds recovered from farmers in a special fund to be utilized for the express purpose of financing O&M costs of the system as well as the cost of rehabilitation and upgrading of the system.

B. Land Resources

4.16 Egypt has a total area of about one million square kilometers, or 238 million feddans, of which only a small portion is agriculturally productive. Based on preliminary data from the 1990 agricultural census on which compilation work is still ongoing, agricultural holdings are estimated to total 7.5 million feddan, or only 3 percent of the total. However, the process for estimating actual cultivated areas is imprecise; while the plantings of some crops are judiciously surveyed (e.g. cotton), the actual irrigated area is an uncertain parameter. Two factors make the estimation process imprecise. First, land reclamation statistics refer to gross areas and net irrigable areas need to be estimated; furthermore, no estimates are made of unproductive, not fully reclaimed areas and/or land taken away from agricultural use. Secondly, there is no statistical series on land losses due to urbanization; various reports suggest land losses averaging 15,000 -30,000 feddans annually. Consequently, the estimates of the country's agriculturally productive areas are not precise. Data from the Ministry of Public Works and Water Resources estimates total cultivated areas at 5.4 m feddan of old lands and 1.9 m feddan of new lands, i.e. totalling 7.3 m feddan, based on water volumes released annually for agriculture; an additional 0.2 m feddan are reported to lie outside of the Nile basin. These estimates too have limitations, as water releases for the new lands are not based on clear estimates of water demand from these lands. While there is need for more precise data, it is nevertheless clear that, after water, the availability of land is the next most important constraint for agricultural growth in Egypt.

4.17 The old lands have good soils, with generally sustainable crop rotations which have evolved as a result of several generations of cropping. Nevertheless, there remains considerable potential for increasing agricultural productivity from the old lands. From the perspective of future sustainability of programs for further intensifying agricultural activities in the old lands, measures relating to better land and soil management in order to maintain and even enrich the fertility of the soils need to be emphasized in the old lands. Particularly important aspects which need to be assessed and investigated in this regard are issues relating to land degradation (especially from waterlogging and soil salinity), redesertification especially of the new lands and the overall aspects of soil amelioration. Various agencies of Government are presently working on these issues, including the Soil and Water Research Institute and the Executive Authority for Land Improvement Projects in MALR, and the Egyptian Public Authority for Drainage Projects and the Drainage Research Institute in MPWWR. The prevention of natural or man made deterioration of this valuable resource should be a national priority, which requires effective coordination between MALR and MPWWR. Implementation of the ongoing programs for national

drainage as well as for gypsum application with subsoiling to saline soils need to be complemented by other measures.

- To ensure a consistent overall program, without duplication between agencies, there is need for an inter-ministerial panel/council, which should be responsible for outlining a rolling five year program of work for the respective institutions involved, and for assessing the work done and approving recommendations. Equally important is the linkage with extension, so that the relevant soils amelioration and land improvement measures can be demonstrated to the farmers through the extension system.

- To protect agricultural lands from the potential threat of desertification, a program for establishing shelterbelts and windbreaks is a priority.

- To study the effect of the relatively low quality mixed drainage water on crop and soils environment, and to identify improvement measures, a research program should be undertaken jointly by the concerned institutions of MALR and MPWWR.

4.18 In the context of horizontal expansion, the new lands are viewed as an opportunity for increasing farm production, as well as for providing an opportunity for increasing the cultivable area for absorbing the increasing population of the country. In view of the intense pressure on Egypt's cultivable land resources, new lands development is justified as long as it is technically and economically viable, with the total program for such new land reclamation being consistent with estimates of total water availability. However, in the context of the reform program on which the Government has embarked, and the need for an early response through increased agricultural production, the first priority must be given to maximizing returns from the already reclaimed lands. The distribution of land reclamation activities over a large number of project sites inhibits timely completion and optimization of returns. Thus far, returns from the new lands have been low relative to investment.

4.19 The area already reclaimed represents an important resource of the country, on which major investments have already been completed, but which is presently not producing to its full potential; a better use of this resource represents a major growth point for agriculture during the coming decade. Consequently, a program for agricultural intensification, supported by a focussed and well designed agricultural support service structure, would be an important element of the Government's strategy for the 1990s.

4.20 There are various reasons for the relatively poor overall performance; nevertheless, there is clear potential for increasing productivity significantly. For successful land reclamation, it is essential that an effective institutional approach be adopted for implementing land reclamation programs, which must meet the different requirements of two distinct but closely interrelated phases:

- coordination during the phase of infrastructure construction, which should include initiatives aimed at settler selection to ensure that settlement follows soon after land reclamation to generate timely realization of expected benefits;

- the second phase of settlement and agricultural production should be effectively dovetailed into the above phase; this second phase requires both intensive and focussed arrangements for providing support services, to meet the special requirements of the newly settled farmers.

The institutional arrangements adopted for the new lands must recognize the above distinction. Presently, the MPWWR is responsible for constructing the main irrigation and drainage infrastructure (with other agencies involved in completing other infrastructure, such as electricity), while the General Authority for Reclamation Projects and Agricultural Development (GARPAD) in MALR is responsible for completing tertiary level and on-farm works. Due to poor institutional coordination, the dovetailing of the various activities to ensure timely generation of benefits is not effectively done. Furthermore, GARPAD is heavily involved in planning for and completing the on-farm investments for horizontal expansion, an activity which takes precedence in its allocation of staff and other resources over its other responsibility of providing post settlement support services. Consequently, the latter functions do not always get the importance they deserve. Clearly, there is a need to discontinue the historic separation of institutional responsibilities for providing support services in the old lands and the new lands, and develop a uniform extension and support services structure for the country as a whole based at the Governorate level. With regard to the disposal of reclaimed lands, the Government's present policy is to allocate 50 percent of the annually reclaimed areas for smallholders and graduates, with the remaining 50 percent earmarked for auction to private investors.

- Consequently, a further prerequisite for success in land reclamation is the need for careful selection of new settlers, taking into account social and other considerations, with a view to establishing new communities in a manner which maximizes the social harmony within the villages established.

A related issue in this context are the implications of the Government's policy to allocate lands to graduates, without fully taking into account their suitability to take up a livelihood in agriculture. With graduates having no agriculture background or expertise being pressed into agricultural activities, production levels achieved are low and land resource utilization sub-optimal. While there is no reason why graduates should not receive reclaimed lands, it is clearly necessary that selection criteria emphasize the selection of graduates who have an agriculture background.

4.21 Resettlement of any nature brings with it unique requirements; to ensure success, there is need particularly during the early years of the development process for the newly settled farmers to be efficiently supported. Consequently, a focussed program for intensifying agricultural production in the new lands must include the following elements, which should be packaged within the context of a focused institutional framework, which has clearly defined lines of authority and responsibility.

- an agricultural research program, which both undertakes adaptive research work within the areas reclaimed in order to adapt relevant technologies to local conditions, and is closely linked to and provides support to the extension system;

- given the weaknesses in the traditional extension function, there is need for a clear approach which focusses on the specific needs of the new lands, recognizing the modern production systems in these areas and the need for improved management practices; training for settlers should be an important element of the program;

- agricultural credit and input supply arrangements for the new lands are poorly developed and generally do not take into account the special requirements of farmers in these areas as opposed to those in the old lands. With no title to property, little resources to plough in as seed capital, and almost complete dependence on the banks for their credit requirements, the newest settlers are the most handicapped. Consequently, there is a strong case for devising specially focussed agricultural credit and input supply schemes which serve the specific needs of farmers in these ares;

- adequate supporting infrastructure, particularly electricity supply and a good farm to market roads network, and efficient social services such as schools and health services, are critical to ensure permanency of settlement and sustainable growth in agriculture.

Land Tenure Arrangements

4.22 In order to maximize returns from land, land tenure issues assume importance. The key issues related to the prescribed tenancy arrangements, whereby, until recent changes to the law: the rent was fixed at seven times the land tax; and the heirs of the tenant had the de facto automatic right to inherit the tenancy contract, with the contract virtually having validity in perpetuity. The past policy has now been changed, with revisions to the old law having been approved by Parliament under Law 96 of 1992. With the new law there is a transition period of five years upto 1996/97, during which time land rent will be fixed at 22 times the land tax and owners will be able to buy back the contract from the tenant under terms defined under the revised law; at the end of the transition period, land rents will be free to be determined by the market, and owners will be able to terminate prevailing tenancy contracts. The changes are clearly a step in the right direction; however, the value of the land tax continues to remain extremely low, at an average of around LE 20 per feddan (and which is revised only once every ten years). Historically, the linkage between land tax and land rents, when combined with legislation (Law 116) which makes the leaving of land fallow for more than one year illegal, militated against the efficient use of the scarce water and land resources of the country. Since there were disincentives to rent out land, given the low rental values, land-owners preferred to crop it in a manner which generates sub-optimal returns from the land; however, by doing so, they complied with the law requiring them to crop the land (Law 116) and were able to protect their ownership rights over the land.

4.23 With regard to the land tax, certain key steps need to be taken.

- A reassessment of the present level of land tax should be undertaken, and future valuations and assessments of the land tax need to be undertaken more frequently;

- With the marked reduction in the implicit taxation of agriculture through the price mechanism, consideration should be given to

bringing farmers owning less than 3 feddan within the purview of the land tax system;

- Other measures necessary include steps for improving land tax collections, as well as upgrade land registry records in the rural areas.

C. Environmental Sustainability

4.24 As has been repeatedly emphasized through this document, the most critical natural resource constraint is water. Demand for water from various sectors will continue to increase in the next decade and beyond. With limited quantities of water, this implies that the agriculture sector will have to adjust to lower percentage of available water than previously. Even with increased use of available ground water and the reuse of drainage water, it is most likely that in percentage terms the agriculture sector will have less water available to it than at present. The implications of this for sustainable agriculture development are that measures should be introduced to induce a more economic use of water. These measures would span the whole spectrum of various alternatives already discussed above; implementation of these measures should begin and be accelerated.

4.25 A related aspect is that of water quality; in this context, the impact of pollution on water availability cannot be over emphasized. This is of importance particularly in the context of ongoing and future reuse of drainage water. Agricultural activities affect water quality through fertilizer, pesticide and other agricultural residues. Other major sources of pollution are the industrial and urban sectors. Consequently, it is clear, that the extent to which polluted drainage water can be reused through the present mechanism of mixing with canal water will have to be carefully monitored to avoid health hazards or risks. Options for cleaning up of this water including inducing industries to remove heavy metals should be examined, as should the introduction of such practices in agriculture as integrated pest management to reduce pesticide use and green manuring to reduce fertilizer use. Dedication of the drainage water for purely agricultural purposes should also be considered for the future. Efforts should be stepped up to improve the monitoring of water quality; for this purpose, the presently dispersed institutional responsibilities should be rationalized and coordinated, and clear institutional responsibility assigned for water quality management. In addition, a national water quality program should be established, with a unified management structure for enforcement of effluent standards. In the context of water related and land reclamation projects, there is need to adopt a mandatory policy of requiring environmental assessments to be carried out, in order to ensure the overall environmental sustainability of such investments. Given the limited expertise available within the country in this field, there is need for a training program to strengthen the technical capabilities within both MALR and MPWWR to undertake this task.

4.26 Given the limitations on land resources, maintaining soil fertility and undertaking soil conservation measures are important issues. Many areas in both the Delta and the reclaimed lands are ill drained and suffer from high salinity levels and waterlogging. This has resulted in substantial drops in yields in certain areas. To tackle some of these problems, a National Drainage Program is

being implemented with World Bank assistance. There is a need for better coordination with the Soil Amelioration Authority in MALR in order to ensure a sustained effort in the area of soil management; soil testing sites should be established, particularly in the higher risk areas, to evaluate changes in fertility and/or contamination levels, especially in the old lands. In addition, consideration needs to be given to establishing shelterbelts and undertaking sand dune stabilization works as part of the overall soil conservation program, in the context of sand encroachments and the potential threat of desertification to agricultural lands. Given the concerns on whether this provides the best use for the scarce water resources, consideration should be given to establishing pilot scale activities to demonstrate viability, as well as to the use of urban waste water. A related issue that engages the attention of many Egyptians is the loss of agricultural land to urban development. A law presently exists that makes this transfer an offence. Given that land is a natural resource, and that conversion to urban/industrial uses carries with it a form of irreversibility when viewed in an inter-generational context, an argument can be made for retaining present controls.

- However, there are potential costs attached in pursuing this approach, arising from the restrictions on investment decisions which could potentially generate higher returns than those available from existing land use, which should be recognized. Furthermore, it is clear that difficulties exist in its enforcement; also, as with any form of control without clearly defined criteria, rents ensue, leading to inequities.

With the liberalization program, and the proposed revision of the land tenure law, the value of land in agricultural uses should increase and should improve this trend. At the same time, this should be complemented by better land use planning and zoning of agricultural and urban lands, with improved monitoring and sanctions for violation of agreed land use plans. This is particularly relevant in the context of the increasing importance which needs to be given to expanding rural industries and other employment creating opportunities in the rural areas.

4.27 The success of Egypt's agricultural sector strategy and the husbandry of resources for future generations depends critically on how the natural resources and environmental issues are managed. These issues are closely linked to the issue of population, and how it affects environmental degradation. There is no doubt that population growth in the rural areas will pose major challenges for overall environmental management particularly in the area of water use and water quality. This is a long term issue which necessitates the development of programs on environmental issues and family planning targeted at rural women in particular and rural families in general. Such programs will require the cooperation of the various agencies charged with social welfare issues; it could also be integrated into the work of the agricultural extension system.

4.28 Finally, many institutions are presently engaged in addressing environmental issues, including MPWWR and MALR. There is considerable scope for improved coordination between these, and the Egyptian Environmental Affairs Agency, which is the Government's central environmental agency. The agency has coordinated the drafting of an Environmental Action Plan for Egypt, which is supported by several donors. This plan provides a framework for dealing with many of the problems mentioned above, including appropriate legislation and

measures for their enforcement, institutional responsibilities and economic aspects of environmental degradation.

V. PRODUCTION AND MARKET PROSPECTS

A. Crop and Livestock Development

5.01 Within the context of the available natural resource base of Egypt, increased agricultural growth can be derived from increasing cropped areas, increasing the yield for individual crops, improving the efficiency of cropping patterns and increasing productivity in livestock activities. In order to achieve the targeted increase in sectoral growth, the crop and livestock production aspects of the strategy are clearly very important. The steps taken in liberalizing prices in the agricultural sector are important for increasing productivity and ensuring optimal choice of cropping and production patterns. The Government needs to consolidate this process of change, and should further support these developments by creating the required enabling environment for promoting growth.

Crop Production Aspects

5.02 The total cropped area has increased by about 8 percent during the five year period 1985-90, at the end of which it totalled about 12.1 million feddans. Most of the increase came in the winter cropped area (primarily wheat and winter vegetables), and orchards. Moderate area increases also occurred for maize and rice. At the same time, there was a significant decline in the cotton and berseem areas. In terms of total output, there were significant increases in the production of cereal, beans and sugarcane, while there was an estimated 29 percent decline in cotton production reflecting the continuing price control exercised by the Government for this crop. Overall, horticulture production increased significantly during the 1980s, as farmers moved to these uncontrolled crops prior to the wider program of liberalization initiated at the end of 1986.

5.03 Crop productivity levels in Egypt are relatively high when compared to yields by world standards and in countries with similar agroclimatic conditions. However, based on available evidence, including yields obtained on the fields of progressive farmers, the average yields could be increased by between 20-25 percent for the self pollinated crops such as wheat and rice, and by more than 35 percent for cross pollinated crops by using hybrid seed, for example for maize. There is also potential for further increasing vegetable production from an expansion in the greenhouse and plastic cover technology. However, in order to sustain high yield levels, it is crucial that aspects of disease and insect resistance are continuously emphasized; in addition, there is considerable room for improvement in the various aspects of crop agronomy. An important ingredient for realizing these higher yields is the need to re-focus and restructure the institutional support services which are so essential to ensure that the growth potential of the sector is realized. These institutional issues are discussed in the next chapter.

5.04 In order to appreciate the demand on the resource base and the economic contribution of the main crops, Table 5.1 shows the different crops' shares of

Table 5.1: Major Field Crops and their Economic Contribution

	Cropped '000 fd	Area times Time	% of Total Area	Water m3/fed	Water mio m3 for crop	% of Total Wat	Value Added per fd	Tot VA mio LE	% of Total Val Add
Perennial Crops									
Sugar Cane	274	274	4%	12000	3288	9%	1552	425	3%
Orchards	660	660	10%	3310	2185	6%	1459	963	7%
All Season Crops									
Vegetables	568	284	4%	3260	1852	5%	1791	1017	7%
Tomatoes	371	186	3%	3260	1209	3%	2682	995	7%
Main Winter Crops									
Wheat	1955	1140	17%	1590	3108	9%	1289	2520	17%
L-Berseem	1743	872	13%	1640	2859	8%	849	1480	10%
Sh-Berseem	877	256	4%	1060	930	3%	331	290	2%
Beans	345	144	2%	1350	466	1%	903	312	2%
Main Summer Crops									
Maize 1)	1975	988	15%	2700	5333	15%	1034	2041	14%
Rice	1036	518	8%	8800	9117	26%	1363	1412	10%
Cotton	993	703	11%	3180	3158	9%	2073	2058	14%
Potatoes 1)	189	95	1%	3260	616	2%	1177	222	2%
Other Crops	1112	556	8%	1300	1446	4%	800	890	6%
	12098	6674	100%		35565 2)	100%		14626	100%

1) Including area cropped in Nili season

2) Including evaporation losses; the difference to the figure in the water balance is due to regional averaging of crop water uses.

Sources: CAPMAS (Cropping Pattern), MPWWR (Crop Water Use), mission calculations (Value Added)

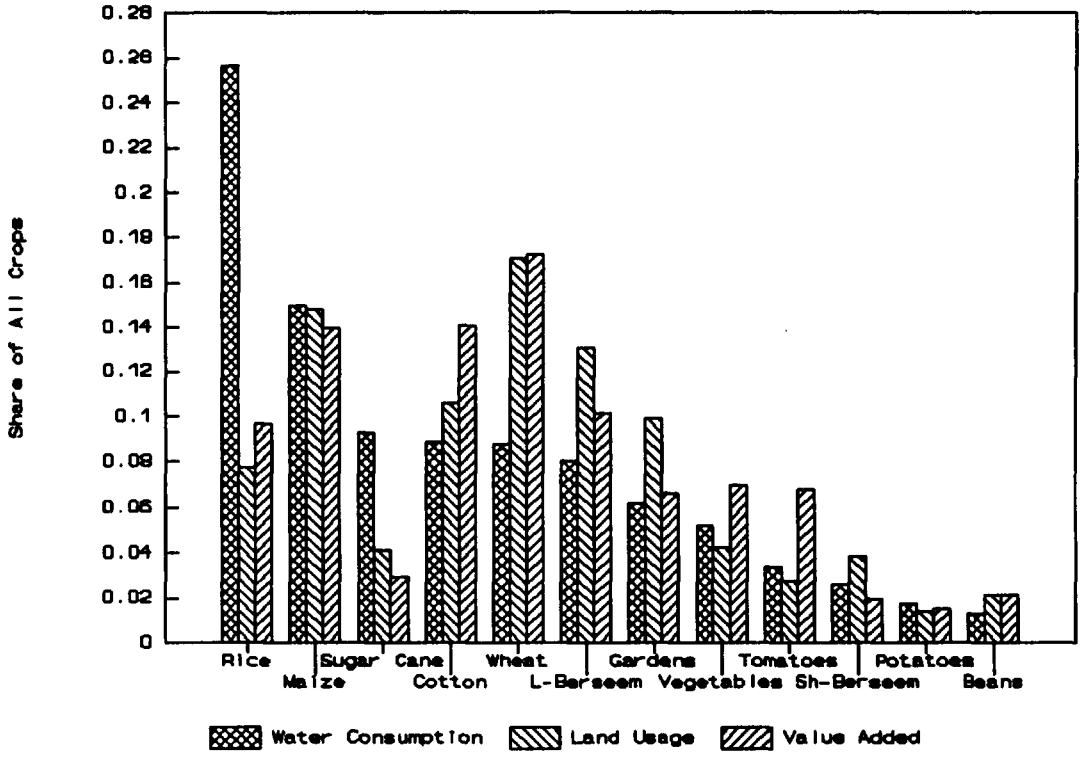
total area, total water consumption and total value added. The share of land for a crop is arrived at by multiplying the cropped area with the fraction of the year occupied by that crop. In order to compare resource consumption and economic contribution of the individual crops, key values from the table have been depicted in Figure 5.1. This figure shows for each crop its share of total consumption of the scarce water and land resources, and contrasts it with the economic contribution as measured by its share of total value added for all crops. Wheat, cotton and maize produce most of the value added in agriculture.

Most land is occupied by wheat, berseem and maize. Most water, on the other hand, is consumed by rice, maize and sugar cane. The comparison shows the relatively high demand on water of sugar cane and rice and the high demand on land of berseem. Cotton, wheat and vegetables make an economic contribution relatively high compared to their resource use.

5.05 With respect to competitiveness, the main agricultural field crops presently grown in the old lands can be divided into three groups[10]. As shown

10/ Competitiveness has been analyzed through the calculation of domestic resource costs (DRCs). DRCs were calculated using the simple Balassa approach, dividing the economic value of domestic resource inputs by the economic value added through production. Domestic resources are land, labor, capital (where included) and water. The economic value added is the shadow priced return

Figure 5.1: Contribution of Major Crops



in the Table 5.2, Egypt has a strong comparative advantage for horticulture products (fruits and vegetables), cotton and wheat. Especially, if the cotton yields of the early 80s could be re-established, the advantage for cotton would be even more pronounced. Egypt is moderately competitive in several relatively low water consuming crops (maize, beans, potatoes, long berseem and oil seeds) and has a disadvantage in producing the water intensive crops rice and sugar cane. In addition, the development of improved short maturity wheat varieties and the increased adoption of hybrid corn can be expected to further shift comparative advantages toward these crops, thereby further enhancing food security. In the new lands, there is a strong advantage for vegetables and fruits and a clear disadvantage for traditional crops such as berseem, wheat, maize and beans.

5.06 The analysis of individual crops has to be put into perspective of feasible crop rotations and their competitiveness. For example, the extended period required for growing cotton makes it feasible in rotation with short berseem. While cropping patterns are in general becoming more diverse, including the practice of inter-cropping and growing of vegetables, Table 5.3 compares the returns to the main traditional crop rotations. Returns to horticulture products

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to these domestic resources including residual returns. A DRC below 1 indicates the existence of a cost advantage in the production of the specific commodity.

Table 5.2 : Competitiveness of Major Crops

Crop	Financial Net Return	Economic Net Return	Value Added	Domestic Resource Cost	Nominal Rate of Protection	Effective Rate of Protection
Wheat	684.1	525.6	1289.0	0.6	-0.2	-0.2
Long Berseem	802.8	181.5	777.2	0.8	0.1	0.3
Short Berseem	292.5	-47.5	294.9	1.2	0.1	0.4
Beans	628.1	134.2	909.0	0.9	0.0	0.1
Maize	489.6	216.2	1033.5	0.8	-0.2	-0.2
Rice	609.4	35.1	1362.9	1.0	-0.3	-0.2
Cotton	737.0	740.0	2073.0	0.6	-0.4	-0.3
Potatoes	923.7	361.7	1177.2	0.7	0.0	0.1
Sugar Cane	1836.4	-636.2	1552.0	1.4	0.2	0.6
Sugar Beet	230.0	137.9	953.5	0.9	-0.3	-0.3
Tomatoes	2140.7	1480.2	2665.2	0.4	0.0	0.1
Oranges	1237.3	604.9	1433.3	0.6	0.0	0.1
Sunflowers	616.3	198.7	830.9	0.8	0.0	0.1

Note: Net Returns and Value Added expressed in LE per feddan.
Source: Based on data collected by the mission.

are higher, in general, coupled with greater risk and greater need for specific skills. All the four main rotations provide a financial return to the farmer between LE 1029 and LE 1293 per feddan. This is consistent with rational choices of farmers and simultaneous prevalence of all four rotations. The short berseem-cotton and the wheat-maize rotation both have a DRC of 0.7 and appear to be socially more desirable than the long berseem-maize and wheat-rice rotations with a DRC of 0.8. However, financial returns to farmers favour the latter two rotations due to the protection for livestock products and the free provision of irrigation water for rice, respectively.

Table 5.3: Competitiveness of Major Rotations

Rotations	Financial Net Return	Economic Net Return	Value Added	Domestic Resource Cost
Short Berseem	292.5	-11.5	330.9	1.2
Cotton	737.0	740.0	2,073.0	0.6
Total	1,029.5	728.5	2,403.9	0.7
Wheat	684.1	525.6	1,289.0	0.6
Maize	489.6	216.2	1,033.5	0.8
Total	1,173.7	741.7	2,322.5	0.7
Wheat	684.1	525.6	1,289.0	0.6
Rice	609.4	35.1	1,362.9	1.0
Total	1,293.5	560.6	2,651.9	0.8
Long Berseem	802.8	253.5	849.2	0.8
Maize	489.6	216.2	1,033.5	0.8
Total	1,292.4	469.7	1,882.7	0.8
Sugar	1,836.4	-636.2	1,552.0	1.4

Note: Net Returns and Value Added expressed in LE.
Source: Mission estimates.

5.07 Two measures of protection were also calculated and are shown in Table 5.2. Nominal rates of protection measure the distortion of the output prices. The largest output price distortion, reflected in a nominal rate of protection of minus 0.4 remains for cotton (based on 1991 prices), while some other previously regulated grains still have negative nominal protection rates.

A possible reason for negative protection, despite the reforms, is that liberalization of trade and marketing requires more time before markets become competitive. In wholesale markets which are not yet fully competitive, farmers may not obtain the full economic value of their products. At current world market prices, there is positive protection of sugar. Effective rates of protection measure distortions of output prices relative to distortions in inputs prices. Remaining input subsidies (including free irrigation services) lead to effective rates of protection above nominal rates of protection for all commodities; yet, effective rates of protection are still negative for the important crops and prominently cotton. Both measures of protection do not reflect the distortions in non-traded inputs such as water and land.

5.08 In carrying out the above analysis, water is treated as a homogeneous commodity, and its value based on average country wide costs; for the base case analysis, it is valued at its long term opportunity cost, as reflected by the maximum marginal benefits from potential cropping pattern changes and land reclamation projects. In the case of rice, this approach has certain limitations, since rice is mainly grown in the six Delta Governorates close to the coast, where the potential for diverting it to other areas is limited. Also in these areas, the average quality of water is generally much poorer, and its opportunity cost consequently much lower than the average value assumed for the base case analysis. In addition, certain externalities accrue from the technical considerations underlying the choice of including rice in the cropping patterns for the lower Delta Governorates. In these areas, rice is grown mostly as a reclamation crop; furthermore, it contributes towards controlling sea water intrusion and the resulting salinity which comes from it. In view of the above considerations, the average country wide opportunity cost of water probably overestimates the real value of water which is used for rice. If the value of water is restated in terms of marginal benefits from potential cropping pattern changes, then the production of rice within these coastal Governorates for domestic markets can be justified; it however remains uncompetitive at present technology levels for exports.

5.09 In the new liberalized environment, farmers are expected to follow market signals that would lead them toward production of those crops in which Egypt has a comparative advantage. Certain desirable shifts in production patterns are already occurring as a result of price liberalization. Most dramatically, farmers have increased the area planted to wheat by 65 percent since 1985 while reducing the berseem area by 13 percent over the same period. Production of vegetables and fruits has risen by 54 percent and 86 percent respectively over the 80s with most of the increase occurring during 1980-85, before net returns to the competing and previously regulated grain crops picked up. An increase in high-value horticultural products has the potential to increase value added in the sector. However, this depends critically on the availability of the necessary transport, processing and marketing infrastructure as well as development of additional export markets. Some shifts can be expected toward increases in the area planted to cotton and the yield obtained from it. Furthermore, hybrid cotton varieties, already developed in China and India, could lead to further increased yields. Increased cotton production would also be beneficial through increased production of cotton seed oil and cake, reducing the imported quantities of vegetable oil and feed ingredients.

5.10 Potentially, there remain possibilities for both increasing agricultural value added and saving irrigation water use from further changes in

the cropping patterns; this could be achieved by shifting cropping patterns away from rice and sugar cane, towards cotton, sugar beet and vegetables, as well as reductions in the area planted to berseem in favor of wheat. While market signals provide the required incentives to increase production of the competitive products, incentives also remain high to produce non-competitive crops since the real value of water is not taken into account in making cropping decisions. As long as distortions remain in the allocation of primarily land and water, further desirable shifts in production patterns would, therefore, not be brought about by market forces. The focus of the strategy ought to be on removal of the remaining distortions to promote desirable production shifts, with a view to increasing the total value-added from the sector. There are primarily three crops for which removal of remaining distortions or additional policy measures to alleviate distortions are required.

- The present procurement price for cotton is still insufficient to provide the necessary incentives for farmers to increase the area planted to cotton and obtain higher yields through improved input application; the cotton rotation remains the least profitable among the major field crop rotations. Therefore, the complete liberalization of the cotton sub-sector is crucial for Egypt to be able to exploit its significant cost advantage in producing this crop.

- In economic terms, rice production using existing technology is competitive only under special circumstances, i.e. when it is produced in the context of a reclamation crop in areas near the coast where the average water quality is generally much poorer. In other areas, where greater potential for crop substitution exists and the possible environmental benefits from growing rice are not forthcoming, the price liberalization of rice leads to high financial attractiveness of rice to farmers, well in excess of its economic value, due to the absence of water charges.

- For the same reasons, sugar cane is financially attractive to farmers even though its production is uncompetitive due to high water consumption. This will lead to farmers' desire to expand their sugarcane area. The domestic production of sugar is desired partially in view of world market distortions and extremely high world market price volatility of sugar; at the same time, substantial investments have been made by the Government in industrial infrastructure which are dependent on locally produced sugarcane. As a first step, sugarcane prices, which in 1991 were in excess of the estimated border price, should be brought in line with the latter. Simultaneously, an action plan needs to be drawn up to identify measures needed to achieve the Government's objective to eliminate all controls within a three year time frame.

5.11 Through the demand for feed crops, the livestock sector competes directly with food crops for the use of the scarce land and water resources of the country. Presently, over 20 percent of the cropped area is planted to berseem. In assessing the allocation of land resources to berseem, the behavior patterns of large and small farmers need to be distinguished. Livestock activities are traditionally an integral part of the farming system of the latter, and consequently berseem will remain in their cropping pattern. However,

the amount of berseem produced, which is in excess of farmers' own requirements, and the amount produced by large farmers, is influenced by additional factors that were distorted in the past. While output prices of field crops were kept at a low level, livestock products (primarily red meat) prices were not only less constrained but also protected at a level above economic prices through a policy of import restrictions on livestock products. Growing berseem and raising livestock allowed farmers to circumvent price controls on food crops, generating excess demand for berseem. Prevailing land tenure laws may also have encouraged the growing of berseem by absentee land owners who did not wish to rent their land. With the removal of import restrictions, and shifts in relative prices of red meat vis-a-vis other products, the attractiveness of berseem, particularly for the larger farmers and those not producing it for their immediate needs, should be reduced. The area planted to berseem has already declined by 13 percent since 1985 as a result of these factors. Its further reduction depends on other factors which influence the area planted to berseem, including the need to address the summer feeding problems faced by farmers, and the fact that the area planted to short berseem is connected to the cotton area through the feasibility of crop rotations.

5.12 While recognizing the nitrogen fixing capacity of berseem in the context of overall soil management, it would be desirable from a perspective of resource use efficiency to take measures aimed at encouraging the use of alternative feed mixes involving more non-traditional feeds. While there are some constraints, efforts should nevertheless be made to increase the yield of fodder crops and to substitute some of the present demand for berseem by non-traditional feeds; both research and the agriculture extension services would need to play an important role in bringing about these changes. By growing food crops, such as wheat, in areas previously cropped with fodder crops, such as long berseem, food security could be enhanced and value added in agriculture increased at the expense of animal feed self-sufficiency.

Livestock Production Aspects

5.13 Livestock is an important and integral part of the agricultural production system, as 85 percent of all livestock is found on small farms. In outlining a strategy for the livestock sector, it needs to be taken into consideration that livestock production, in which rural women are heavily involved reportedly accounts for one-third of Egypt's gross agricultural production, and is important for the incomes of a large part of the rural economy. It provides an opportunity to maintain soil fertility through the manure produced, better utilization of family labor, and provision of proteins in the local diet. Within this context, however, the strategy must be consistent with the underlying requirements of the overall agricultural strategy of ensuring optimum returns to the limited water and land resources of the country.

5.14 The Government has stated its intention to encourage the production of fish and poultry products as a more efficient and healthy source of protein, as compared to red meat. Since both fish and poultry make relatively less demand on the water and land resources of the country, such developments would certainly contribute towards better overall resource utilization. In this context, the importance of the fisheries sub-sector as a source of protein in the national diet is without doubt. Given the special subsectoral characteristics of fisheries, it merits a separate and more detailed review. Overall though, the liberalization of prices and the removal of import controls should result in

appropriate relative price signals among these products, thus encouraging producers and consumers to make the correct choices; public education supported by relevant extension advice in this regard would be important in promoting such development. At the same time buffaloes (which represent 55 percent of the national dairy herd and produce 70 percent of the milk) and cattle are of overwhelming importance for the average small farmer in the country; buffalo milk is preferred due to its higher butterfat content and its taste. While analyzing the efficiency of using the nation's resources for growing berseem, it is clear that its competitiveness is based on the use to which it is put. While highly productive exotic cattle are competitive and buffaloes provide services that cannot be substituted for, the measures of efficiency show that the local Baladi cow causes both a financial and social loss. Therefore, it would be expected that the number of Baladi cows will decrease through up-grading.

5.15 The first priority for a livestock strategy should include measures for improving livestock productivity on small farms in order to increase farm income and make efficient use of fodder crops as well as crop residues produced on the farm; both research and extension would play an important role in this. At present, livestock management practices are poor and productivity is low; despite a significant increase in gross productivity, the value added from livestock increased by an average of only 1.2 percent per annum during the last few years. However, improvements in animal production can be achieved if some of the major constraints on the sub-sector are removed, such as low yield of fodder crops, low genetic potential of the existing animal population, insufficiencies in nutrition, shortcomings in the control and treatment of diseases and infertility, and a weak livestock extension service. Yields in the old lands of fodder crops should be optimized through new high-yielding berseem and sorghum varieties, use of berseem mixed with legumes, improving by product utilization and greater use of non-traditional feed and encouragement of fodder beets. Livestock production should be intensified, for example, through continued upgrading and crossing the native Baladi cow, previously appreciated for its draft power. This will increase milk production and require corresponding improvements in the milk collecting, processing and marketing systems.

5.16 In the new lands, intensive and large scale livestock activities would need to be promoted, which guarantee benefits commensurate with the investments in order to make it a viable proposition; the traditional small scale livestock activities are not consistent with the cropping patterns in the new lands which emphasize high value crops. To ensure feed availability, focus in the new lands would need to be on improving green fodder productivity using HYVs of perennial forages, such as alfalfa and salt tolerant grasses, improving the nutritive value of crop by-products, intercropping fodder and barley with tree crops and encouraging hybrid maize. However, a note of caution needs to be built into this approach; firstly, small farmers coming from the old lands will inevitably pursue the scale of operations they are familiar with, and secondly, preconditions for success of this approach is a very strong extension system, an effective veterinary service as well as an efficient marketing and processing infrastructure.

5.17 In the traditional poultry sector, where productivity is low, locally adapted strains of dual-purpose birds should be encouraged. The commercial poultry sector is presently in difficulties due to over-investment in production capacity. Demand is stagnant and the market for poultry products appears to be saturated. Further investments in the commercial poultry subsector are therefore

unlikely and undesirable at present. On the other hand, the role of the rural poultry sector is increasing, using locally established strains of dual purpose birds. Poultry is an important source of efficiently produced protein and should form an integral part of this subsector's future strategy.

5.18 The livestock extension, animal health and artificial insemination services need to be intensified in order to assist farmers in providing better nutrition and, through balanced rations, making maximum use of farm-grown fodder and crop by-products. Women play an important role in carrying out livestock activities on the farm. Hence it is important that they be targeted by the extension services in order to improve productivity of large and small ruminants. The privatization of veterinary services should be emphasized, particularly with a view to promoting veterinary services at the village level for ensuring better disease prevention/curative measures, and to undertake an effective artificial insemination program.

B. Market Prospects for Agricultural Products

5.19 Real incomes often decline, with a corresponding effect on domestic consumption, during a period of reform. While this phenomenon has no doubt occurred in Egypt, the extent of decline appears to have been arrested. Available data suggest an expected average annual growth in real per capita income of around 2 percent in the remainder of the 1990s. At the same time, the transition to a market based economy will, in the short term, induce a worsening income distribution. From a market perspective, these developments have various implications. First, the domestic demand for basic food commodities will continue to be strong, driven principally by population growth. However, once real per capita incomes begin to rise, domestic demand for the various commodities is expected to provide an important source for absorbing the projected increase in domestic production. As incomes go up, and the share of the poor in total income declines, demand for meat, horticultural products and the more processed items of food will increase faster, at the cost of a corresponding decline in the growth in demand for basic primary commodities. For example, work done on Egypt by the FAO shows that demand for cereals is expected to go up by about 35 percent between 1988-2000, and by only 20 percent between 2000-2010; in comparison, the demand for meat and fish during these two periods is expected to grow by around 40 percent and 65 percent respectively. The projected real growth in overall annual real per caput consumption is expected to average in excess of 1.2 percent; growth in per caput food consumption can be expected at similar levels of magnitude at least in the medium term. Consequently, the projected increase in domestic demand has the capacity to absorb the expected increase in domestic production; however, the strategic requirements of the economy require a thrust for larger export markets.

Trade Prospects

5.20 Within the context of achieving overall food security from a national perspective, there is a recognizable need to pursue policies and actions needed for promoting agricultural exports. Major steps have been taken in trade and marketing for encouraging exports and import substitution through: a liberalized exchange rate policy; elimination or reduction of export and import regulations and taxes on most agricultural commodities; and liberalization of marketing

activities in order to promote the participation of the private sector in trade and domestic marketing. As a result of these policies, the production of a number of previously controlled commodities has increased substantially. Both, the promotion of exports of crops (with increased domestic value added through processing) in which Egypt has a comparative advantage and a clearly identified export potential and import substitution, will continue to be important Government objectives. However, these should be pursued in a manner which does not contravene the underlying guiding principles of economic efficiency. In this context, Egypt's comparative advantage should be viewed in a dynamic sense, as new technologies and lower costs of production may lead to new opportunities.

5.21 The ability of the sector to meet the above objectives need to be explored within the context of the following observations on recent trends in agricultural commodity trade.

- Presently, agricultural exports are heavily concentrated in three commodities - cotton, oranges and potatoes, which together account for 90 percent of total agricultural commodity exports;

- Cotton exports, which make up 60 percent of the total, have been declining at about 13.6 percent p.a. in volume terms during the last decade, resulting in a real decline in total export revenues of 7.2 percent p.a. Given the increasing substitutability of Egyptian cotton with the advent of new technologies, its demand on the world markets is heavily influenced by prices. Egyptian cotton may no longer be a price setter, as was the case in the past; this needs to be taken into account in the bid to increase exports. Increased private sector participation, and liberalization of cotton imports to meet domestic needs will also be important;

- While exports of oranges increased by 1.8 percent in the 1980s, around 60 percent of the total went to the former USSR. Consequently, Egypt's orange exports could decline sharply due to the "disappearance" of the former USSR market. To protect against such a decline, there is a need for an aggressive search for new markets, and more importantly, significant improvements in quality;

- The exports of several commodities, including rice, onions, dates, tomatoes, lemon, artichokes, which form part of the remaining 10 percent of exports, have increased significantly in volume terms.

- The European Community is the most important export market for Egypt; it imports 35 percent of Egypt's cotton, 50 percent of its rice, 45 percent of vegetable exports and 2.5 percent of its fruits; however, its trade restrictions render most of Egypt's beyond-quota outside-period exports to the EC unprofitable.

5.22 While the export base of agricultural commodities is presently not wide, it is nevertheless clear that Egyptian exporters have successfully competed in the regional and wider export markets, in traditional products such as potatoes and citrus, as well as in the newer horticultural products which have entered Egyptian trade more recently. While competition is strong, and the total potential volume of horticultural exports does not as yet absorb a large share of Egyptian farm production, there are interesting prospects to be pursued that

will add noticeably to total earnings of the sector. However, as Egypt has a long history of inward looking policies, numerous impediments to trade remain; and it will take concerted effort to ensure that the export potential is realized. Egypt has advantages in terms of locations and climate that have value in foreign markets; but it has no unique claim to any export markets. Virtually all of the country's agricultural exports must compete with other suppliers for a share of the most likely markets -the EC, Eastern Europe and the Gulf States. It is consequently, particularly important to take measures which would facilitate investor response to the policy changes being put into effect. One would also expect that the conclusions of the presently ongoing GATT Uruguay round talks, will favorably impact on Egypt's ability to exploit the world markets. A number of actions can be taken to increase exports and market efficiency.

- The complete liberalization of the production, export and marketing of cotton is a priority. Otherwise, in the context of the dynamic world cotton market, Egypt's share of the non-ELS world market may decline. Cotton imports from pest free countries should be liberalized, subject of course to strict enforcement of quarantine regulations; similarly, the imports of all types of agricultural equipment should also be liberalized.

- With increasingly competitive commodity markets, it is critical that adequate and timely information on trade is available to existing and potential exporters. In Egypt today, such information is difficult to obtain. Existing public and private sector organizations could fulfil this important role with better focus of efforts. At the same time, an atmosphere of competition needs to be fostered, since the development of private sector monopolies would be as inhibiting to growth as is the case with public sector owned operations.

- Given the past inward looking policies, research and extension activities have so far concentrated mainly on domestically consumed commodities; strengthening their focus on exportable commodities should lead to increased exports. In addition, horticulture exporters should be encouraged to establish export quality-control systems, particularly as they face stiff competition especially in the European Community. Other than quality issues, the terms of sale and the timing of shipments would need to be improved. Cooperatives need to be strengthened and their activities better focussed for undertaking export and marketing activities.

- As a complement to the international trade negotiations presently ongoing, it is important for the Government to negotiate with major importing nations, such as the European Community, to reduce tariffs and increase access to markets. Since the EEC is not self sufficient in horticultural products, it must import from countries outside the Community. Negotiations should be pursued, whereby Egypt can obtain reductions in tariffs to the levels of, for example Turkey which enjoys more favourable terms, which would increase Egypt's horticultural commodity exports significantly; in return, privileged access to the Egyptian economy may need to be granted to EC products.

5.23 In addition to the above measures, there is need to complete the process of trade liberalization, which has been shown to bring about favorable results. Other than for cotton, restrictions on trade and marketing remain for a number of other commodities, including imports of vegetable oil, poultry and other meats, and some agricultural machinery and equipment. These restrictions were adopted for the purpose of protecting domestic industry; but they raise costs to consumers and to other industries, thereby undermining efficiency. The removal of the prevailing food subsidies, which are presently not targeted and consequently available to virtually the entire population, would facilitate the process of liberalizing trade and marketing of commodities which are still restricted. Finally, it is important that Egyptian suppliers begin to monitor developments in Eastern European markets, and establish relations on which future sales would be based. During this period of change in Eastern Europe, new systems are being formed, and a new generation of clients is emerging which will need sources of supply in the future.

Marketing Infrastructure

5.24 Historically, priority was given to investment aimed at increasing agricultural production, with a corresponding neglect of post production requirements, in particular for marketing. Consequently, the marketing of agricultural products is typified by significant post harvest losses, which for certain horticultural products is reported to be as high as 35 percent of output; for grain, post harvest losses are reported to go up to 15 percent. Key marketing impediments at the rural level have included: the absence of adequate infrastructure (produce is often displayed under the sun and on the ground without the basic supporting amenities such as concrete floors, water, sanitation, parking, etc.); a marked lack of storage facilities, as well as collection/grading centers; a severe shortage of refrigerated storage for perishable products; poor quality of packaging materials and containers; and inadequacies in the transport system. In addition, significant losses take place on-farm, as a result of poor harvesting methods.

5.25 A key factor which has contributed to the above situation has been the fact that the agricultural marketing system has been for a long time under government control through direct intervention in trade and prices. At the same time, the private sector has been reluctant to undertake major investment, in view of perceived uncertainties about the future. In addition, with most production going to domestic markets where quality issues were less important as compared to price, the incentives for improving post harvest handling and grading of products has generally been missing. The structure of the agriculture sector, which is characterized by a large number of very small holdings, has also contributed to the problem; in the new lands, the low productivity without effective cooperative marketing, has inhibited active private sector involvement in marketing due to the difficulties in deriving the needed economies of scale. The prevailing structure adds to unit collection costs, prevents effective supervision, and limits the share of production that can be stabilized and managed through farming contracts.

5.26 A major effort to reduce the inefficiencies and losses in the marketing chain provide a significant source for increasing marketed production and overall food availability in the country. While there is considerable need for additional investment, the underlying requirement is to develop effective farm level organizations, which would have available to them the necessary market

information on which they are able to react. The following actions are needed to reinforce the role of the private sector in this activity.

- While reforms have been initiated, these need to be effectively implemented at the lowest levels; with the public sector marketing institutions still occupying strategic positions in the marketing system, the private sector needs to be reassured and encouraged to undertake investments;

- Regulatory and institutional impediments to active private sector involvement in post harvest enterprises need to be aggressively removed;

- Promotion of, as well as provision of training to independent farmer cooperatives of local producers, middlemen and exporters, with a view to improving efficiency and reducing marketing costs;

- During the interim phase, the primary role of the public sector should be to provide supporting and facilitating services, till a competitive market begins to function independently. In this, two functions are particularly important: first, the establishment of an effective market information system, which collects and disseminates relevant market information at the farm level in a timely manner; and an efficient marketing extension system to support the farmers;

- There is need to strengthen the extension efforts, supported by the provision of appropriate technology/mechanization, with a view to reducing on-farm losses of agricultural production;

The above program for developing responsive farm level institutions and active private sector involvement in marketing needs to be supported by an investment program to alleviate the present infrastructural weaknesses.

5.27 Underlying the Government's efforts to promote exports, is the need to ensure exporters are provided the necessary support and infrastructure in order to respond to market conditions. There is evidence from the pattern of Egyptian shipments to Europe that these efforts may not be generating the best benefit for exporters. Market information and the knowledge and facilities to take advantage of that information are critical; presently, the information base and its easy availability is weak. In particular, surface transportation systems for horticultural exports and other agricultural products is a binding constraint on producers and traders at the present time and, without concerted action, will worsen rapidly over the next five years. The role of the Government is to identify and remove regulatory impediments and pricing distortions which discourage the establishment of efficient transport systems by private entrepreneurs. Except for the most delicate products, the majority of horticultural trade takes place through surface freight, with reefer ships giving way to the more efficient refrigerated container system. Both the lack of containers as well as present regulations effectively prohibit this type of operation.

5.28 In the first instance, a detailed review needs to be conducted of the services available, and of the regulatory and competitive factors which govern the pattern of service. Based on the findings, the customs, labor and

transportation regulations which restrict the use of containers would need to be reviewed and revised. For example, at present, a deposit in the value of the container itself must be made with Customs before a container will be permitted to leave Egypt. This effectively precludes the use of the transport system to which general cargo has switched in most of the world. While there does not appear to be a shortage of transport capacity to handle agricultural products domestically, the system review should include an examination of waiting times for loading and unloading, and regulatory impediments to more effective use of the existing fleet of trucks.

C. Agro-Industry Development

Transforming the Rural Economy

5.29 Agro-industrial and rural industrial enterprise development will form an important element in the strategy for achieving broad based rural development. Population growth and the reduction of public sector enterprises will generate a need to create viable employment opportunities; the process of liberalization will provide opportunities for the private sector to contribute to growth and employment. However, if the rural sector is to achieve its development potential, then off-farm and non-agricultural activities will need to be encouraged; also these enterprises must be linked by information, technology and infrastructure to the domestic and international markets they serve.

5.30 Agroindustrial activities (encompassing the various aspects of manufacturing, storage and marketing) are presently dominated by the public sector, both in terms of the ownership/operation of productive enterprises, and the regulation of all aspects of the sector. Their domination in terms of their share in value added and employment is summarized in Table 5.3 below. However, with the liberalization of production and trade activities that is now underway, two trends are becoming evident:

- With reduced restrictions to entry by private entrepreneurs and declining advantages for public competitors, private enterprises have moved rapidly into such diverse former public domains as horticultural exports and land development;

- With reduced controls on production activity, growers are redeploying resources towards crops that offer the prospect for greater return or greater flexibility in production or marketing.

5.31 Nevertheless, various issues and constraints need to be addressed to ensure that these developments are further reinforced. For example, in many agroindustrial activities, the concentration of production in the hands of public enterprises is so high, and raw material supply and distribution so regulated that private investors have not been able to enter and compete in the sector. The lag in policy implementation at the working level, particularly with respect to the ongoing liberalization measures, means that many growers and entrepreneurs continue to face the same regulations and restrictions that prevailed before the change in policy. The benefits from liberalization will depend on the response of the private sector, from shifts in cropping pattern to investment in new post-harvest activities. However, in order to respond, the private sector must first

know what the changes have been, and then must see that they have effectively been translated into reduced regulation at the operational level; for example, there are still large private traders in horticultural products who believe that it is forbidden for them to import potato seed. While this is clearly a transitional problem, it is necessary that steps are taken to remedy this. Specific measures could include, among others: develop specific operating instructions for intermediate and working level public agencies; produce written information for producers and investors; remove the discretionary elements in any remaining approval procedures; and reduce the role of public officials in the management of nominally private sector organizations. Overall, the program of privatization of public enterprises which the Government has initiated under the reform program, albeit slowly so far, is an important prerequisite for efficient agro-industry development in the country, and needs to be pursued vigorously.

Table 5.4: Share of Public Sector in Key Industries (percent)

Industry	Value Added	Employment
Food Industries	60.9	64.3
Beverages	81.9	68.3
Tobacco	92.6	82.4
Spinning and Weaving	78.6	75.9
Leather Industries	96.8	74.3
Wood Industries	86.4	72.2

Source: World Bank; Arab Republic of Egypt, The Private Sector Regulatory Environment, 1992

5.32 For sustainable rural transformation to take place, it is important that the linkages between agriculture and the overall rural economy are further strengthened. Rural industry must be seen as a set of activities which not only uses labor and raw material supplies in the rural areas, but also responds to rural demand. This is the basis for successful employment and production generation such as has occurred in China and other countries less advanced in their rural areas. Farm non-farm linkages in terms of economic activity are presently high in Egypt, and derive in part from the many interdependencies in the rural community.

5.33 From the perspective of a future strategy, the underlying objective is the removal of regulatory and institutional impediments to private investment in support and post-harvest enterprises. Investment activities need to be encouraged which respond best to market requirements while at the same time offering good employment opportunities. To be most effective in these respects, emphasis should be placed on activities which can be viable on a relatively small scale, for ease of management, adaptability to the fragmented supply pattern of small growers, and the local demand of communities. Examples include feedmills which produce basic feed formulae from prepared concentrates and locally available grains and meals; packing houses; bakeries and specialty food producers; farm supply and service depots; transport and machinery services; and machine shops. The other important feature of these activities is that they have either low capital/labor ratios or their capital equipment can be used for different purposes. This keeps down the investment cost of employment, eases access by new entrepreneurs, and ensures that capital investment can be kept busy during longer periods in the year and during shifts in market conditions.

5.34 Finally, the strategy should not discourage larger scale private sector investment in agroindustries which take advantage of advanced technologies and economies of scale. There are many areas, such as fruit and vegetable processing where these factors are essential to long term viability. However, the investors

in such enterprises have access to the technology and resources they need to develop and operate these facilities, and their technical support requirements are limited. The strategy in the public sector should be to assist smaller investors to take advantage of opportunities to provide support services to these larger firms, and to ensure that the regulatory environment does not distort their investment decisions or unduly impede their operations.

VI. ENABLING ENVIRONMENT FOR GROWTH

A. Changing the Role of the Government

6.01 For several years the Government of Egypt has been closely involved in both participation and regulation of economic activity in the country. In the context of the reform program, there is a need to review the role of the Government in this changed environment to ensure success. Essentially, the role of the government is to create the enabling environment and perform the necessary regulatory and coordinating functions which are essential for ensuring private sector incentives and opportunities to flourish unhindered and in an efficient manner; at the same time, and in a broader context, an important role of the Government is to provide a program for the poor, including a social safety net for those adversely affected by economic adjustment. The key pillars for this approach would include support to the farming community from the research and extension system, easy availability of key inputs, an efficient marketing and processing infrastructure, removal of bottlenecks for expanding exports, and efficient credit channels to meet the financing needs for the sector's development; at the same time, there is need to closely review the present structure of the overall agricultural administration, with a view to rationalizing it in a manner which makes it more responsive to the sector's needs.

Regulatory Aspects

6.02 Within the new economic environment, changes are needed to the overall regulatory framework which has been in place for many years, and which defined the manner in which economic activities were undertaken in the past. In reviewing the regulatory role of the Government, two key issues need to be emphasized:

- The Government has certain regulatory functions, which it should undertake; however, these need to be clearly defined; among others, these would include aspects relating to controlling seed quality and certification, quality control over food and feed items, regulating agrochemical use, overall environmental management, enforcement of related legislation, etc.;

- At the same time, the private sector needs to be able to function efficiently, with minimum impediments to its responsiveness; at the moment, regulations provide an opportunity for discretionary enforcement by Government agencies, over private sector operations, in a manner which is not consistent with efficient operations.

Egypt is presently going through a period of transition. However, this is also a period during which the confidence of the private sector needs to built up, as many potential investors are still waiting to ascertain the permanency and commitment of the Government to this change. Consequently, it is obligatory on the part of the Government to take the measures necessary for instilling and strengthening this confidence. Key examples regarding this include the following:

- Even though crop area allotments have been removed for most crops, some forms of control and influence continue to be exercised on farmers by officials at the rural level;

- Regulations governing the establishment or expansion of agro-industrial enterprises require approval from the Ministry of Industry, for which a committee process exists; such an arrangement often creates inefficiencies and possibly rents; based on clearly defined criteria, such activities should follow an approach of registration rather than approval;

- Labor laws have tended to grant more job security and greater expectations to workers than is often justified by the economic conditions surrounding the activity or the employer. These factors have contributed to poor labor mobility, and an inflationary impact on the cost of employment, with consequent negative effects on the profitability of productive ventures;

- Separate regulations are in force for defining Government responsibilities for supporting farmers in the agrarian reform areas, other old lands and in the new lands.

6.03 Over the years, a number of laws have been passed, which either directly or indirectly influence the production related aspects of the sector. Steps are already being taken to closely review the prevailing legal framework; new laws governing land tenure arrangements and for the operations of the cooperatives have already been prepared and are being discussed within the Government. Among the more important areas where changes in the regulatory environment are needed include those related to seeds, land markets, regulations affecting the cotton and sugarcane subsectors, and the regulations controlling the manufacture of and trade in certain categories of agricultural equipment; the underlying objective of the changes required is to reduce public sector presence in commercial operations. There remains much to be done in this field, starting with a detailed review of all existing legislation with a view to simplifying and reducing their number (as well as introducing new legislation where it is needed), in order that the role of the Government is better defined to support the reform process, and to ensure that the private sector is able to play the role assigned to it in an effective manner.

Agricultural Research

6.04 A strengthened research-extension system is crucial for achieving increased agricultural productivity and product diversification at the farm level. While the research agencies supporting agriculture in Egypt have independently made significant contributions, the work of the extension and research system is presently dispersed among various agencies, and largely

focussed on the delta and old lands; support services in the new lands are weak. In addressing the priorities of the 1990s, it is clear that both the institutional and technical aspects of research and extension would need to be focussed upon and strengthened; extension and research depend on each other and should benefit each other; institutional links between both services require strengthening in order to better coordinate activities. Underlying such developments is the basic requirement of a close linkage between the agricultural research organizations and the scientists within the system and their clients, the farmers; for the research system to be relevant and responsive to the latters' needs, it is clearly necessary that farmers and the private sector have a say in setting the research agenda.

6.05 In the MALR, the Agricultural Research Center is the primary agency responsible for technology generation, with 16 research institutes, 6 central laboratories, and 37 research stations affiliated to it. The Desert Research Centre (also under MALR), which has 5 stations, is responsible for conducting research relevant to rainfed areas. Within MPWWR, there is the Water Research Centre with its 11 institutes and a training centre, which is undertaking research in water resources/irrigation and the drainage aspects related to agriculture. The research network draws heavily on the Universities under the Ministry of Education, which provide 50 percent of the human resources in the agricultural sciences. In addition, the National Academy of Scientific Research and Technology and the National Research Centre, under the Ministry of Scientific Research and Technology are also involved in agricultural research through their specialized irrigation, food and agriculture divisions. Finally, the private sector is increasingly getting involved in agricultural research, particularly dealing with seeds, tissue culture and agrochemicals. Most of the research and development programs are undertaken by the parent companies in developed countries; however, an increasing share of the adaptive research is being carried out within Egypt. Private sector efforts in research should be further encouraged and integrated into the overall agricultural research program of the country. While the public sector all over the world is involved in research, many agencies extend their research activities into areas where private research organizations could be expected to work well if given a chance (and do work well in some developed countries), since the resulting products could be patented and privately marketed (such as hybrid seeds). There is a need in the medium to long term to explore such possibilities in the Egyptian context.

6.06 While overall efforts are dispersed, some of the institutes are doing excellent work. The development and introduction of high yielding varieties in various vegetables, cereals, oil crops and sugar beet, has resulted in increased production. Similarly, the introduction of improved on-farm irrigation and protected cultivation coupled with improved cultural practices in use of fertilizers and agricultural practices has generated significant water savings and boosted yields for many crops; the mechanization of primary activities such as land preparation, threshing, and water lifting is now well established. Overall, the agricultural research network has pursued the development of modern techniques of agricultural production. The next phase of agricultural growth will depend very much on a wider adoption of improved farming technology, including appropriate mechanization and investments to improve post harvest technology and primary processing activities. There is potential for mechanization of operations, such as laser land levelling, which would promote more efficient water use and increase crop yields; crop maintenance practices, such as seeding, fertilizing and harvesting, also lend themselves to effective

secondary mechanization to overcome shortages of labor at peak season and reduce turn around time between crops. While research and adaptation of new machinery is ongoing, this needs to be reinforced with a strengthened program for technology dissemination. At the same time, there is scope for better integrating the work of the institutes in the different ministries, which presently have overlapping of efforts, within the framework of a national agricultural research program. There is scope for merger of activities and for better coordination with the Universities and National Research Center, through an effective research review mechanism. The adoption of a comprehensive agricultural research policy and establishing a core central research management system encompassing the efforts of the various agencies involved, would improve coordination and avoid some of the duplication in research efforts which presently prevails. These constraints can be addressed through:

- the formation of an Agricultural Research Council, with the primary responsibility to prepare a comprehensive national agricultural research policy, with a view to enhancing the coordination and monitoring of research activities of the different agencies involved.

Improved management of research programs requires transparency of decision making and accountability of staff; to be effective, the formulation of revolving short, medium and long term national research plans is essential. For this the design and implementation of an accurate and a widely accessible database is a prerequisite. In line with liberalization, the research system has to adjust in order to better serve the needs of the private sector, both as at present and through the generation or adaptation of new technologies for the future in the context of potentially emerging new markets. This can be best achieved by the active participation of the private sector and farmers in the development of research programs.

6.07 There are major challenges facing the research system in the future. These all derive from the need to develop new technologies which are consistent with the arable land and water constraints facing Egyptian agriculture, which fit into the socio-economic fabric of the agricultural sector, and which generate measurably significant financial benefits for the farmers to ensure rapid adoption. Some of these challenges include the following:

- need for research work (such as on developing new varieties and better crop rotations) which is aimed at maximizing returns to first water, and then land, is targeted at improved overall natural resource management, and fosters new developments such as in biotechnology;

- technology generation, and more important, the on-site adaptation of existing technologies to the needs of the new lands, in a manner which recognizes the socio-economic background of the settlers (smallholders and graduates);

- need for adaptive research in improved irrigation technologies for both the old and new lands, with a view to identify the most appropriate technologies for the different categories of farmers, as well as the wide range of local conditions;

- the need for research efforts aimed at varietal improvement (in particular,

development of short duration varieties to enable more intensive land utilization), increased coverage of high yielding varieties, improved varieties of fodder crops, crop and animal by-product utilization, improved on-farm irrigation systems, post-harvest activities and agroindustries, addressing the concerns of producers, as well as consumers' preferences in domestic and export markets;

- while rainfed areas are a small part of the cultivated land resources of the country, there is nevertheless need for developing water saving technologies as well as drought tolerant varieties for these areas;

- research work on farm mechanization should be fostered, with a view to addressing the concerns of small and medium farmers; there is the need for developing appropriate capital intensive technologies for a smallholder dominated agriculture sector, recognizing at the same time the availability of a large labor force;

- there is need for research in relevant food processing technologies, anticipating the likely emergence of new consumer preferences;

- the need to strengthen analytical capabilities for assessing the economic and financial viability of research findings, and of the implications of public policies for the sector's development;

- the need for socio-economic research to address issues of relevance for bringing women, who are an important part of the available human resource, into the mainstream of the agricultural development process (women are also an important group to target in research on reduction of post-harvest losses), to identify measures to avoid land fragmentation, and to support research work aimed at developing technologies suitable for small-scale farming.

In order to better focus research programs, these should be made specific to Egypt's agroclimatic zones. Efforts in this direction have already been initiated by the Agricultural Research Center, which has drawn up a five year research plan, which is aimed at better integrating the work of its 16 institutes. The plan would be implemented through five regional committees for research, extension and training, based on agro-ecological zones, and would cover all commodities (including fisheries) and involve universities, other research institutes and local farmers and institutions. It is proposed that the program be implemented in a flexible manner, taking into account local conditions; the Agricultural Research Center would be the national coordinator for implementing the program. From an overall technological perspective, there is need for emphasis on the adaptation of new technologies, keeping in mind the projected needs of the domestic and international markets in the future, and to support the achievement of the above mentioned overall objectives. In this context, the need for a strong linkage between research and an analysis of future markets prospects needs to be emphasized, for crops in which Egyptian agriculture could be expected to have a comparative advantage in the future.

Agricultural Extension

6.08 The extension function of MALR is presently weak and fragmented, partially due to inadequately trained staff, but mainly due to an uncoordinated approach towards providing extension services to particularly the smaller farmers of Egypt. Prior to the reforms, the extension system performed regulatory functions on behalf of the Government, in addition to their technology transfer duties; implementation of the MALR's annual cotton pests protection campaigns and enforcing the Government's regulations to ensure supply of cotton and other crops were central functions, some of which are still being exercised. While the extension system has contributed to increasing agricultural productivity, their structure, responsibilities and staffing need close scrutiny in order to ensure the development of a vibrant system capable of meeting the needs of the new economic environment. Presently, extension services are being provided through three channels:

- By the Governorate extension services, under the Director of Extension, for non-agrarian reform areas;

- By the Agrarian Reform Organization, for farmers within their area of responsibility, under the Director Agrarian Reform Extension, within each Governorate; and

- In a limited manner, by staff working within GARPAD, for the newly reclaimed areas.

Superimposed on all this are occasional campaigns for particular crops or new practices for which everyone's attention is diverted for a period of time. In order to rationalize the above structure, the Agricultural Research Centre was given responsibility for extension; ARC's activities are based on the triangle of research, extension and training. However, ARC will need considerable strengthening and assistance to adequately perform this task. In addition, the Central Administration for Agricultural Extension Services supervises general extension administration through offices at Tanta (for the northern delta), El Minya (for Upper Egypt) and at Giza (for the southern delta). Specialized extension administrations also exist for horticultural crops, veterinary services, fisheries, animal production, mechanization and pest control.

6.09 Support services for the new lands merit special consideration. These areas represent nearly 20 percent of the cultivable area of the country, but are poorly serviced by extension staff. The ability of GARPAD to fully carry out this function, with the necessary linkages with research, are inevitably weak, given the greater emphasis to physical land reclamation activities in their overall program. The responsibility for the new lands has not yet been fully integrated into the mainstream Governorate services. If the new lands are to be expected to contribute in line with the investments made, to the overall growth of the sector, it is clear that the extension and research activities need to be restructured, both from the perspective of strengthened capabilities, as well as to bring it into the mainstream agricultural organization of the Ministry.

6.10 Management problems plague the organization of extension activities, particularly the relationship between governorates and headquarters, as well as the multiplicity of organizations. The MALR objective is to have an extension agent at the basin level of about 200 feddan. This approach based on

administrative boundaries, i.e. governorate, district, village and basin levels, should be examined in view of the liberalization of agriculture and streamlining of its functions. In this context, the first issue which needs to be addressed is that of a clear division of responsibilities at the different levels of national administration. Set out below is a proposed approach in this regard.

- At the central level, MALR and more specifically the ARC should be responsible for planning and outlining strategies for extension, developing extension methodologies, providing training and ensuring linkages between research and extension. Training programs should emphasize new areas, such as water management, integrated pest management, post harvest and marketing aspects, use of modern inputs and farm machinery.

- Integrate all field level extension services, including those for the new lands and the agrarian reform areas, into uniform Governorate based services under the respective Directors of Extension, and being technically and administratively responsible to the Governorate Undersecretary for agriculture and the Governor. Staffing levels and training programs should be drawn up for each governorate in accordance with its needs and agricultural plans and agreed with MALR and ARC; particular emphasis should be given to recruiting female extension agents and to foster development programs for women among the rural families.

- If improved technology packages are to be adopted, the development of a highly motivated cadre of subject matter specialists particularly at the Governorate level is required. A national cadre of experienced SMSs should be established, who should be stationed at the different levels (central, governorate and district) of the system. An intensive training program for SMSs in fields other than just production oriented technologies is necessary, to ensure downstream linkages aimed at increasing value added from processing and exports.

- At the same time, there is clearly a need to encourage the emerging private sector initiatives at providing extension services. This can be done in various ways, including the promotion of advisory services, encouraging contract extension services, and devising cost sharing arrangements within local communities.

6.11 The above is intended as a broad institutional framework, within the context of which more work is necessary in order to articulate more detailed arrangements for defining the overall structure and approach for organizing extension, identifying categories, number and location of staff, developeng a framework of training programs for the different staff levels and for providing them mobility which needs to be fostered and planned for. A key requirement which needs to be built in is a clearly defined monitoring and evaluation system, the findings of which should guide the activities of both the research and extension network. At the same time, linkages with credit institutions, input distribution and marketing staff should be strengthened, and improved and more effective extension approaches towards women need to be adopted. Special focus needs to be built into the structure for meeting the needs of the new lands as well as key programs; also, MALR has to separate the advisory and regulatory

functions of extension staff. The development of private extension services by consultants to medium and large scale growers is already taking place. Availability of soil, water and animal and plant diagnostic laboratories, licensed through MALR, should complement the consultants advisory functions. Extension methodology should make use of television and other mass media. Finally, the prevailing high rate of farmers' illiteracy presents difficulties in ensuring the rapid adoption of new technologies and improved cultural practices. Consequently, within the context of overall rural development, programs aimed at adult education and literacy need to be encouraged, in order to enhance receptivity to innovations.

Agricultural Administration

6.13 In this period of change, where the agriculture sector has moved away from the earlier system of heavy Government involvement in implementing sector programs, there have been few substantial reforms made to the agricultural administration. Beyond the need to limit the role of the public sector in direct production, the economic reform process has thrown into relief the need for accompanying institutional reforms as the role of ministries and agencies involved in the agriculture sector undergo rapid change. Without a significant restructuring of the agricultural administration, i.e. those public agencies working in the agricultural sector [11], agricultural reform is very likely to be only partially successful. In addition, other ministries touching upon activities related to the agriculture sector include the Ministry of Supply, through its food imports and distribution system; the Ministry of Industries, through control over certain agriculture related industries, such as cotton and sugar processing; and the Ministry of Housing and New Communities, which is engaged in infrastructure construction in newly reclaimed lands.

6.14 The problems of the agricultural administration are well known, and are becoming increasingly debated as the reform process proceeds. The different roles for the public and private sector are fully recognized by the Government; however, the changes need to be operationalized principally through reorientation of institutional objectives and accordingly, streamlining of the overall structure. Presently, the MALR is organized into five sectors at the centre (extension, services and monitoring, economic affairs, administration and finance, and the Minister's Office); at the Governorate level, MALR is represented by a substantial administrative structure, which is administratively responsible to the Governor, but for technical matters, reports to the centre. In addition, the various semi-autonomous agencies affiliated to MALR have representation at the Governorate or regional level, often reporting to their parent agencies. The MPWWR, also with five main departments at the centre (planning, irrigation, mechanical and electrical, finance and administration, and budget and accounts), functions in a centralized manner, with Governorate and regional offices reporting directly to the centre. The process of streamlining the MALR has already begun through the clear articulation that the ministry's main functions will be in research, extension, and regulation, with economics and policy seen as an essential function embracing all the ministry's activities. With some internal reorganization ongoing, MALR is in essence, presently in a

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11/ Principally MALR, MPWWR, their 12 affiliated authorities or organizations, the three major research centers, and various production projects or activities now organized in three holding companies in MALR and one in MPWWR.

period of transition. In the case of MPWWR, although it does not foresee much change in its functions in the context of reform, as in MALR, some modification is occuring as a result of the reform process. With momentum provided by the Government initiated reform process, this presents a unique opportunity to take into account the issues outlined below so that ultimately the new agricultural administration can be a strong administration capable of leading the agriculture sector in the 1990s.

6.15 The multiplicity of organizations presently involved in agriculture, often have overlapping functions and activities, and poor coordination within and between organizations; in addition, some public agencies remain whose functions are now obsolete in the context of the reforms. These issues of overlap and lack of coordination are magnified at the governorate level where actual implementation takes place. Rationalization at the center should lead to rationalization at local levels, which will make the task of implementation much easier.

- In order to benefit from the momentum which presently exists, a detailed study should be undertaken to examine the terms of reference of each affiliated organization or authority in the two ministries and to determine where streamlining can be achieved, and how it should be undertaken.

A preliminary look at these organizations suggests three options:

- complete but gradual phasing down of organizations whose functions are obsolete;

- partial phasing down of some organizations and integration within the main ministry of their regulatory aspects with other activities being privatized;

- merger of some organizations with others whose activities are similar or complementary.

6.16 In the reform context where efficiency and effectiveness are key, the two ministries should seriously consider options for improving communications and coordination. Bold visions are required and, based on a careful public administration study, no options should be left unconsidered including partial steps such as:

- merging authorities or activities in the two ministries that are similar;

- establishing joint technical committees around issues that concern the two ministries, for example, implementation of on-farm water management activities;

Ultimately consideration should be given to adopting a more unified approach to the management of water resources (irrigation and drainage aspects) and agriculture.

6.17 There is a problem of overstaffing coexisting with poorly trained staff and inadequate salaries and incentives. Close to half a million people work in

the agricultural administration. This is close to 12 percent of the formal agricultural labor force as well as 12 percent of total Government employees. Only a fraction of the workers are highly skilled staff. The large numbers of ill-trained and poorly paid workers constitute, at present, a drag on the agricultural administration. The staffing problem is well known and is a direct result of the Government's guaranteed employment policies for secondary school and university graduates. As part of the reform process, some constructive means have to be found to make proper use of this human resource while relieving the administration of excess staff. While considerable potential exists for downsizing the agricultural administration, it is a very sensitive social and political issue which needs to be tackled with care. Options have to be developed which are humane and which take into account the social consequences of any actions. The donor supported Social Fund developed under the Structural Adjustment Program is a beginning in this direction. Reductions of staff require a detailed study of functions and skills, including proper phasing for such reductions.

6.18 The present administration structure needs to be further decentralized leaving much more responsibilities and decision making to the governorates and local areas. At present multiple reporting requirements are common for staff at Governorate level, many of whom like those in the Authorities and MPWWR, report directly to Head Offices in Cairo. Others, such as the Directors General for Agriculture, while reporting administratively to the Governor are technically responsible to their ministries in Cairo. Such centralization slows decision making and implementation and makes for complex management arrangements at the Governorate level. The situation is difficult and requires the immediate attention of top level ministry and Governorate management to devise means to decentralize decision making increasingly to local levels while maintaining the technical integrity of the staff.

6.19 Finally, there are several pieces of <u>legislation</u> relating mainly to civil service rules for employment, termination and promotion which will need to be revisited if streamlining of the agricultural administration with increased efficiency is to be achieved. Again, this is a sensitive issue which cannot be tackled without reference to other parts of the civil service. However, it is an area which ultimately, cannot be ignored.

B. <u>Private Sector Development</u>

6.20 The MALR had adopted a progressive approach on privatization, even prior to the enactment of Law 203 of 1990 governing the Public Business Sector; it has accomplished much through the sale of reclaimed lands, publicly owned agricultural and desert lands, the lease of fish ponds, and the sale of projects belonging to the Holding Companies responsible for some of the agricultural activities. More recently, and in line with Law 203, holding companies have been transferred to the jurisdiction of the new Public Enterprise Office (PEO) which reports to the Prime Minister. The steps for the implementation of this law are currently underway. The Executive Regulations have been issued, and the nomination of the General Assemblies has been announced; this will be followed up by the formation of the Board of Directors.

6.21 As is the case for the overall privatization efforts in Egypt, privatization in agriculture is also facing important generic problems. These include: competition for limited private sector savings; with limited knowledge of share trading and securities markets, the public is generally risk averse, preferring to invest in high interest bearing bank deposits and bills; companies need to be audited in accordance with international accounting standards so as to allow proper valuation; issues of debt and labor redundancy need to be addressed; and management capabilities of companies not to be privatized in the short term need to be upgraded, providing them with autonomy and accountability.

6.22 It is important to recognize that privatization in the agricultural sector goes beyond the simple sale of ongoing activities to encompass private sector development. Concerted efforts are needed to remove the bottlenecks to competition and transparency of the privatization efforts, and establishment of a level playing field between the public and private sectors. Since the market is unlikely to absorb a large number of companies in a short period, there is need for careful programming and sequencing of the privatization process. It is therefore recommended that a two pronged approach be followed.

- The first would be demand driven "spontaneous" privatization in response to private sector expression of interest; the smaller agricultural enterprises would most likely fit in this category.

- The second would be the privatization of selected groups of enterprises in consecutive batches. The careful selection of the first privatization candidates is critical; these should be profitable, visible and with the highest chances of success in attracting private venture capital.

Underlying the program is the need to guarantee transparency at all stages of privatization. While the program of privatization must remain a focal point of Government's new policies, the social implications of the program of privatization arising from the significant overstaffing which prevails in many public sector companies need to be recognized. In the context of ensuring a social safety net, the linkage with the Social Fund or some other similar mechanism would need to be emphasized.

6.23 The underlying focus of the strategy in the context of privatization would re-emphasize Government's commitment to proceed with this on an accelerated basis; in the agricultural sector, privatization involves four types of operations:

- the land and livestock based operations which come directly within the purview of the sixteen affiliated companies belonging to the Holding Company for Agricultural Development, and the two companies within the Poultry and Animal Wealth Holding Company;

- companies involved in civil works and related operations, such as the six Land Reclamation Companies in MALR, and the Public Excavation Companies in MPWWR;

- activities undertaken within the framework of the Egyptian Agriculture Organization, which include, among others, equipment and machinery sales, seed sales, horse breeding, etc.; and

- sale of fully or partially reclaimed lands, which is the responsibility of GARPAD.

6.24 Companies within the first two categories of operations come within the purview of the PEO and will be subject to its rules and regulations. For the first category, the PEO may wish to avail itself of MALR contributions in expediting the privatization of these activities. There is also need for assistance and specialized expertise to help the different holding companies to analyze the different markets in which companies operate, review options for privatization, and assist in the privatization of key enterprises. The companies belonging to the Holding Company for Agricultural Development, have been subdivided into 83 projects in order to facilitate and expedite their privatization; a portion of the company lands were sold to employees under long repayment periods. For the remainder which has been sold, the experience has been that an average of four buyers at most expressed interest in the projects. The current approach has led so far to the sale of only thirteen projects with a value of LE 200 Million. This approach needs to be reconsidered. All methods of privatization need to be considered, including management contracts, leases, joint ventures, divestiture of marginal lands and activities, as well as sales to large national or international companies who are willing to make substantial investments in the lands, with a view to expediting sales.

6.25 In the context of activities falling within the third category of operations, it is proposed that the current institutional set-up be reviewed in detail. For example, the Egyptian Agricultural Authority, while being subject to the civil service law is nevertheless performing commercial activities. Specifically, there is a need for MALR to examine all the activities, determine those that would remain in public hands and those that could be effectively transferred to the private sector based on clearly defined criteria; in this context, there is also a need to separate the regulatory and research activities from the commercial activities whenever they are being performed in the same institution, as is the case for example with the Marriut Fish Company and the Egyptian Company for Fishing. These criteria should then be applied consistently to all MALR activities to come up with a strategy, action plan and timetable. In addition, public sector cotton companies should be required to operate in a competitive environment alongside private sector companies.

6.26 Finally, the present approach followed by GARPAD in selling fully or partially reclaimed lands needs to be revisited. Under present Government policy, a substantial portion of the lands presently being reclaimed or to be reclaimed by GARPAD are earmarked for sale to graduates under subsidized terms. This approach forms an integral part of the Government's employment policy. However, since there are no directives aimed at selecting only agricultural graduates for such sales, graduates with no agricultural background (including those holding arts, law or accounting degrees) are pressed into agricultural activities in which they have little expertise or interest. Consequently, production levels achieved by many graduates have been low, leading to the sub-optimal utilization of the valuable land resources of the country. Clearly, better selection criteria have to be developed to ensure that the productivity of the land is maximized.

Agricultural Inputs

6.27 Concurrent with efforts to improve the overall environment for ensuring agricultural growth, is the need to assure both timely and good quality inputs to the farmers; without these, there is little justification for creating the incentives for their use. Consequently, special attention should be devoted to seeds, agrochemicals, particularly fertilizers, and aspects of agricultural mechanization, because of their major influence on agricultural productivity. Presently, the Government is involved in the supply to farmers, as well as in regulatory functions, of farm inputs. The privatization of the input distribution activities is proceeding in tandem with the phasing out of subsidies for these inputs; however, the transition needs to be carefully managed, and the risks of creating private monopolies guarded against, in order to ensure that supplies to farmers are not disrupted with corresponding implications on productivity.

6.28 Seeds. Farmers are fully aware of the important contribution of quality seeds to high agricultural productivity. Presently, the following agencies are involved in the production and regulatory aspects of seed production: the Agricultural Research Centre is involved in breeding of improved HYVs, including production of breeder and foundation seed, as well as in the testing of new varieties; the Central Administration of Seeds (CAS), MALR is responsible for the multiplication, conditioning, and distribution of seed, as well as for fulfilling regulatory functions with regard to seed; the Egyptian Agriculture Organization imports foreign seed, and also owns seed cleaning and conditioning facilities which it makes available to the private sector; the Organization for Improvement of Egyptian Cotton, which supervises cotton seed multiplication, roguing and laboratory testing, with CAS maintaining supervisory functions to ensure varietal purity; and six private sector seed companies, which are involved in corn, vegetable and forage crops seed production.

6.29 Clearly, there is significant potential for increased private sector involvement in seed production and distribution (with hybrids, the private sector is already heavily involved in seed production), as well as rationalizing the structure for regulating seed related activities. This should occur, taking into account the following considerations:

- The long term objective should be one of progressive diminution in the Government's role in seed production, with the underlying policy being one of encouraging greater private sector involvement. In the interim, since seeds are a critical input (and since some types of seed, such as the high volume/low value open pollinated crops, may not be so attractive to the private sector), there will be need for continued Government involvement; however, such involvement should be as equal partners/competitors with the private sector;

- Production of breeder and foundation seed should remain the responsibility of ARC until such time that the private sector shows interest in this activity;

however, commercial multiplication and conditioning should be entrusted to the private sector, farmers' groups and cooperatives;

- Given the importance of horticultural crops, and the increasing use of imported seed to ensure that export quality standards are met,

the procedures for evaluating such varieties should be reviewed to ensure that it is done expeditiously;

The seed sector is already being subjected to reform, and a new seed law is being prepared. The underlying objective is to enlist increased entry and participation of the private sector in seed production and supply. The CAS is also being reorganized, with a view to terminating its seed production, processing and distribution activities, and transferring them to an Undersecretariat for the Production of Seed as a transitional measure prior to privatization.

6.30 Agrochemicals. Egyptian soils are poor in organic matter content and available nitrogen, but contain average amounts of phosphorous and potassium; the sandy and calcareous soils, particularly of the new lands, are deficient in macro and micro nutrients. Some of these problems have been compounded by the discontinuation of silt deposits after the construction of the high dam. Therefore, there is need for relatively high fertilizer application under intensive agriculture. Present fertilizer use in the country is very high, and rivals average consumption levels in some developed countries; for example, Egyptian farmers apply an average of 319 kg/ha of basic nutrients (N, P, and K), as compared to 346 kg/ha in Holland and 377 kg/ha in Japan (world average is estimated at 28 kg/ha). There is a need to undertake a closer assessment of fertilizer needs for the different crops (including that for microelements such as iron, zinc, copper, etc.), and developing recommendations which meet the specific needs of the different agro-climatic regions of the country. In the case of pesticides, these are mostly used for the cotton crop, where the Government continues to play a central role. To address the environmental concerns regarding this, there is need to actively pursue a program of integrated pest management (IPM), where the focus needs to be on interrupting the pest life cycle, use of modern biological pest control, adoption of improved cultural practices and judicious use of pesticides.

6.31 In terms of private sector involvement in the inputs trade, a decree passed in 1991 nullified earlier legislation which made the participation of private dealers in fertilizer trade illegal. Presently, an estimated 20-25 percent of fertilizer sales are handled by the private sector, with the remainder going through PBDAC and cooperatives; in this process, private dealers have also imported fertilizers and distributed them to farmers at non-subsidized prices.

6.32 Agricultural Mechanization: Primary farm mechanization is already well established for land preparation, threshing, water lifting and transport. Custom hire services are provided mostly by small private operators. There are other mechanized services offered by public sector companies, but their activities are being phased out as the useful life of their equipment fleet diminishes. Therefore, it is expected that the private sector will increasingly assume a larger role in providing, as well as in the operation and maintenance of farm machinery. Given the strong demand for such services, particularly in newly reclaimed lands, provision of long term credit and promotion of private custom hire services should be encouraged to stimulate intensive production. The Agricultural Engineering Research Institute is actively involved in research, adoption, training of SMSs and farmers in aspects of farm mechanization, provision of machinery services for demonstration purposes in farmers fields, and in the design of on-farm irrigation and drainage schemes. The Institute is also

involved in articulating agricultural modernization packages, and is responsible for ensuring that engineering standards are maintained. In this respect, the strategy for agricultural mechanization should be designed for: (i) solving constraints which have hampered the mechanization of Egyptian agriculture in the past and achieve maximum utilization efficiency of the limited available resources; (ii) improving water use efficiency through modern irrigation and drainage management and water conservation measures; and (iii) adapting modern mechanization systems for improving the efficiency of land and labor utilization, which may also provide opportunities for upgrading skills and employment. If the envisaged benefits from agricultural machinery are to be achieved, serious efforts should be taken to balance the roles of the public sector with those of the private sector in importation, testing, certification, etc., and in commercial production. This needs to be combined with strengthened extension activities, with suitable training programs for extension personnel and farmers. Private sector involvement in these activities would clearly be important, and should be actively encouraged.

C. Developing Rural Institutions

Rural Financial System

6.33 The rural financial system in Egypt is dominated by the Principal Bank for Development and Agricultural Credit (PBDAC), along with its 17 affiliated Banks for Development and Agricultural Credit, which have played a particularly dominant role in the agricultural sector. While there are 44 commercial banks, 33 investment and business banks and 4 specialized banks in the country, they have been minimally involved in rural finance so far. With its network of about 800 village banks and 4300 agencies, PBDAC has an extensive outreach of credit servicing centres in the rural areas. Of the total loans granted by the banking sector in 1991, only about nine percent were for agriculture; of these, about 75 percent were extended by PBDAC (totalling LE4.3 billion). While there are no firm data on the relative contribution of informal sources in meeting credit needs in the rural areas, it is not believed to be large; this is partially explained by the fact that input supply has historically been a monopoly of PBDAC. With deposit mobilization in the rural areas being extremely low, agricultural credit has been financed primarily from external sources; it is estimated that deposits from the rural areas represented only one percent of total deposits in the banking sector.

6.34 While PBDAC has an excellent record in recovering loans (averaging 99 percent over the past five years, which has declined to 94 percent in 1991), there are indications that it will face increasing difficulty in meeting the future credit demand of the agriculture sector. The dependence on deposits to finance lending has declined over the last five years, with a corresponding increase in commercial borrowings which come at a higher cost. While interest rates have been deregulated, an estimated 28 percent of PBDAC's loans in 1991 were lent at interest rates (11 to 14 percent) which were negative in real terms, for which it receives a subsidy reimbursement from the Government. In addition, long term external loans have helped PBDAC to keep its average cost of funds low; however, the present average interest yield of 14.1 percent on its loan portfolio is inadequate to cover the cost of commercial borrowing (about 16 percent at present) and administrative costs. Furthermore, with the ongoing program of

divestiture of trading activities, PBDAC's gross income from trading operations has declined from 37 percent of total gross income in 1990 to 27 percent in 1991; this has not yet been accompanied by a corresponding decrease in total staff. Finally, the capitalization of PBDAC is presently insufficient for the higher risks associated with its lending in the new economic environment. With subsidy incomes to be phased out soon and the likely need to increase loan provisioning, PBDAC needs to develop a strategy for realigning its interest rate structure, reducing its dependence on commercial bank borrowing, increase deposit mobilization and reduce its overhead costs.

6.35 PBDAC's lending operations as well as its deposit mobilization is primarily concentrated on the farming community; lending to agro-based businesses is limited, and to non-agricultural rural based enterprises insignificant; it also needs to improve its coverage of disadvantaged groups such as women and the landless. Consequently, in the context of promoting broad based rural development, there is scope to improve the financial services provided by the bank to the rural population. In addition, access to credit in the new lands is extremely limited, both on account of strict collateral requirements, as well as the absence of an adequate branch network in these areas.

6.36 Under an ongoing program, donor assistance is being provided to PBDAC to strengthen its credit operations, and to divest and privatize its non-banking activities. PBDAC is therefore in a transition phase. This transition must be carefully managed to ensure that the divestiture and privatization program takes place in an orderly and phased manner, that does not cause serious disruptions in services provided to farmers, which could in turn have important repercussions on agricultural output and incomes. In the context of the strategy, the bank is expected to play an important role, not only in providing credit to farmers and mobilizing savings, but also to act as a catalyst in promoting broad based rural development. While there are no restrictions on other banks to operate in rural areas, PBDAC is best placed at least in the immediate future, to perform this important role in the rural economy. Nevertheless, the bank is presently faced with a situation where it is attempting to reduce administrative and other burdens so as not to undermine its financial integrity. Consequently, there is merit in continuing to provide PBDAC with financial support during this transition phase, in the context of a clearly defined time bound program with specific performance targets, until it effects the transition and until competition in providing farmers services fully develops in the rural areas. At the same time, the regulatory environment within which the overall financial sector operates is being subjected to review and change[12]. In defining a phased program for PBDAC for the future, it is necessary to recognize that even if there is a role for Government intervention in the rural credit market, the intervention should not crowd out the participation of the private sector; there should not be general interest rate subsidies for the sector, even though there may be a case for subsidizing lending costs to small farmers. In this event, subsidies should be transparent, as a budgetary item. PBDAC should be allowed the autonomy to establish its interest rate policy with due regard to its financial viability and the prevailing trends in the banking sector. Furthermore, within the context of the reform program, particularly the proposed financial sector and regulatory reforms, it is hoped that the involvement of other banks

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12/ See World Bank, "Financial Policy for Adjustment and Growth", June 1992 (Unpublished Draft).

in the rural areas will increase, thereby creating a more competitive environment in rural financial markets.

6.37 Based on the above framework, and the underlying objective that PBDAC should further develop into an efficient and viable rural financial intermediary to respond to the needs of a liberalized rural sector, the following recommendations are made:

- The long term objective should be to divest PBDAC of its non-banking activities. Options to be considered include transferring the non-banking activities to a subsidiary to be managed separately. Studies on how this could be best undertaken in a phased manner are presently ongoing with donor support.

- A phased program for redeploying existing staff should be undertaken, through incentives for voluntary retirement, encouragement for staff to take over divested operations, such as in input trading, retraining schemes, etc.

- The capital base of PBDAC needs to be strengthened, combined with measures (including, improved village bank facilities, introduction of mobile banks, and training of staff) aimed at increasing deposit mobilization not only among farmers, but from the entire rural community. The interest rate structure should be rationalized so as to put the bank on a sound financial footing; deposit rates should be set at competitive levels, while lending rates should be sufficient to provide an adequate spread for fully recovering costs and providing a reasonable profit.

- Activities should be diversified from largely agricultural lending to overall rural lending; lending policies should be reviewed, so as not to inhibit lending for long term purposes (loans for periods in excess of 3 years represented only 1 percent of loans in 1991). This would expand access to credit by groups such as women and landless workers. In addition, a cooperative financing program should be formulated to provide necessary financing to strengthen and restructure existing cooperatives into market oriented enterprises.

6.38 In order to address the issue of credit availability in the new lands, there are various alternatives which could be considered with the underlying objective of spreading the initial risks of lending to small farmers in these areas between the bank, farmers and the Government. The specific risks (such as are normal in the early stages of the process of land reclamation) attached to special programs emphasized by the Government as part of the overall development strategy, should not be <u>wholly</u> borne by the financing agency. Options include: revision of the terms and conditions of lending to incorporate, among others, longer repayment periods, innovative collateral requirements; the setting up of a loan guarantee scheme (with the scheme underwritten from contributions from the bank, Government and farmers), which would not cover the general risks of PBDAC's lending, but would be targeted at clearly defined activities, such as in the new lands, where the initial risks of lending are recognised to be high. In addition, the branch network of PBDAC in the new lands needs to be enlarged.

Voluntary Farmer Organizations

6.39 The cooperative system presently in place was largely organized and controlled by the government, to support the earlier system of input distribution and the marketing of the controlled crops. Membership was mandatory. There was a proliferation of cooperatives, with three national unions organized along geographical lines and 11 national unions along commodity lines, with a combined total of over 6400 cooperatives. Since the system was largely aimed at supporting the old Government functions now being transferred to the private sector, the existing cooperative law is restrictive, with little flexibility for cooperatives to develop self-reliance and pursue initiatives. Furthermore, savings cooperatives were not encouraged; hence, there are no cooperatives which mobilize savings in the rural areas.

6.40 With liberalization, cooperatives are technically free from Government control. However there are two issues relevant in the context of the transition period. Firstly, while steps are being taken to liberalize the cooperative sector, effective implementation requires both new legislation and awareness of the changes at the lowest levels of the system. Secondly, the ability of the cooperatives to fully take over some of the previous Government responsibilities need to be reviewed to enable a trouble free process of change. Cooperatives are now allowed to engage in any business but farmers have the option of selling to any outlet. Consequently, cooperatives must now compete on the basis of price and efficiency of their service.

6.41 Within the context of rural development, cooperatives could play a significant role in providing services to farmers in the areas of input distribution and marketing, and in promoting initiatives for rural diversification. Initial indications are that the volume of business of cooperatives has significantly declined. The future success of the cooperative system will depend on how well the system will be restructured, financed and managed. Presently, there are too many cooperative organizations to permit an efficient operation of the whole system; in addition, they are still structured along the old lines. For revitalizing the cooperative system on the basis of efficiency and truly private initiatives, the following actions are proposed:

- The introduction of new cooperative legislation which will permit flexibility for cooperatives to react to market forces and take advantage of business opportunities. Underlying it would be the need to free the cooperative system of Government involvement, with membership on a voluntary basis, and the importance of ensuring that cooperatives generate their own financing;

- A detailed review of existing cooperatives should be undertaken, with a view to developing a program for restructuring and strengthening the overall system. The underlying objective should be to reduce the number of cooperatives, possibly through encouraging mergers, and to wean them away from Government control. The formation of special farmer groupings, such as water user associations should be encouraged.

- An aggressive and sustained cooperative education and training program should be undertaken, combined with efforts aimed at

learning from the experience of cooperative movements in other countries.

- While cooperatives should have free access to financing, this must be made available within the context of financially viable ventures combined with an effective auditing system. The organization of savings cooperatives should be encouraged.

Within the above context, it is necessary to recognize that experience in other countries has shown that success with cooperative movements is not easily assured; among other factors, key elements of success include total participation of all members, transparency and complete openness in all cooperative activities and financial transactions, and a dedicated and well trained management system. In addition, input supply and marketing cooperatives have generally been far more successful in establishing themselves on a sustainable basis, as compared to production based cooperatives.

D. Rural Women in Agriculture

6.42 Egyptian women represent an important human resource for promoting the agriculture development process; yet very little systematic attention is paid to their needs. Close to 47 percent of the total active female population in Egypt is engaged in agricultural work. Due to male out-migration to seek urban or regional job opportunities, many are effectively Head of Households who have to make the daily decisions. Women participate in virtually all facets of agricultural activities, including planting, weeding, irrigating, harvesting and marketing. Studies have shown that in lower Egypt 62 percent of the women plant crops, 62 percent irrigate, while 50 percent plough; in Upper Egypt, comparable figures for these activities are 34, 35 and 11 percent. Livestock and animal husbandry is an area in which women are particularly prominent with one study estimating about 70 percent of women's annual working time devoted to animal husbandry. Their participation in processing and marketing presents an opportunity to deal with issues related to post-harvest losses which are significant in Egypt. Targeting women with new techniques and methods could lead to substantial reductions in these losses. In addition women are also engaged in handicraft activities linked to agricultural by products such as basket and carpet weaving.

6.43 Positive developments in improving the status of women has taken place in a number of areas. However, various constraints remain, mainly arising from cultural and social factors. The more severe constraints include high fertility, high maternal and child mortality, illiteracy, and lack of access to resources (such as, agricultural services related to extension and credit, and thereby to input supplies and marketing outlets) for increasing productivity and return in agricultural and other rural enterprises. With regard to extension, the existing extension service is geared to serve male farmers; in many Governorates, there are only a handful of skilled female extension agents. In the case of credit, problems of collateral requirements, and illiteracy constrain women's access to credit. Furthermore, women's access to governmental decision making processes is limited and there are few institutional mechanisms that can ensure that their concerns are integrated into the planning and implementation process.

6.44 In view of the above constraints, rural women's opportunities for raising their productivity and thereby increasing both household and national income remains very limited. In order to remedy this situation, the following recommendations are made:

- An information and data-base on women's activities, contributions and constraints needs to be developed; to be used as a tool by policy makers in better planning for improving the contribution by women in on-farm and off-farm activities in the rural areas;

- Improve access to information and training for women, supported by SMSs and local women leaders as disseminators of information; while it may be inappropriate to suggest development of a parallel female extension service, it is clear that present numbers of female extension staff need to be increased, and more importantly, relevant training similar to that of the male extension agents be provided;

- Reexamine research programs to ensure that research relevant to women's concerns in agriculture is undertaken, for example in labor saving food processing technologies, techniques to reduce post harvest losses, improvement of small scale dairy processing techniques, etc.;

- Improve access of women to credit through innovative credit programs, reviewing collateral requirements and introducing options such as group guarantee schemes, and introducing training of bank staff in this regard;

- Develop, test and evaluate approaches for assisting women to organize themselves into groups or cooperatives for small scale rural enterprises;

- Complement the above with improved access to health and relevant adult education.

6.45 With regard to institutional aspects, MALR has established the position of an adviser to the Minister on Women's issues. This is a commendable development. The main task of the adviser is to ensure the integration of women's concerns in the policy, planning and implementation activities of the Ministry. In particular, these concerns should pervade the formulation and implementation of programs and projects emanating from the agricultural strategy for the 1990s and beyond. The adviser should also ensure coordination with other ministries and agencies working with women in rural areas. In the medium term, a broader institutional coverage of WID issues should be developed, perhaps through a unit in the Minister's Office and strengthening of present units at the Governorate level.

6.46 In the medium to long term, efforts must be intensified to develop training programs for adult women that are relevant to their cultural and rural environment, as well as to improve the access to basic resources such as safe drinking water and health services. Increasing the primary and secondary school enrollment of young girls and developing curriculum relevant to their rural environment is a further important aspect so as to ensure that the disadvantages of present adult rural women do not get repeated in the future and to further

ensure that the next generation of rural women can fully benefit from the new technological developments in agriculture.

VII. KEY ELEMENTS OF A STRATEGY

7.01 Following on from the review of the sector, including present constraints and potentials for future growth, this chapter summarizes the key elements of a proposed strategy for the agricultural sector for the 1990s. In outlining this strategy, the underlying focus is to build on the momentum already created by the reforms initiated by MALR in 1986 for the agriculture sector, and by the comprehensive economic reform program adopted by the Government of President Mubarak in 1990. In a period of worldwide change, measures are increasingly being adopted in numerous countries, including Egypt, which emphasize the need for revisiting earlier held views on the role of the Government in managing economic decision making, without compromising on the underlying tenets of Government responsibility for ensuring growth and the basic needs of the people. While clearly the Government has an important role to play in national economic management, what is necessary is a clear definition of this role, and implementation of measures necessary for it to fulfil this role without undermining incentives for the other participants of the economy who would ensure growth.

7.02 Progress has been made over the last few years in implementing reforms which are expected to revitalize the agriculture sector. To contribute towards achieving the key objectives of the economic reform program - achieve sustainable macroeconomic reform, renew economic growth and minimize negative impacts on the poor - it is now necessary to complete the reform process in the agriculture sector. While the growth rates in agriculture have been modest over the last decade, there are signs of a turnaround; this change needs to be fostered and reinforced through a combination of policy and institutional reforms, to which the Government is already committed, complemented by a program of investments which will ensure a vigorous supply response from the sector.

7.03 Certain key themes underlie the strategy articulated in this report; the principal ones include the following:

- need for implementing measures aimed at ensuring efficiency and environmental sustainability in the management and utilization of the most important natural resources of the country, i.e. water and productive land;

- emphasis on using free market considerations, in particular the promotion of the private sector, in resource allocations. In this regard, it is recognized that at present world markets for certain key commodities are distorted; however, the ongoing Uruguay round discussions offer possibilities for new opportunities;

- the need for implementing measures for the agriculture sector within the context of an overall rural development strategy, which should encompass within it aspects related to diversifying rural activities and to providing key services, in particular, the intensification of essential social programs for health and education;

- recognition of the social and political issues, and the need for social safety nets to assist in absorbing some of the potential dislocations which will inevitably accrue through the implementation of the comprehensive reform program; and

- initiating a program of institutional reforms, so as to streamline the array of institutions presently serving the agriculture sector, and make them more responsive to its needs.

Based on the above broad themes, various recommendations have been made within the different sections of this report; set out below is the outline of a program for implementation within a medium term framework in order to achieve the objectives set for the sector. Essentially, the proposed program is aimed at eliminating policy distortions and strengthening the institutional framework, for meeting the key objective of increasing agricultural production and reducing unit costs of production. Technology generation and its effective dissemination among the potential users would form a key element of the strategy.

A. Policy

7.04 The proposed program of policy reforms is principally aimed at ensuring efficiency in resource allocation, and would encompass the following key areas:

- Based on the findings of the ongoing cost recovery study, outlining a program for the setting up of irrigation and drainage service fees. The issue confronting the Government is how to initiate measures whereby farmers would contribute more towards the costs of the irrigation and drainage system, which would be acceptable from a socio-political perspective. Clearly, a two pronged approach needs to be pursued. Firstly, water saving irrigation technologies which are technically and economically feasible need to be encouraged. Secondly, cost recovery of the O&M costs of the irrigation network, leading eventually to price incentives for more efficient use of water, also have to be introduced.

- Completing the process of liberalizing the cotton subsector, since prevailing distortions are inhibiting the sector's ability to maximize potential benefits from this important crop. The program should include the elimination of area allotments, the removal of Government monopsony procurement and the related restrictions on private sector trading, freeing of cotton prices and the establishment of a cotton exchange, and removing restrictions on cotton imports.

- Complete the process of eliminating all input subsidies, and liberalize restrictions on the import of agricultural equipment.

- Through a detailed subsector study of the sugar sector, identify a phased program for the liberalization of the sugar subsector; as a first step, set the sugarcane procurement price at levels equal to its economic price;

- Take steps to formulate/revise the rural land tax policy, particularly with a view to reassessing the present level of land tax and bringing farmers owning between 2 to 3 feddan within the purview of the land tax system, as well as eliminating the rent control aspects of the agrarian reform laws which impact on agricultural land;

- Review the present criteria for selecting graduates to whom allocations of newly reclaimed land is made, with a view to targeting mainly those who hold agriculture related qualifications, or have a background or expressed interest in agriculture; in addition, revise the presently restrictive terms of lending to smallholder farmers who are newly resettled in the new lands, backed by appropriate guarantee mechanisms;

- The above measures should be complemented by concerted efforts to expedite the program of privatization, on which the Government has already embarked. While for the newly created holding companies this is being undertaken through the recently established Public Enterprise Office, there remain various MALR activities which are outside these holding companies. The privatization of commercial activities which remain within MALR needs to be pursued under a specific MALR managed program.

B. Institutional

7.05 While the elimination of the remaining policy distortions is clearly a prerequisite for generating growth from the agriculture sector, the removal of institutional constraints which prevent the full effects of policy changes from being realized is an objective of equal importance. The many years of public sector control over the economy has led to a situation where there remains in the private sector a lack of confidence in the Government's commitment to reform, leading to its reluctance to participate and invest. The following program of actions is proposed to address prevailing constraints, and to make the agricultural institutions more responsive to the needs of the sector.

- Within the framework of the new role seen for MALR in the future, undertake a detailed study of the sector institutions, with a view to outlining a phased program for streamlining, restructuring and strengthening them; in this regard, measures for bringing about timely and closer coordination between MALR and MPWWR should be identified;

- the above should be complemented by a detailed review of all existing legislation related to the agriculture sector with a view to simplifying/reducing their numbers, and to better define the Government's regulatory functions;

- Both from the perspective of human resources and poverty, there is need for developing broader institutional coverage and more innovative actions at both the Central and Governorate levels, for dealing with issues related to better utilizing the female resources

presently involved in the rural sector, with a view to integrating these concerns in the policy, planning and implementation stages of Government programs;

- Given the importance of research there is need to establish a more focussed research institutional mechanism for preparing and reviewing agricultural research programs of the various agencies, supported by a core group of eminent international scientists, and strengthened links with the international research network;

- To better able to disseminate the findings of the agricultural research system, restructure the agricultural extension system, particularly with a view to unifying dispersed efforts as at present, strengthen the on-farm water management aspects of agricultural extension (in particular for providing an efficient irrigation advisory service to farmers) and to bring all field services under the authority of the respective Governor; in addition, support private sector initiatives in extension;

- Within the framework for an improved agricultural support services structure nationwide, implement a comprehensive targeted support service program for the new lands, which would need to be more intensive and include aspects related to research, extension, training, credit, input supply and produce marketing;

- In order to better focus PBDAC's activities on its primary rural finance objectives, accelerate the program of divestiture of PBDAC's trading activities, including a phased program of redeploying excess staff; to support such a program strengthen PBDAC's capital base and rationalize its interest rate structure; strengthen the bank's capabilities specially with regard to deposit mobilization and diversified lending; establish a loan guarantee mechanism for new lands lending as well as for other viable operations for which borrowers may have inadequate security.

C. Investment Program

7.06 To support the program of policy reforms and institutional upgrading, a clearly defined public investment program is essential to ensure that the expected supply response from the sector is generated. At the same time it is important to recognize that although the level of public investment directly affects economic activity, it is the subsectoral distribution of investments and the quality of the project implementation within each subsector, that influences the rate of growth of the sector; in addition, there is need to promote private sector investment. As outlined in the Bank's review of the Public Sector Investment Program, project selection for public sector involvement should emphasize the following:

- areas that present large externalities, where the private sector would normally underinvest;

- where such investment is necessary to attract private investment, i.e. where the Government's investment would act as a catalyst ;

- where Government is needed to address equity and long term or broader development issues that are not normally tackled by the private sector.

The other key considerations in outlining an investment program for the agricultural sector should be to undertake investments aimed at the more efficient utilization of the country's limited water resources, and at better managing and utilizing the scarce agricultural land resources available to Egypt.

7.07 The World Bank has recently carried out a detailed review of the Government's proposed Public Sector Investment Program for the Third Five Year Plan. Allocations of public sector investment during the Third Plan indicate an allocation of about 13.5 percent of total proposed outlays (of about LE70 billion) for the agriculture sector; this compares with an allocation (actual) of only 6.9 percent during the Second Plan. To complement the findings of this review[13], and going beyond the proposals and the time frame of the Third Plan, this section briefly presents broad themes for public investment programming in the medium term future, with a view to providing a framework for Government decisions in this regard; this is set within the context of the role foreseen for the Government in the future. It is worth emphasizing at the outset that in terms of outlining an approach for public sector investments, different strategies are needed for the old lands as opposed to the new lands, which should be incorporated into the design of specific projects.

- For the old lands, the emphasis needs to be on measures aimed at increasing crop yield levels. At the same time, initiatives are needed for promoting the diversification of the rural economy, and to strengthening the respective Governorate institutional capabilities for providing key support services;

- For the new and old-new lands, the focus has got to be on tackling on an urgent basis the problem of continuing low average yields, which are much below the technical potential of the areas reclaimed. This needs to be combined with measures aimed at Government divestment of reclaimed lands still owned and managed by the public sector.

Furthermore, in the context of setting priorities and for allocating resources between different activities, economic rates of return estimated either by the Government or by international agencies, while undertaking feasibility studies or project preparation/appraisals for the different types of investments, provide a good initial measure on which to base future decisions. These show higher returns on investments for vertical expansion in agriculture, in particular dealing with better water resource management (24 percent for investments in drainage for the old lands and for rehabilitating pumping stations, 21 percent for improvement of the old new lands, around 20 percent for rehabilitation of control structures, and between 15-24 percent for the irrigation improvement

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13/ World Bank, "Arab Republic of Egypt, Public Sector Investment Review, 1992" (Unpublished draft).

program in the old lands); in comparison, estimates of economic rates of return for investments in new lands reclamation range from less than 11 percent to 14 percent.

7.08 Program for Improved Water Resources Utilization/On Farm Water Management. The major limiting factor to agricultural growth is water; consequently, the most important investments should be those that raise the rate of return to water use. The highest priority in this regard would go to investments that improve the irrigation and drainage system management; rehabilitate or renew deteriorated infrastructure; remove drainage constraints; and improve the efficiency of on farm water use and management. The developments should be supported by an improved agro-meteorological data network. Briefly, the program should include the following elements:

- Investments for improved O&M of the irrigation and drainage system, given the reportedly substantial scope for further improvement in system management;

- The case for rehabilitating in-channel structures and pumping stations is compelling to keep the system operating efficiently; there are opportunities for improving the selection and design of canal structures, allowing possibilities for innovation;

- There is clear priority for continuing, and to the extent feasible, accelerating the drainage program; there should be emphasis on assisting local contractors to improve their management skills, and to assist private contractors to participate in the drainage program;

- There is sufficient evidence to indicate that irrigation improvements in the old lands enhance system efficiency and increase crop production; studies are needed to identify priority areas and to justify the technical and economic viability of an enlarged irrigation improvement program;

- Finally, there is pressing need for undertaking a phased program for supporting developments, including investments for improving and rehabilitating tertiary level irrigation infrastructure, training and the establishment of tertiary level farmer organizations, aimed at improving on-farm water management.

7.09 Program for the New and Old-New Lands. From the Government's perspective, horizontal expansion through increased land reclamation is a priority. While various non-economic considerations give the expansion of the agricultural land base a high national profile, it is important that investments in land reclamation should be technically feasible and economically viable. At the same time there is the basic issue of ensuring balance between investments in creating new agricultural lands, as opposed to those for agricultural intensification in the already cultivated areas. Given the large externalities which can be tapped from intensifying agriculture on lands on which significant investments have already been made, and the need for quick yielding investments at this time of reform, the medium term investment program should adopt the following approach:

- Priority should be given to intensifying agriculture on the already reclaimed areas, through a series of area specific investments projects targeted in the new lands lying in the West Delta (i.e. along the Nubariya and El Nasr canals) and the East Delta (i.e. along the Ismailia and El Salaam canals), as well as specific areas lying in Upper Egypt;

- Underlying the program should be a clearly defined and focussed institutional framework for managing the program and for supporting newly settled farmers in the new lands, the lack of which has been one of the most important factors responsible for the realized benefits from these investments not matching expectations;

- In the old-new lands (totalling about 900,000 feddan), there is need for investment in drainage, rehabilitation of water control structures, and for making improvements to on-farm irrigation systems, through which high returns can be expected in a relatively short time and at low unit costs;

- Within the above context, a more modest new lands reclamation program should be undertaken, within the limits of assured water supplies, selectively based on identified high potential areas which are expected to yield higher than the average returns to land reclamation.

7.10 Agricultural Research and Extension. The ongoing externally financed national program to strengthen agricultural research and extension is expected to come to an end in 1994. Improved agricultural research is a critical input to increased agricultural productivity; this needs to be complemented by a strengthened extension service that Egypt will badly need to face the technological challenges of the 1990s. In this context, the importance of improved fodder production and its utilization on-farm needs to be emphasized in the strengthened research and extension program, to better use the water and land resources of the country. The implementation of a well defined follow on program is consequently of high priority, with its design based on the recommendations made in this report.

7.11 Agricultural Marketing and Export Promotion. Initiatives to improve the marketing system is a clear priority, if the benefits from increased agricultural production are to be fully realized. However, the long term program for marketing development should be centered around promoting private sector initiatives and strengthening the cooperatives. Other than further liberalizing the regulatory environment within which the private sector has been operating in the past, there is need for the financial system to be strengthened in order that it can be more responsive to specific private sector needs. The public sector should refrain from direct intervention in marketing; emphasis on public investments should be in areas where the Government can perform a catalytic role in encouraging private sector participation. This can be done by creating essential infrastructure, such as rural roads and market centers, restructuring and strengthening a privately managed cooperative system, and creating a market promotion and information disseminating service in the public sector particularly to support the new agricultural areas where private sector investment may initially be slow in emerging.

7.12 Potential Studies. The agriculture sector is going through a period of change, which is accompanied by a re-evaluation of the future role of the Government. In order to support the Government in managing this change better, provide it with meaningful options for consideration in taking decisions, and to review alternatives for taking investment programming decisions, there are various potential areas which lend themselves to detailed studies or grant financed technical assistance operations. Set out below are certain areas which merit priority attention in this context:

- In view of the present lack of knowledge and data on rural financial markets, a rural financial market study should be undertaken to assess the presently available sources of credit in rural areas, prospective demand for credit and investment opportunities, including for rural based enterprises, and of sources of savings. In this context, the rural land markets should also be reviewed to assess the linkage of land issues with rural credit markets;

- Steps for improving the overall water resources management in Egypt is a critical part of the development strategy for the sector. Consequently, a technical assistance program is needed for preparing a 10 year program for nationwide irrigation improvement;

- A detailed fisheries sub-sector study, with a view to outlining the potentials and constraints, as well as a strategy for the development of the subsector;

- Formulation of an action plan for implementing measures aimed at liberalizing the sugar subsector, based on past and ongoing studies;

- A study of the public agencies involved in agriculture and food related issues, in order to draw up a phased program for restructuring and strengthening them. Given the magnitude of the issues involved, and that various socio-political considerations will need to be taken into account, it is recognized that this is a difficult area; consequently, a long term program needs to be articulated, which should provide the basis for a phased program for change;

- A technical assistance program for strengthening the planning, policy analysis and monitoring capabilities of both MALR and MPWWR;

- Technical assistance for strengthening the environmental assessment capabilities of agencies involved in preparing and implementing investment projects, including a program of training;

- Rural women are involved in numerous agricultural activities, employment in which may be influenced in the future by the secondary effects of agricultural modernization; there is a need for a study to identify innovative approaches for addressing potential negative effects from such changes in the rural economy;

- A technical assistance program to strengthen policy analysis and planning related to the integration of women's issues into the mainstream activities at the Ministry and Governorate level;

- A technical assistance program to review in detail the existing cooperative system, with a view to outlining a phased program aimed at restructuring and strengthening it.

ARAB REPUBLIC OF EGYPT

AN AGRICULTURAL STRATEGY FOR THE 1990s

POTENTIAL PROJECTS IN THE AGRICULTURE SECTOR

1. Agriculture Sector Investment Loan. Following on from the work done by the Government and the international agencies for preparing the Agriculture Sector Strategy for the 1990s, and to take advantage of the momentum presently in place, it is proposed that an Agriculture Sector Investment Loan jointly financed by the World Bank and other interested donors should be considered, with its primary objective being to provide assistance to the Government in completing its program of policy and institutional reforms for the agriculture sector, with a view to increasing sectoral efficiency and achieving sustainable agricultural growth and an expansion in exports. Among others, the proposed sector operation would address the following objectives: initiate implementation of a phased program for introducing water charges, investments for irrigation improvement, tertiary level institutional strengthening for improved on-farm water management, phased program for privatizing the commercial operations of MALR which remain outside the holding companies, and initiate a program for restructuring and strengthening the overall institutional framework for supporting the agriculture sector.

2. Potential Projects for Improved Water Resources Utilisation. The major limiting factor to agricultural growth is water; consequently, the most important investments should be those that raise the rate of return to water use. The highest priority in this regard would go to investments that improve the irrigation and drainage system management; rehabilitate or renew deteriorated infrastructure; remove drainage constraints; and improve the efficiency of water use. Briefly set out below are potential projects which should be considered while developing an investment program:

- Irrigation Improvement Program. There is sufficient evidence to indicate that irrigation improvements in the old lands enhance system efficiency and increase crop production; studies are needed to identify priority areas and to justify the technical and economic viability of an enlarged irrigation improvement program. Consulting engineers could be recruited to formulate a ten-year plus program for a phased program of nationwide irrigation improvement. Based on their findings, the first time slice could be financed under the proposed Agriculture Sector Investment Loan.

- On-farm Water Management Program. Given its importance, a program to support developments aimed at improving on-farm water management is a pressing need, and should be undertaken in a manner which is complementary to the above mentioned irrigation improvement program.

- System Operation and Major Infrastructure Rehabilitation. The case for rehabilitating in-channel structures and constructing new control structures is essentially compelling to keep the system operating. The MPWWR is implementing an emergency rehabilitation program under the USAID financed Irrigation Management Systems Project which is expected to end in FY 95; a supplementary program is needed to accelerate work markedly over the next decade based on

careful ordering of priorities. This could also include investments for improved system operation, given the reportedly substantial scope for further improvement in system management. There are opportunities for improving the selection and design of canal structures, allowing possibilities for innovation. For pumping, efforts should made to bring about improvements in operating reliability and automation. For the longer term, given that Nag Hammadi is presently being studied, the condition of the remaining barrages, especially those at Assiut and Zifta, should be examined and plans for any needed rehabilitation and renewal developed.

- Second time slice of the National Drainage Program. After completion of the first time slice of this program, additional areas totalling about 1.0 million feddan will require field drainage. There is need to consider measures needed to assist local contractors to improve their potential and management skills, and to encourage more private sector contractors to participate in the drainage program.

- Replacement of Nag Hammadi Barrage. A feasibility for this project is presently ongoing. The project will be costly, and require commitment of substantial resources by the Government. Further processing of this proposal should be based on the outcome of the feasibility study, which is reportedly reviewing options for improving the existing structure with or without power, and a new dam.

- Pumping Stations Rehabilitation III. The ongoing project for rehabilitating pumping stations is scheduled to end in 1996. The program for rehabilitating pumping stations will need to be continued with a follow up project.

3. Potential Projects for the New and Old-New Lands. Given the large externalities which can be tapped from intensifying agriculture on lands on which significant investments have already been made, and the need for quick yielding investments at this time of reform, the medium term investment program should consider the following potential projects:

- Program for Agricultural Intensification in the New Lands. The program could be based on a series of area specific investments projects targeted in the already or substantially reclaimed new lands lying in:

- the West Delta (i.e. along the Nubariya and El Nasr canals), including the West Nubaria Agricultural Intensification Project and the New Lands Agricultural Services Project;

- the East Delta (i.e. along the Ismailia and El Salaam canals);

- specific areas lying in Upper Egypt;

- Program for completing ongoing land reclamation projects on an accelerated basis, to ensure early commencement of benefits;

These projects would possibly take a "rural development" type of approach to provide any missing infrastructure, as well as ensure access to credit, technology package, processing, marketing, etc.; the program would support the

Government's efforts at divesting the lands presently held by the public sector. Underlying the program should be a clearly defined and focussed institutional framework for managing the program and for supporting newly settled farmers in the new lands, the lack of which has been one of the most important factors responsible for the realised benefits from these investments not matching expectations.

4. Cotton and Sugarcane Subsector Operations. In order to support the Government in implementing a program of reforms for these subsectors, operations will be needed to address the policy, technical, infrastuctural and institutional issues, to ensure sustainability and efficiency in implementation of the proposed reforms.

5. National Agricultural Research and Extension Project. The ongoing externally financed national program to strengthen agricultural research and extension is expected to come to an end in 1994. Improved agricultural research is a critical input to increased agricultural productivity; this needs to be complemented by a strengthened extension service that Egypt will badly need to face the technological challenges of the 1990s. The implementation of a well defined follow on program is consequently of high priority, and which should include aspects dealing with on-farm water management, improved and innovative methods for the transfer of technology, training and human resource development, and improved improved information and documentation systems. The program could be complemented with area specific agricultural intensification subprojects, with particular focus on strengthening the full complement of agricultural support services specially targeted on the old lands.

6. Agricultural Modernization Project. The project would support the program for intensifying agricultural production, encourage the more widespread adoption of improved technologies and promote rural enterprises, and initiate a program for the restructuring and strengthening PBDAC's rural banking activities.

7. Marsah Matruah Resource Management Project. The project would initiate measures for improved natural resource management on a sustainable basis, and improve the living conditions of communities located in identified rainfed based agricultural areas. It would also aim at developing replicable approaches for addressing the development needs for such communities.

8. Agricultural Marketing and Export Promotion. Initiatives to improve the marketing system is a clear priority, if the benefits from increased agricultural production are to be fully realised. However, the long term program for marketing development should be centered around promoting private sector initiatives. Other than further liberalizing the regulatory environment within which the private sector has been operating in the past, there is need for the financial system to be strengthened in order that it can be more responsive to specific private sector needs. The public sector should refrain from direct intervention in marketing; emphasis on public investments should be in areas where the Government can perform a catalytic role in encouraging private sector participation. This can be done by creating essential infrastructure, such as rural roads and market centres, restructuring and strengthening a privately managed cooperative system, and creating a market promotion and information disseminating service in the public sector particularly to support the new agricultural areas where private sector investment may initially be slow in emerging.

9. Cooperatives Development. The cooperatives system in Egypt is presently going through a period of transition, and considerable changes are foreseen to take place in the medium term; a new cooperatives law is also being drafted. There is need for undertaking a program to assist in guiding the process of change, and to develop a strengthened and privately managed cooperative system.

10. Inland Fisheries Project. With its vast coastline and inland water resources, Egypt is well positioned to develop its marine, inland fisheries resources. Based on the findings of the proposed fisheries subsector review, a project for developing the potential in inland fisheries could emerge as a priority.

11. Potential Studies. The agriculture sector is going through a period of change, which is accompanied by a re-evaluation of the future role of the Government. In order to support the Government in managing this change better, provide it with meaningful options for consideration in taking decisions, and to review alternatives for taking investment programming decisions, there are various potential areas which lend themselves to detailed studies or grant financed technical assistance operations. Set out below are certain areas which merit priority attention in this context:

- The earlier proposed study of the MALR institutions, in order to draw up a phased program for restructuring and strengthening them;

- A technical assistance program for strengthening the planning and policy analysis capabilities of both MALR and MPWWR, with particular emphasis on establishing a well defined monitoring and evaluation structure for ensuring effective implementation of the investment program;

- A technical assistance program to recruit consulting engineers who would prepare a 10 year program for nationwide irrigation improvement;

- Technical assistance for strengthening the environmental assessment capabilities of agencies involved in preparing and implementing investment projects, including a program of training.

- Rural women are involved in numerous agricultural activities, employment in which may be influenced in the future by the secondary effects of agricultural modernization; there is a need for a study to identify innovative approaches for creating new gainful employment for women in the rural economy;

- A technical assistance program to review in detail the existing cooperative system, with a view to outlining a phased program aimed at restructuring and strengthening it;

- A study to identify measures for increasing rural savings, and to identify steps necessary for promoting rural enterprises and other employment creating ventures, including the acceleration of field level implementation of policy changes already carried out.

ARAB REPUBLIC OF EGYPT

AN AGRICULTURAL STRATEGY FOR THE 1990s

THE ECONOMICS OF CROP AND LIVESTOCK PRODUCTION

1. The competitiveness of the various crops and livestock products has been analyzed through the calculation of domestic resource costs (DRCs). DRCs were calculated using the simple Balassa approach, dividing the economic value of domestic resource inputs by the economic value added through the production. Domestic resources are land, labour, capital (where included in the budgets) and water. The economic value added is the shadow priced return to these domestic resources including residual returns. A DRC below 1 indicates the existence of a cost advantage in production of the specific commodity.

2. For the purpose of the analysis, a serious effort has been made to gather reliable price data and compile comparable crop budgets. These efforts were inhibited by the difficulty of studying the situation in the midst of the implementation of a comprehensive program of economic reform. Therefore, it could not always be secured that all data is completely consistent. Furthermore, while a large volume of relevant data as well as sufficient computer hardware are available, data is often fragmented, access to data and exchange of data is sometimes restricted, and information management and analysis skills are lacking. Nevertheless, data has been compiled for the analysis with the assistance of the Government, and while differences may exist between different data sets, they would not affect the qualitative conclusions in this report.

3. Crop budgets on a per-feddan basis were compiled for the major field crops; these are shown in Attachment A[1]. All prices in the budgets refer to price levels at the end of 1991, which were obtained from MALR. Family labour was included as a cost item in all budgets; the net return calculated is consequently a residual return to management, risk and capital. Export or import parity prices were calculated, based on World Bank Commodity Price projections, to arrive at economic prices of tradable input and output commodities. Even though Egypt is rice exporter, the economic analysis using export parity prices shows clearly that Egypt is not cost competitive in production of rice for export markets. Assuming that rice production would subsequently be reduced below the level of domestic consumption, it was assessed whether Egypt is at least competitive on the domestic import market. Therefore, import parity prices were calculated as well. Beans were assumed to be non-tradable; however, some import has taken place recently and an import parity price is calculated for supplementary analysis. Berseem itself is not traded; it has been evaluated at the economic price of a substitution package of tradable feed components. Domestically produced feed is evaluated at the economic price of traded inputs.

1/ The technical coefficients for the crop budgets were obtained from the Chemonics survey for the 1989 summer crop and the 1989-1990 winter crop. Mission estimates of technical coefficients for sugar beet are based on the "Sugar Study for Egypt in 2010" by the National Council for Production and Economic Affairs, Industry Division. 1987, Cairo. Estimates for sunflower are based on the IFC report "Pioneer Egypt Edible Oil Company, SAE".

4. While the DRC analysis provides important information for assessing the competitiveness of products in the current situation, it is important to consider the dynamic aspects that may change inherently static measures such as DRCs. The dynamic factors are addressed through sensitivity analysis and are particularly important in the current state of transition since farmers' response to changing price signals (for example changes in yield due to changing allocation of labour) could impact considerably on the assessment of competitiveness of individual commodities. Also, analysis of competitiveness is based on partial analysis taking prices as given. Therefore, recommendations can be made only for marginal changes in production patterns. The benefits of any potential large-scale substitution would have to be verified in a general equilibrium context which is beyond the scope of this report.

5. The analysis of DRCs focuses on the major field crops and selected livestock products. For the analysis of commodities for which special expertise is required in production, or for which processing and export channels are not developed yet, cost and benefit estimates depend on the availability of such expertise and marketing channels. Low DRCs for such products may, therefore, be misleading if specialized inputs cannot be obtained or markets prove to be very narrow. Also, due to this report's focus on the economics of crop and livestock production, analysis of the processing and marketing channels has not been of sufficient depth to present DRC calculations with sufficient confidence for products involving major industrial processing. Correspondingly, the analysis of citrus and vegetable products should be interpreted with caution.

Table 1: Competitiveness of Major Crops

Crop	Financial Net Return	Economic Net Return	Value Added	Domestic Resource Cost	Nominal Rate of Protection	Effective Rate of Protection
Wheat	684.1	525.6	1289.0	0.6	-0.2	-0.2
Long Berseem	802.8	181.5	777.2	0.8	0.1	0.3
Short Berseem	292.5	-47.5	294.9	1.2	0.1	0.4
Beans	628.1	134.2	903.0	0.9	0.0	0.1
Maize	489.6	216.2	1033.5	0.8	-0.2	-0.2
Rice	609.4	35.1	1362.9	1.0	-0.3	-0.2
Cotton	737.0	740.0	2073.0	0.6	-0.4	-0.3
Potatoes	923.7	361.7	1177.2	0.7	0.0	0.1
Sugar Cane	1836.4	-636.2	1552.0	1.4	0.2	0.6
Sugar Beet	230.0	137.9	953.5	0.9	-0.3	-0.3
Tomatoes	2140.7	1480.2	2665.2	0.4	0.0	0.1
Oranges	1237.3	604.9	1433.3	0.6	0.0	0.1
Sunflowers	616.3	198.7	830.9	0.8	0.0	0.1

6. The results of the DRC analysis for field crops are shown in Attachment B and summarized in Table 1. The field crops in the old lands can be divided into three groups with respect to their competitiveness. Egypt has a strong comparative advantage (DRC < 0.7) for horticulture products (fruits and vegetables), cotton and wheat. Especially, if the cotton yields of the early 80s

could be re-established, the advantage for cotton would be even more pronounced (an estimated DRC of 0.4). Egypt is moderately competitive (0.7 < DRC < 1) in several relatively low water consuming crops (maize, beans, potatoes, long berseem and oilseeds) and has a disadvantage (DRC > 1) in producing the water intensive crops rice and sugar cane. If beans are treated as a tradable commodity (import parity price), beans would also fall into the first category of crops with a strong comparative advantage (DRC of 0.6). In the new lands, there is a strong advantage for vegetables and fruits (tomatoes, green peas and watermelon) and a clear disadvantage for traditional crops such as berseem, wheat, maize and beans.

Table 2: Competitiveness of Major Rotations

Rotations	Financial Net Return	Economic Net Return	Value Added	Domestic Resource Cost
Short Berseem	292.5	-11.5	330.9	1.0
Cotton	737.0	740.0	2073.0	0.6
Total	1029.5	728.5	2403.9	0.7
Wheat	684.1	525.6	1289.0	0.6
Maize	489.6	216.2	1033.5	0.8
Total	1173.7	741.7	2322.5	0.7
Wheat	684.1	525.6	1289.0	0.6
Rice	609.4	35.1	1362.9	1.0
Total	1293.5	560.6	2651.9	0.8
Long Berseem	802.8	253.5	849.2	0.7
Maize	489.6	216.2	1033.5	0.8
Total	1292.4	469.7	1882.7	0.8
Sugar	1836.4	-636.2	1552.0	1.4

7. The analysis of individual crops has to be put into perspective of feasible crop rotations. For example, the extended period required for growing cotton makes cotton only feasible in rotation with short berseem. Therefore, the competitiveness of crop rotations was analyzed. While cropping patterns are in general becoming more diverse, including the practice of inter-cropping and growing of vegetables, Table 2 compares the returns to the main traditional crop rotations. Returns to horticulture products are higher, in general, coupled with greater risk and greater need for specific skills that are not available to all farmers. All the four main rotations provide a financial return to the farmer between LE 1029 and LE 1293 per feddan. This is consistent with rational choices of farmers and simultaneous prevalence of all four rotations. The short berseem-cotton and the wheat-maize rotation both have a DRC of 0.7 and appear to be socially more desirable than the long berseem-maize and wheat-rice rotations with a DRC of 0.8. However, financial returns to farmers favour the latter two rotations due to the protection for livestock products and the free provision of irrigation water for rice, respectively.

8. Table 3 shows the results of DRC analysis for the major livestock products. The composition of livestock feed differs considerably with time and location. Since livestock calculations are sensitive to the assumptions made about the exact composition of feed, they should be interpreted with care. DRCs are calculated first using berseem as a marketed input. However, since berseem is a non-traded input, DRCs have been calculated for the production of livestock including growing berseem (last column in Table 3). The calculations take the nitrogen fixing capacity of berseem into account (evaluated as a ten percent reduction of nitrogen fertilization required in the following season). At current world market prices, raising cattle for milk and meat production is competitive for exotic cows (DRC of 0.7). Production from buffaloes is marginally competitive (DRC of 0.9). However, there are difficulties in estimating some of the benefits from buffaloes (including some remaining animal draft and intangible benefits such as social status of farmers from holding cattle), and in evaluating the outputs from buffaloes which are less comparable to traded commodities than products from exotic cows. The native Baladi cow does not produce a positive value added and a sensible DRC is, thus, not defined. Its production is clearly uncompetitive. Poultry production is marginally competitive reflecting currently depressed world market conditions for poultry meat.

Table 3: Competitiveness of Livestock Products

Animal	Financial Net Revenue	Economic Net Revenue	Value Added	Domestic Resource Cost	Domestic Resource Cost Berseem 1/
	---------- per animal ----------				
CATTLE, EXOTIC	613.5	214.1	864.1	0.8	0.7
CATTLE, BALADI	-201.8	-380.8	-105.8	n.a.	6.5
CATTLE, BUFFALO	317.6	-9.9	540.1	1.0	0.9
POULTRY, HOME	0.7	0.2	5.2	1.0	
POULTRY, COMM	0.6	-0.2	10.3	1.0	

1/ DRC where farmer grows the berseem, rather than buys it as a marketed input.

9. Three measures of protection were calculated and are shown in Attachment B. Nominal rates of protection measure the distortion of the output prices. The largest output price distortion, reflected in a nominal rate of protection of -0.4 remains for cotton (based on 1991 prices) while some other previously regulated grains have still negative nominal protection rates. A possible reason for negative protection despite liberalization is that liberalization of trade and marketing requires more time before markets become competitive. In not fully competitive wholesale markets, farmers may not obtain the full economic value of their products. At current world market prices, there is positive protection of sugar.

10. Effective rates of protection measure distortions of output prices relative to distortions in inputs prices. Remaining input subsidies (including

free irrigation services) lead to effective rates of protection above nominal rates of protection for all commodities; yet, effective rates of protection are still negative for the important crops and prominently cotton. Both measures of protection do not reflect the distortions in non-traded inputs such as water and land. Therefore, the difference between financial and economic net return was divided by economic value added to give a measure of total distortion of the incentives faced by farmers. If this measure of total distortion of incentives is considered (including lack of water pricing), farmers incentives are excessively high for all crops with the exception of cotton, for which depressed output prices just offset the lack of water charges. Incentives are most distorted for sugar cane and berseem.

Water and Land Pricing

11. The most complex task in determining the economic cost of producing the various agricultural commodities is economic pricing of water and land. Water is provided to farmers free of charge; a market price, therefore, does not exist. The land market is distorted through legislative restrictions on land rents which are legally limited to a multiple of the land tax. This section discusses and compares various approaches that were used in the past to individually shadow price land and water. Prices quoted from previous studies have been adjusted to 1991 price levels.[2] Since water and land are complementary inputs to agricultural production, their economic values are highly interrelated, and shadow prices for land and water should be determined simultaneously. A very simple linear programming approach was used to that end, and the findings are presented at the end of this section.

12. The economic price of water includes two main components. First, operation and maintenance expenditures as well as capital expenditures for replacements are required to maintain the services provided by the irrigation and drainage system. These current and future O&M and investment costs are considered a tradable input to agricultural production. Second, Nile water itself and the investment costs sunk in the existing irrigation and drainage infrastructure lead to the accrual of resource rents and returns to previous investments. Since the quantity of water delivered by the system is limited, irrigation water has an opportunity cost. Calculations of water costs are based on the net water consumption of different crops (crop consumption and evaporation losses).

13. The purpose of this report is to assess aggregate production patterns. Water is, therefore, treated as a homogenous commodity based on average country wide costs. Several limitations of this aggregate approach should be kept in mind. The location in the system has an impact on costs. The costs of delivering a unit of water differ by up to 50 percent between regions. In areas near the coast, recovered drainage water could be reused only at a higher cost; actual water consumption is, thus, higher than crop consumptive use. On the

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2/ All calculations of real prices in this report are based on the Consumer Price Index for Egypt in the IMF's International Financial Statistics. The difference between this deflatior and the wholesale price index or the rural consumer price index has been found to not affect the results of this report.

other hand, crop consumptive water use is higher in Upper Egypt due to climatic conditions. Water quality differs by region and water quality requirements differ by crop. Data for a systematic treatment of these differentiations are not available in the given context. However, these factors are, as far as possible, considered in the discussion of recommendations.

14. Preliminary results of the ongoing cost recovery study indicate that current expenditures for operation, maintenance and investments for replacement and rehabilitation of structures of the irrigation and drainage system down to the mesqa level (excluding tile drainage costs) are about LE 0.013/m^3. This estimate is based on the current insufficient level of expenditures. A second scenario for the same study that has not yet been completed will assess future costs of an improved maintenance system based on expenses budgeted for the following years. Preliminary figures for this improved scenario are in the order of LE 0.02/m^3. The cost of operating the system at the desirable and efficient level of maintenance would presumably be significantly higher. These figures do not include a return to the sunk costs of the existing investment in the system or an opportunity costs of water.

15. An alternative figure for irrigation and drainage system costs for improved conditions can be derived from annualizing the costs of recent irrigation and drainage projects. Investment costs per feddan (including on-farm costs) are in the magnitude of LE 1,350 and LE 900 for the Irrigation Improvement Project and the National Drainage Project respectively. Recurrent annual costs are approximately LE 150 per feddan. Annualized over thirty years, these investment and O&M cost figures imply irrigation and drainage costs of LE 0.041/m^3. This figure does not include the costs of the main irrigation and drainage canals nor returns to sunk costs nor the opportunity cost of water. Based on an average figure from the different approaches to calculate the system costs, an economic cost for systems investment and O&M of LE 0.03/m^3 has been used as the base case assumption (tradable component of the cost of water).

16. The opportunity costs of water and the existing infrastructure are the marginal benefits from water in its best alternative use, measured as residual returns to water after subtracting all production costs including the current and future costs of the irrigation system. The best alternative use could be increased irrigation quantities on existing cropping patterns, changes in cropping patterns to more water consuming crops and horizontal expansion through land reclamation. Increased irrigation quantities are unlikely to generate benefits since farmers already over-irrigate in an economic sense due to the lack of water measuring devices in the system. Therefore, the crop yield-response to irrigation quantity changes is not an appropriate basis for determining opportunity costs of water. Land reclamation projects require a long lead time. Cropping patterns, on the other hand, can generally be changed from year to year. Hence, the correct short-run opportunity costs of water are the marginal benefits from cropping pattern changes that become possible with increased water supply. Long-term opportunity costs are the maximum of marginal benefits from cropping pattern changes and land reclamation projects. No attempt has been made to calculate marginal benefits from incremental water consumption in other sectors of the economy. Subsequently, DRC analysis and statements about competitiveness assess relative competitiveness of various crops but do not imply statements

about the efficient allocation of water (or land) between different sectors of the economy.

17. For determining the long-run opportunity costs of water, returns to water in land reclamation projects must be calculated. For example, the net benefits from the proposed Northern Sinai Development Project[3], annualized at a rate of 10 percent would result in a return of LE 0.03/m^3. The World Bank's Land Reclamation Sub-sector Review estimates that generic land reclamation projects would be profitable at water prices below LE 0.13 and 0.07/m^3 at 10 percent and 12 percent discount rate respectively. Since benefits are measured net of systems investment costs, this is a pure opportunity cost to be added to systems investment and operations costs.

18. A study undertaken in 1988 by McCarl[4] examines the reduction in social benefits resulting from changes in agriculture following a hypothetical reduction of the annual release of water from the High Aswan Dam. For an up to twenty percent reduction in water releases, social benefit would fall by LE 0.09-0.15 per m^3 of water depending on the size of the reduction. This welfare reduction is the result of a reduction in cropped area adjusted for changes in cropping patterns. The difference between the benefits of incrementally increasing water supply (returns of LE 0.03-0.13/m^3 in land reclamation projects) and the cost of incrementally decreasing water supply (LE 0.09-0.15/m^3) is intuitive and reflects the complementarity between developed land and irrigation water. The incremental benefits from additional water are relatively low because of the high costs of developing new lands. Reduction in water availability, on the other hand, would lead to net reduction in production on already developed agricultural lands.

19. The high complementarity of land and water highlights the need to simultaneously estimate shadow prices for land and water, for example, through solving a linear programming problem. The underlying approach would be to maximize the economic returns to water and land by choice of aggregate cropping patterns subject to water and land availability and rotation feasibility. The solution to this problem would provide the socially optimal overall cropping patterns as well as shadow prices for land and water. This was done in 1979/80 under the Water Master Plan.[5] In that study, the shadow price for water, inflated to 1991 prices, is LE 0.2/m^3. However, economic returns to various crops and relative prices have changed considerably since then. The results of that study are, therefore, not applicable any more.

20. In order to indicate the solution to a linear programming problem using most recent data, a very simple model was used. In the first model, new land development is not considered and additional water can only be used to grow more

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3/ Based on the project preparation report completed by the FAO/World Bank Cooperative Program in December 1989.

4/ McCarl, Bruce A., An Examination of Lake Nassar Operating Policies and Associated Policies, January 1988

5/ Arab Republic of Egypt, Ministry of Irrigation, Master Plan for Water Resources Development and Use, The Agro-Economic Model, Technical Report #16, March 1981.

water intensive crops in the old lands. The resulting shadow prices are LE 0.036/m^3 and LE 687 per crop per feddan for water and land respectively. This would be the short-run opportunity cost of water and reflects the benefits from switching to high water consuming crops (in particular switch from cotton to rice/wheat). If vegetable production was not constrained by market size and support infrastructure, the shadow price of water would be LE 0.12/m^3 and the shadow price of land LE 848 per crop per feddan. Since the return to water is higher from land reclamation projects than from switching cropping patterns (excluding increase in vegetables), the shadow price of water is the return to water in such projects (assumed to be LE 0.07/m^3), if the possibility of new land reclamation is included (model 2). The shadow values for land would be LE 609 per crop per feddan. Hence, LE 0.07/m^3 would be the long-run opportunity cost of water.

21. Figure 1 shows the marginal benefit curve (or demand curve) for water in the old lands, decreasing with available quantity. This short-run opportunity cost curve is obtained from the shadow prices of water from solving the linear programming problem for varying amounts of water available to the agriculture sector. As water availability increases, the shadow value of land increases up to LE 1011 when the water constraint is not binding. This is consistent with currently observed land rents of up to LE 1000 in the absence of water pricing. Above approximately 19 BCM, the marginal benefits of water arise from shifts to more water consuming crops. Below 19 BCM, the land constraint is not binding and the marginal benefit of water rises sharply since land would be left idle. The shadow price of water for significant reduction of supply below the current level is LE 0.06-0.16/m^3 and consistent with McCarl's LE 0.09-0.15/m^3. The assumed marginal benefit of water in land reclamation of LE 0.07/m^3 is shown as a horizontal line in Figure 1. At the current supply of 35.5 BCM (including evaporation losses), the marginal benefit of water is higher in land reclamation than in old lands. The long run opportunity cost curve of water would be the maximum of marginal benefits of water in old lands and land reclamation.

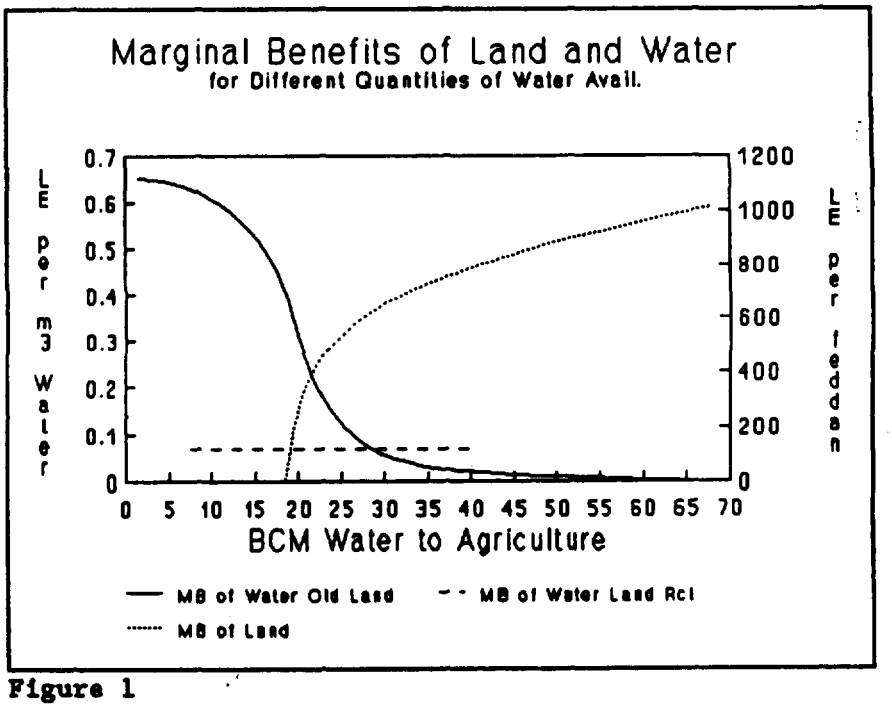

Figure 1

22. The assumptions used in defining the linear programming problem are crude and the results should be interpreted with caution. However, some additional confidence can be derived from the consistency of the results with the other approaches discussed above. Based on the discussion, the long-term opportunity cost of water is assumed to be LE 0.07/m^3. Subsequently, an economic price of water of LE 0.03/m^3 for systems investment and O&M (tradable component) plus LE 0.07/m^3 opportunity cost of water (domestic resource component) has been used as the base case in the following analyses. A total water cost of LE 0.1/m^3 falls in the middle of the range of reasonable water cost estimates and is consistent with the treatment of water costs in the recent Cotton Sub sector Study done by the Bank. At present, there exists no strong foundation that could lead to a point estimate for water prices with a high level of confidence. Therefore, emphasis is put on sensitivity analysis, testing for the robustness of this report's conclusions with respect to water and land prices.

23. The only available data on land rent are the records of the official land rent. The official land rent, prior to the recently enacted legislation, was constrained to seven times the amount of the land tax of around LE20 per feddan and year. Clearly, the marginal value of land is much higher than the official land rent. There exists a market for land working through share-cropping arrangements or cash side payments on top of the official land rent. As reported, actual rent payments, either in cash or implicit in share-cropping arrangements, are at or above the level of seven times the official land rent depending on soil, location and crop[6]. Since land and water are complementary inputs to agricultural production, high observed land rents reflect the fact that irrigation water is provided to farmers free of charge. The marginal return to land would be lower if water was correctly priced. Recognizing the complementarity between the economic values of land and water resources, for the purposes of the analysis it is assumed that the economic cost of land is five times the official land rent.

Sensitivity Analysis

24. The three main questions examined through sensitivity analysis are how robust the assessments of competitiveness of the various crops and rotations are with respect to the valuation of land and water, with respect to world market price changes and with respect to envisioned yield increases for different crops. In Attachment C, economic farmgate prices are calculated for the major traded commodities based on the 70 percent confidence band of the World Bank Commodity Price projections for 1995. From the higher and lower limit of the band as well as the point estimates, economic net returns, value added and DRCs were calculated. The results show that wheat is competitive under any reasonably expected price (DRC 0.4 to 0.7). Also, the competitiveness of maize and cotton is relatively robust. However, for both crops the DRC rises to 1.2 at the lower price limit. Rice is non-competitive at any expected export parity price. It could only become competitive on the import market at the higher price limit (DRC

6/ While precise data on market land rents are not available, anecdotal information provides a range varying between LE300-400 per feddan per year, to crop based rental values ranging between LE700 per feddan for berseem to LE1000 per feddan for a tomato crop. In addition, varying crop sharing arrangements also prevail.

0.7). The DRCs for sugar range between 1.8 and 0.4 for beet and between 3.1 and 0.7 for cane. The high volatility of world market sugar prices leads to a situation in which a confident statement about the competitiveness of domestic sugar production cannot be made. However, at any price, sugar cane is dominated by sugar beet. Therefore, domestic production of sugar from sugar beet can be justified. Competitiveness of producing exotic cattle is relatively unaffected by price changes within the projected band.

25. Attachment D summarizes the impacts of different economic values of land and water on competitiveness of crops and rotations. As previously discussed, the economic values for land and water are negatively correlated since both are complementary inputs to production. Four scenarios are analyzed. In scenario 1, the water constraint is considered to be not binding and the value of land is correspondingly high (irrigation systems cost LE 0.012/m^3, opportunity cost zero, land value 10 times the official land rent). Scenario 2 is using the assumed short-term opportunity cost of water (irrigation systems cost LE 0.03/m^3, opportunity cost LE 0.036/m^3, land value seven times the official land rent). Scenario 3 is the base case using the assumed long-term opportunity cost of water (irrigation systems cost LE 0.03/m^3, opportunity cost LE 0.07/m^3, land value five times the official land rent). Scenario 4 is a case with high water value and correspondingly low land value (irrigation systems cost LE 0.06/m^3, opportunity cost LE 0.14/m^3, land value three times the official land rent). As expected, water intensive crops (sugar cane, rice) fare worse under scenario 4 while land intensive crops (berseem, beans) fare worse under scenario 1. Sugar cane remains uncompetitive under any scenario; wheat, maize and cotton remain competitive under any scenario. The competitiveness of rice is highly sensitive to water pricing (DRC 1.6 to 0.7). Production of rice for domestic markets (import parity prices were used) can be justified at water costs at or below the short-run opportunity costs (scenarios 1 and 2).

Table 4: Expected Yield Changes 1991-2000

Yield per feddan		1991	2000	change
Fava Beans	Ardeb	6.52	9	38%
Maize	Ardeb	17.35	26.18	51%
Sorghum Grain	Ardeb	15.8	25	58%
Berseem	t	30	40	33%
Wheat	Ardeb	14.5	18	24%
Sesame	Ardeb	4.33	5.75	33%
Peanut	Ardeb	12.5	20	60%
Sunflower	t	0.82	1.2	46%
Cotton	mke	5.88	8.28	41%
Rice	t	3.16	3.5	11%
Sugar Cane	t	42.3	45	6%
Sugar Beet	t	18.5	22	19%

26. The continuing effort of the ARC research institutes and the extension services are expected to lead to further yield increases in the future. In order

to assess whether expected yield increases would lead to any reversal in the assessment of competitiveness, DRCs and economic returns were recalculated using yields projected for the year 2000 by the ARC institutes as listed in Table 4. The results, assuming that the only change in the crop budgets are the yields and ignoring subsequent changes in costs or relative prices, are shown in Attachment E. The results show that little would change about the relative competitiveness of various crops if all yield forecasts did materialize. Except for horticulture crops, which were excluded from this analysis, cotton and wheat would be most attractive, followed by maize, sugar beet and long berseem. Rice and sugar cane would remain relatively uncompetitive. Therefore, yield increase expectations do not appear to impact significantly on the assessment of relative competitiveness of crops.

Recommended Production Patterns

27. DRC analysis stongly suggests to focus on production of commodities with a strong and robust comparative advantage, namely wheat and cotton as well as beans up to the level of self sufficiency. The following paragraphs discuss the recommended strategy for other commodities with comparative advantage where significant constraints need to be taken into account and for commodities in which Egypt does not have a comparative advantage.

28. The calculation of competitiveness indicates that Egypt should focus on horticulture products. However, for most horticulture products, processing, transportation and export marketing rather than production are the bottlenecks. Since this infrastructure is still lacking or incomplete, farmers will not, at least in the short run, move toward horticulture production on a massive scale despite the impressive DRCs and high net returns. While the potential of increased horticulture product exports should be exploited, many of these markets are thin and it is unrealistic to assume that the area planted to horticulture crops can be expanded dramatically without the opening of additional export markets.

29. The analysis of competitiveness of oilseed production is based on sunflower as an oil crop which fits well with the general cropping patterns and for which there is ongoing commercial development. Based on the use of high yielding varieties and modern processing technology, Egypt is moderately competitive in production of oil seeds. Given the large volume of imported vegetable oil, there is a significant potential for economically efficient import substitution. Hypothetically, about 1 million feddan cropped with sunflower would be required to replace all imports of vegetable oil for food consumption. However, in terms of returns per feddan oilseeds are relatively low value crops. Therefore, such large scale substitution would be desirable only at the expense of other low value crops such as berseem but not at the expense of wheat, cotton or other crops with higher economic returns.

30. The calculations show that sugar cane production is highly uncompetitive due to high water consumption. Even if current inefficiencies in sugar production are removed, growing sugar cane makes little economic sense. The economic return is relatively poor for sugar beet as well. However, within the range of reasonable water cost estimates, sugar beet is providing a higher economic return than sugar cane (the economic return on sugar beet is higher than

for cane above a water cost of LE 0.025/m^3 including systems and opportunity costs). Since domestic production of sugar is a declared political objective that can be defended considering world market distortions, price volatility and food security concerns, production of sugar should be shifted to sugar beet. Advantages of sugar beet versus cane include lower water requirements, more flexibility for reversing production decisions since beet is a seasonal and cane a perennial crop that requires 5 to 6 years to grow as well as less critical timing in the processing of sugar beet to sugar.

31. Growing rice for export markets is highly uncompetitive. Therefore, import parity prices for rice were used in the base case analysis showing that rice production for the domestic market is marginally uncompetitive (DRC of 1.0) at current prices and uncompetitive at projected prices for 1995 (DRC of 1.2). Even if projected yield increases are taken into account, the economic returns to rice are inferior to the other main crops due to the high water requirements. Subsequently, domestic rice production, which is artificially attractive to farmers due to lacking water pricing, should be significantly reduced. Two additional aspects, however, need to be taken into account. First, rice is more robust to soil salinity and low quality irrigation water than most other crops. Hence, rice production is acceptable in areas where soil and water conditions do not allow growing other more competitive crops and in areas in the Northern Delta where rice must be grown as a reclamation crop to avoid seawater seepage. Second, the base case calculations are based on long-run opportunity costs of water. This is correct for long-term decisions, such as investments in the irrigation system or consideration of water availability for land reclamation. For cropping decisions with a short time horizon, on the other hand, the short-term opportunity cost of water can be used at which rice is marginally competitive (DRC of 0.9). Therefore, growing rice for domestic markets is acceptable as long as no long-term investments are made in related infrastructure and rice production is given up as soon as additional water is required for land reclamation or expansion of vegetable areas.

ARAB REPUBLIC OF EGYPT
AGRICULTURE SECTOR STRATEGY
OLD LAND CROP BUDGETS

		LONG BERSEEM					SHORT BERSEEM					WHEAT					MAIZE				
	Unit	Q	FP	EP	FV	EV	Q	FP	EP	FV	EV	Q	FP	EP	FV	EV	Q	FP	EP	FV	EV
VALUE OF PRODUCTION																					
Main Crop	local	4.0	282.0	246.0	1128.0	984.0	2.0	282.0	246.0	564.0	492.0	13.9	75.0	100.1	1042.5	1390.7	18.5	64.0	79.9	1183.4	1478.1
By Products	hsml	4.0	13.0	13.0	52.0	52.0	2.0	13.0	13.0	26.0	26.0	10.0	30.0	3 0	300.0	300.0	12.0	5.0	5.0	60.0	60.0
		Seeds			51.3	51.3															
TOTAL VALUE	LE/fd				1231.3	1087.3				590.0	518.0				1342.5	1690.7				1243.4	1538.1
COST of INPUTS																					
Seeds	Kaila	2.9	26.0	26.0	75.9	75.9	3.7	11.1	11.1	41.1	41.1	6.2	10.0	10.0	62.4	62.4	2.3	29.2	29.2	68.3	68.3
Manure	Load	45.5	0.23	0.23	10.5	10.5	52.5	0.23	0.23	12.1	12.1		0.23	0.23	0.0	0.0	225.4	0.23	0.23	51.9	51.9
N fertil.	kg	82.5	0.19	0.22	15.3	18.4	78.5	0.19	0.22	14.5	17.5	400.0	0.19	0.22	74.0	89.0	585.0	0.19	0.22	108.2	130.2
P fertil.	kg	176.5	0.19	0.22	32.7	39.4	176.5	0.19	0.22	32.7	39.4	130.0	0.19	0.22	24.1	29.0	84.0	0.19	0.22	15.5	18.7
K fertil.	kg		0.93	2.33	0.0	0.0		0.93	2.33	0.0	0.0		0.93	2.33	0.0	0.0	5.0	0.93	2.33	4.7	11.7
Foliar	kg		9.00	9.00	0.0	0.0		9.00	9.00	0.0	0.0		9.00	9.00	0.0	0.0	0.2	9.00	9.00	2.2	2.2
Pesticides	LE				3.1	3.1				5.9	5.9				8.0	8.0				7.9	7.9
Machine (Hired)	LE				97.1	97.1				61.8	61.8				145.1	145.1				96.9	96.9
Animal	LE				16.7	16.7				13.7	13.7				20.5	20.5				36.0	36.0
Water, irr/drain	m3	1640.0	0.00	0.03	0.0	49.2	1058.0	0.00	0.03	0.0	31.7	1590.0	0.00	0.03	0.0	47.7	2700.0	0.00	0.03	0.0	81.0
Water, opp cost	m3	1640.0	0.00	0.07	0.0	114.8	1058.0	0.00	0.07	0.0	74.1	1590.0	0.00	0.07	0.0	111.3	2700.0	0.00	0.07	0.0	189.0
Labor (Hired)	LE	5.2	6.00	6.00	31.2	31.2	4.7	6.00	6.00	27.9	27.9	24.0	6.00	6.00	144.0	144.0	24.3	6.00	6.00	146.0	146.0
Labor (Family)	LE	11.7	6.00	6.00	70.3	70.3	8.3	6.00	6.00	49.7	49.7	16.4	6.00	6.00	98.4	98.4	25.0	6.00	6.00	149.9	149.9
Land Rent	LE	75.9	1.00	5.00	75.9	379.4	38.1	1.00	5.00	38.1	190.7	82.0	1.00	5.00	82.0	409.8	66.5	1.00	5.00	66.5	332.5
TOTAL COST	LE/fd				428.5	905.8				297.5	565.5				658.4	1165.2				753.8	1322.0
NET BENEFIT	LE/fd				802.8	181.5				292.5	-47.5				684.1	525.6				489.6	216.2
Net Farm Revenue	LE/fd				873.1	251.8				342.3	2.3				782.5	624.0				639.5	366.0
Domestic Resources					177.4	595.7				115.8	342.4				324.4	763.5				362.4	817.4
Value Added					980.2	777.2				408.3	294.9				1008.5	1289.0				851.9	1033.5
Return on water						0.5					0.3					0.8					0.4
DRC						0.8					1.2					0.6					0.8
NRP						0.1					0.1					-0.2					-0.2
ERP						0.3					0.4					-0.2					-0.2
Source:		PBDAC survey					PBDAC survey					PBDAC survey					PBDAC survey				

Q: Quantity - FP: Financial Price - EP: Economic Price - FV: Financial Value - EV: Economic Value

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ARAB REPUBLIC OF EGYPT
AGRICULTURE SECTOR STRATEGY
OLD LAND CROP BUDGETS

		RICE					COTTON					SUGAR CANE					BROAD BEANS				
	Unit	Q	FP	EP	FV	EV	Q	FP	EP	FV	EV	Q	FP	EP	FV	EV	Q	FP	EP	FV	EV
VALUE OF PRODUCTION																					
Main Crop	local	3.1	460.0	659.8	1426.0	2045.4	5.6	303.1	476.7	1697.2	2669.8	40.2	76.0	61.3	3055.2	2464.4	8.2	140.0	140.0	1150.4	1150.4
By Products	heml	5.0	15.0	15.0	75.0	75.0	10.0	6.0	6.0	60.0	60.0				50.0	50.0	6.5	15.0	15.0	97.5	97.5
TOTAL VALUE	LE/fd				1501.0	2120.4				1757.2	2729.8				3105.2	2514.4				1247.9	1247.9
COST of INPUTS																					
Seeds	Kaita	6.7	5.6	5.6	37.6	37.6	7.0	1.0	1.0	6.7	6.7	1.0	96.7	96.7	96.7	96.7	5.6	10.5	10.5	58.7	58.7
Manure	Load	87.7	0.23	0.23	20.2	20.2	135.7	0.23	0.23	31.2	31.2		0.23	0.23	0.0	0.0	82.6	0.23	0.23	19.0	19.0
N Fertil.	kg	328.5	0.19	0.22	60.8	73.1	495.0	0.19	0.22	91.6	110.2	840.0	0.19	0.22	155.4	187.0	203.5	0.19	0.22	37.6	45.3
P Fertil.	kg	131.5	0.19	0.22	24.3	29.4	135.0	0.19	0.22	25.0	30.1	220.0	0.19	0.22	40.7	49.1	171.9	0.19	0.22	31.8	38.4
K Fertil.	kg	6.0	0.93	2.33	5.6	14.0	11.0	0.93	2.33	10.3	25.6		0.93	2.33	0.0	0.0		0.93	2.33	0.0	0.0
Foliar	kg	0.1	9.00	9.00	1.2	1.2	0.5	9.00	9.00	4.7	4.7		9.00	9.00	0.0	0.0		9.00	9.00	0.0	0.0
Pesticides	LE				12.7	12.7	1.0	43.00	165.00	43.0	165.0				12.7	12.7				15.9	15.9
Machine (Hired)	LE				257.9	257.9				169.4	169.4				246.1	246.1				107.2	107.2
Animal	LE				47.6	47.6				18.5	18.5				10.7	10.7				19.9	19.9
Water, irr/drain	m3	8800.0	0.00	0.03	0.0	264.0	3180.0	0.00	0.03	0.0	95.4	12000	0.00	0.03	0.0	360.0	1350.0	0.00	0.03	0.0	40.5
Water, opp cost	m3	8800.0	0.00	0.07	0.0	616.0	3180.0	0.00	0.07	0.0	222.6	12000	0.00	0.07	0.0	840.0	1350.0	0.00	0.07	0.0	94.5
Labor (Hired)	LE	39.5	6.00	6.00	237.0	237.0	64.1	6.00	6.00	384.4	384.4	91.0	6.00	6.00	546.0	546.0	22.7	6.00	6.00	136.1	136.1
Labor (Family)	LE	19.1	6.00	6.00	114.8	114.8	18.8	6.00	6.00	113.0	113.0						17.9	6.00	6.00	107.4	107.4
Land Rent	LE	72.0	1.00	5.00	72.0	360.0	122.6	1.00	5.00	122.6	613.0	160.4	1.00	5.00	160.4	802.2	86.2	1.00	5.00	86.2	430.9
TOTAL COST	LE/fd				891.6	2085.4				1020.2	1989.8				1268.8	3150.5				619.8	1113.7
NET BENEFIT	LE/fd				609.4	35.1				737.0	740.0				1836.4	-636				628.1	134.2
Net Farm Revenue	LE/fd				724.2	149.9				850.0	853.0				1836.4	-636.2				735.5	241.5
Domestic Resources					423.8	1327.8				620.0	1333.0				706.4	2188.2				329.6	768.9
Value Added					1033.2	1362.9				1357.0	2073.0				2542.8	1552.0				957.7	903.0
Return on water						0.2					0.7					0.1					0.7
DRC						1.0					0.6					1.4					0.9
NRP						-0.3					-0.4					0.2					0.0
ERP						-0.2					-0.3					0.6					0.1
Source:		PBDAC survey					PBDAC survey					MALR data					PBDAC survey				

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ARAB REPUBLIC OF EGYPT
AGRICULTURE SECTOR STRATEGY
OLD LAND CROP BUDGETS

		TOMATOES					ORANGES					POTATOES					SUGAR BEETS				
	Unit	Q	FP	EP	FV	EV	Q	FP	EP	FV	EV	Q	FP	EP	FV	EV	Q	FP	EP	FV	EV
VALUE OF PRODUCTION																					
Main Crop	local	9.3	390.0	390.0	3644.2	3644.2	6.5	400.0	396.0	2600.0	2574.0	9.0	320.0	320.0	2872.6	2872.6	17.0	60.0	84.5	1020.0	1436.6
By Products	heml				0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0
TOTAL VALUE	LE/fd				3644.2	3644.2				2600.0	2574.0				2872.6	2872.6				1020.0	1436.6
COST of INPUTS																					
Seeds	Kaila	13.3	6.6	6.6	87.9	87.9	1.0	305.0	305.0	305.0	305.0	1359.0	0.7	0.7	928.2	928.2	6.2	10.0	10.0	62.4	62.4
Manure	Load	115.7	0.23	0.23	26.6	26.6	200.0	0.23	0.23	52.0	52.0	378.2	0.23	0.23	87.0	87.0	0.0	0.23	0.23	0.0	0.0
N Fertil.	kg	1450.0	0.19	0.22	268.3	322.7	625.0	0.19	0.22	115.6	139.1	1022.5	0.19	0.22	189.2	227.6	400.0	0.19	0.22	74.0	89.0
P Fertil.	kg	381.0	0.19	0.22	70.5	85.0	500.0	0.19	0.22	92.5	111.6	575.8	0.19	0.22	106.5	128.5	130.0	0.19	0.22	24.1	29.0
K Fertil.	kg	8.0	0.93	2.33	7.5	18.6		0.93	2.33	0.0	0.0	9.2	0.93	2.33	8.6	21.4		0.93	2.33	0.0	0.0
foliar	kg		9.00	9.00	0.0	0.0		9.00	9.00	0.0	0.0	0.0	9.00	9.00	0.0	0.0		9.00	9.00	0.0	0.0
Pesticides	LE				195.8	195.8				180.0	180.0				45.4	45.4				45.4	45.4
Machine (Hired)	LE				134.9	134.9				260.0	260.0				85.0	85.0				85.0	85.0
Animal	LE				9.5	9.5				0.0	0.0				91.3	91.3				91.3	91.3
Water, irr/drain	m3	3260.0	0.00	0.03	0.0	97.8	3100.0	0.00	0.03	0.0	93.0	2700.0	0.00	0.03	0.0	81.0	2700.0	0.00	0.03	0.0	81.0
Water, opp cost	m3	3260.0	0.00	0.07	0.0	228.2	3100.0	0.00	0.07	0.0	217.0	2700.0	0.00	0.07	0.0	189.0	2700.0	0.00	0.07	0.0	189.0
Labor (Hired)	LE	52.4	6.00	6.00	314.4	314.4	49.0	6.00	6.00	294.0	294.0	16.0	6.00	6.00	95.8	95.8	16.0	6.00	6.00	95.8	95.8
Labor (Family)	LE	54.1	6.00	6.00	324.6	324.6						42.9	6.00	6.00	257.3	257.3	42.9	6.00	6.00	257.3	257.3
Land Rent	LE	63.6	1.00	5.00	63.6	317.9	63.6	1.00	5.00	63.6	317.9	54.7	1.00	5.00	54.7	273.4	54.7	1.00	5.00	54.7	273.5
TOTAL COST	LE/fd				1503.4	2164.0				1362.7	1969.6				1948.9	2510.9				790.0	1298.7
NET BENEFIT	LE/fd				2140.7	1480.2				1237.3	604.4				923.7	361.7				230.1	137.9
Net Farm Revenue	LE/fd				2465.3	1804.8				1237.3	604.4				1181.1	619.1				487.4	395.2
Domestic Resources					702.5	1185.0				357.6	828.9				407.8	815.5				407.8	815.6
Value Added					2843.2	2665.2				1594.9	1433.3				1331.5	1177.2				637.9	953.5
Return on water						0.8					0.5					0.4					0.4
DRC						0.4					0.6					0.7					0.9
NRP						0.0					0.0					0.0					-0.3
ERP						0.1					0.1					0.1					-0.3
Source:		PBDAC survey					FAO/CP Prep, National Drainage Proj PBDAC survey										Mission estimates				

CROPBUDG.WK1 05.CK50

ARAB REPUBLIC OF EGYPT
AGRICULTURE SECTOR STRATEGY
OLD LAND CROP BUDGETS

		SUNFLOWER				
	Unit	Q	FP	EP	FV	EV
VALUE OF PRODUCTION						
Main Crop	local	1.1	950.0	940.0	1026.0	1015.2
By Products	kemi	0.0	0.0	0.0	0.0	0.0
TOTAL VALUE	LE/fd				1026.0	1015.2
COST of INPUTS						
Seeds	Kaila				30.0	30.0
Manure	Load	35.0	0.23	0.23	8.1	8.1
N Fertil.	kg	20.0	0.19	0.22	3.7	4.5
P Fertil.	kg	0.0	0.19	0.22	0.0	0.0
K Fertil.	kg		0.93	2.33	0.0	0.0
Foliar	kg		9.00	9.00	0.0	0.0
Pesticides	LE				15.9	15.9
Machine (Hired)	LE				49.0	49.0
Animal	LE				19.9	19.9
Water, irr/drain	m3	1900.0	0.00	0.03	0.0	57.0
Water, opp cost	m3	1900.0	0.00	0.07	0.0	133.0
Labor (Hired)	LE	38.2	6.00	6.00	229.2	229.2
Labor (Family)	LE					
Land Rent	LE	54.0	1.00	5.00	54.0	270.0
TOTAL COST	LE/fd				409.8	816.5
NET BENEFIT	LE/fd				616.3	198.7
Net Farm Revenue	LE/fd				616.3	198.7
Domestic Resources					283.2	632.2
Value Added					899.5	830.9
Return on water						0.4
DRC						0.8
NRP						0.0
ERP						0.1

CROPBUDG.WK1 05.CX50

ARAB REPUBLIC OF EGYPT
AGRICULTURE SECTOR STRATEGY

Summary of Economic Analysis of Crops

Old Lands

Crop	Gross Farm Revenue	Net Farm Revenue	Financial Net Return	Economic Net Return	Value Added	Return on Water	Domestic Resource Cost	Nominal Rate of Protection	Effective Rate of Protection	FNR-ENR over Val Add
Sugar Beet	1020.0	487.4	230.1	137.9	953.5	0.4	0.9	-0.3	-0.3	0.1
Long Berseem	1231.3	873.1	802.8	181.5	777.2	0.5	0.8	0.1	0.3	0.8
Short Berseem	590.0	342.3	292.5	-47.5	294.9	0.3	1.2	0.1	0.4	1.2
Wheat	1342.5	782.5	684.1	525.6	1289.0	0.8	0.6	-0.2	-0.2	0.1
Maize	1243.4	639.5	489.6	216.2	1033.5	0.4	0.8	-0.2	-0.2	0.3
Rice	1501.0	724.2	609.4	35.1	1362.9	0.2	1.0	-0.3	-0.2	0.4
Cotton	1757.2	850.0	737.0	740.0	2073.0	0.7	0.6	-0.4	-0.3	0.0
Sugar Cane	3105.2	1836.4	1836.4	-636.2	1552.0	0.1	1.4	0.2	0.6	1.6
Beans	1247.9	735.5	628.1	134.2	903.0	0.7	0.9	0.0	0.1	0.5
Tomatoes	3644.2	2465.3	2140.7	1480.2	2665.2	0.8	0.4	0.0	0.1	0.2
Oranges	2600.0	1237.3	1237.3	604.4	1433.3	0.5	0.6	0.0	0.1	0.4
Potatoes	2872.6	1181.1	923.7	361.7	1177.2	0.4	0.7	0.0	0.1	0.5
Sunflowers	1026.0	616.3	616.3	198.7	830.9	0.4	0.8	0.0	0.1	0.5

CROPBUDG.WK1 CN1.CX19

New Lands

Crop	Gross Farm Revenue	Net Farm Revenue	Financial Net Return	Economic Net Return	Value Added	Return on Water	Domestic Resource Cost	Nominal Rate of Protection	Effective Rate of Protection	FNR-ENR over Val Add
LONG BERSEEM	940.0	n/a	612.4	-228.3	410.6	0.1	1.6	0.1	0.8	2.0
GROUNDNUTS	1200.0	n/a	650.5	-44.7	843.3	0.2	1.1	0.0	0.2	0.8
WHEAT	680.0	n/a	214.5	-167.6	512.3	0.2	1.3	-0.2	-0.1	0.7
MAIZE	554.6	n/a	67.3	-329.1	464.1	0.1	1.7	-0.2	-0.1	0.9
W MELONS (fr)	2400.0	n/a	1888.1	1313.5	2055.1	0.6	0.4	0.0	0.1	0.3
TOMATOES (w)	2730.0	n/a	2122.5	1650.2	2325.2	1.1	0.3	0.0	0.1	0.2
BROAD BEANS	632.3	n/a	222.3	-128.7	480.5	0.4	1.3	0.0	0.1	0.7
PEAS (green)	1426.0	n/a	855.6	371.6	964.9	1.4	0.6	0.0	0.2	0.5

NEWLANDS.WK1 CN3.CX16

ARAB REPUBLIC OF EGYPT
AGRICULTURE SECTOR STRATEGY
SENSITIVITY OF ECONOMIC RETURNS TO PRICE CHANGES
All in constant 1991 terms

Import Parity		Wheat			Maize			Rice		
		Low	Point	High	Low	Point	High	Low	Point	High
Projected Price (1985$)	$/t	82	108	134	47	67	88	135	178	264
Projected Price (1991$)	$/t	122	161	199	70	100	131	201	265	393
+ Ocean Freight-Ins	$/t	32	32	32	32	32	32	35	35	35
CIF Alexandria	$/t	154	193	231	102	132	163	236	300	428
CIF Alexandria	LE/t	508	636	763	336	434	537	778	989	1411
+ Quality Adjustment	LE/t							-156	-198	-282
+ Port Charge and Handlin	LE/t	30	30	30	40	40	40	40	40	40
+ Importer Charge	LE/t	36	44	53	24	30	38	44	55	79
+ Transp Port-Wholesale	LE/t	45	45	45	65	65	65	45	45	45
Price at Market	LE/t	619	755	892	465	570	680	751	932	1293
- Processing Costs	LE/t							30	30	30
- Transport Farm-Wholesal	LE/t	25	25	25	25	25	25	25	25	25
+ By Products	LE/t									
Concentration		1.00	1.00	1.00	1.00	1.00	1.00	0.65	0.65	0.65
Economic Farmgate Price	LE/t	594	730	867	440	545	655	452	570	805
Economic Farmgate Price	LE/va	89	110	130	62	76	92	452	570	805
Economic Net Return	LE/fd	274	636	997	-115	143	439	-909	-243	485
Value Added	LE/fd	1038	1400	1760	701	960	1256	719	1084	1813
Domestic Resource Cost		0.7	0.5	0.4	1.2	0.9	0.7	1.8	1.2	0.7

Import Parity		Sugar Cane			Sugar Beet			Beef (exot)		
		Low	Point	High	Low	Point	High	Low	Point	High
Projected Price (1985$)	$/t	135	200	264				1350	1780	2210
Projected Price (1991$)	$/t	201	297	393						
+ Ocean Freight-Ins	$/t	35	35	35						
CIF Alexandria	$/t	236	332	428				1132	1492	1852
CIF Alexandria	LE/t	778	1097	1411				3734	4924	6113
+ Quality Adjustment	LE/t							560	739	917
+ Port Charge and Handlin	LE/t	30	30	30				30	30	30
+ Importer Charge	LE/t	54	77	99				187	246	306
+ Transp Port-Wholesale	LE/t	45	45	45				45	45	45
Price at Market	LE/t	907	1249	1585	907	1249	1585	4556	5983	7411
- Processing Costs	LE/t	510	510	510	510	510	510	120	120	120
- Transport Farm-Wholesal	LE/t	25	25	25	25	25	25	40	40	40
+ By Products	LE/t	56	56	56	50	50	50			
Concentration		0.09	0.09	0.09	0.13	0.13	0.13	0.48	0.48	0.48
Economic Farmgate Price	LE/t	40	72	103	55	99	143	2110	2795	3480
Economic Farmgate Price	LE/va	40	72	103	55	99	143	2.11	2.80	3.48
Economic Net Return	LE/fd	-1493	-206	1040	-363	384	1132	63	112	161
Value Added	LE/fd	696	1982	3228	452	1200	1947	713	762	811
Domestic Resource Cost		3.1	1.1	0.7	1.8	0.7	0.4	0.9	0.8	0.8

ARAB REPUBLIC OF EGYPT
AGRICULTURE SECTOR STRATEGY
SENSITIVITY OF ECONOMIC RETURNS TO PRICE CHANGES
All in constant 1991 terms

Export Parity		Rice			Cotton		
		Low	Point	High	Low	Point	High
Projected Price (1985$)	$/t	135	178	264	720	1110	1490
Projected Price (1991$)	$/t	201	265	393			
- Ocean Freight-Ins	$/t	35	35	35			
FOB Alexandria	$/t	166	230	358	1756	2707	3634
FOB Alexandria	LE/t	547	758	1180	5794	8933	11991
+ Quality Adjustment	LE/t						
- Port Charge and Handlin	LE/t	30	30	30	100	100	100
- Exporter Charge	LE/t	55	76	118	579	893	1199
- Transp Port-Wholesale	LE/t	45	45	45	50	50	50
Price at Market	LE/t	417	607	987	5065	7890	10642
- Processing Costs	LE/t	30	30	30	480	480	480
- Transport Farm-Wholesal	LE/t	25	25	25	25	25	25
+ By Products	LE/t				0	0	0
Concentration		0.65	0.65	0.65	1.00	1.00	1.00
Economic Farmgate Price	LE/t	235	359	606	4560	7385	10137
Economic Farmgate Price	LE/va	235	359	606	255	413	568
Economic Net Return	LE/fd	..	-897	-131	-216	747	1855
Value Added	LE/fd	..	430	1196	1117	2080	3189
Domestic Resource Cost		..	3.1	1.1	1.2	0.6	0.4

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ARAB REPUBLIC OF EGYPT
AGRICULTURE SECTOR STRATEGY
Sensitivity of Economic Returns to Land and Water Pricing Assumptions

		Scenario 1 Low-Water/High-Land Value Water Systems 0.013 Water Opp Cost 0.000 Land 10		Scenario 2 Med-Water/Med-Land Value Water Systems 0.030 Water Opp Cost 0.036 Land 7		Scenatio 3 (Base Case) Med-Water/Med-Land Value Water Systems 0.030 Water Opp Cost 0.070 Land 5		Scenario 4 High-Water/Low-Land Value Water Systems 0.060 Water Opp Cost 0.140 Land 3	
Crop	Financial Net Return	Economic Net Return	Domestic Resource Cost	Economic Net Return	Domestic Resource Cost	Economic Net Return	Domestic Resource Cost	Economic Net Return	Domestic Resource Cost
Sugar Beet	230.1	99.3	0.9	120.3	0.9	137.9	0.9	-22.7	1.0
Long Berseem	802.8	-55.2	1.1	85.5	0.9	181.5	0.8	169.2	0.8
Short Berseem	292.5	-146.1	1.5	-87.8	1.3	-47.5	1.2	-77.0	1.3
Wheat	684.1	254.1	0.8	415.7	0.7	525.6	0.6	530.5	0.6
Maize	489.6	118.6	0.9	175.0	0.8	216.2	0.8	79.2	0.9
Rice	609.4	440.7	0.7	190.3	0.9	35.1	1.0	-700.9	1.6
Cotton	737.0	403.7	0.8	602.9	0.7	740.0	0.6	667.2	0.7
Sugar Cane	1836.4	-394.4	1.2	-549.0	1.4	-636.2	1.4	-1515.3	2.3
Beans	628.1	-179.3	1.2	7.7	1.0	134.2	0.9	171.5	0.8
Tomatoes	2140.7	1445.9	0.5	1463.9	0.5	1480.2	0.4	1281.3	0.5
Oranges	1237.3	556.2	0.6	582.6	0.6	604.4	0.6	421.5	0.7
Potatoes	923.7	323.2	0.7	344.2	0.7	361.7	0.7	201.1	0.8
Sunflower	616.3	94.0	0.9	155.3	0.8	198.7	0.8	116.7	0.8
Rotations	**Financial Net Return**	**Economic Net Return**	**Domestic Resource Cost**	**Economic Net Return**	**Domestic Resource Cost**	**Economic Net Return**	**Domestic Resource Cost**	**Economic Net Return**	**Domestic Resource Cost**
Short Berseem	292.5	-146.1	1.5	-87.8	1.3	-47.5	1.2	-77.0	1.3
Cotton	737.0	403.7	0.8	602.9	0.7	740.0	0.6	667.2	0.7
Total	1029.5	257.6	0.9	515.2	0.8	692.5	0.7	590.2	0.7
Wheat	684.1	254.1	0.8	415.7	0.7	525.6	0.6	530.5	0.6
Maize	489.6	118.6	0.9	175.0	0.8	216.2	0.8	79.2	0.9
Total	1173.7	372.7	0.8	590.7	0.7	741.7	0.7	609.6	0.7
Wheat	684.1	254.1	0.8	415.7	0.7	525.6	0.6	530.5	0.6
Rice	609.4	440.7	0.7	190.3	0.9	35.1	1.0	-700.9	1.6
Total	1293.5	694.8	0.8	606.0	0.8	560.6	0.8	-170.5	1.1
Long Berseem	802.8	-55.2	1.1	85.5	0.9	181.5	0.8	169.2	0.8
Maize	489.6	118.6	0.9	175.0	0.8	216.2	0.8	79.2	0.9
Total	1292.4	63.4	1.0	260.5	0.9	397.7	0.8	248.4	0.9
Sugar	1836.4	-394.4	1.2	-549.0	1.4	-636.2	1.4	-1515.3	2.3

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Attachment E

ARAB REPUBLIC OF EGYPT
AGRICULTURE SECTOR STRATEGY

Economic Returns with Expected Yield Increases until the Year 2000

Crop	Financial Net Return	Economic Net Return	Value Added	Domestic Resource Cost
Wheat	991.6	935.8	1699.2	0.4
Long Berseem	1175.1	602.0	1197.6	0.5
Short Berseem	478.7	162.8	505.2	0.7
Beans	1065.2	571.3	1340.2	0.6
Maize	983.0	832.5	1649.9	0.5
Rice	793.4	299.0	1626.8	0.8
Cotton	1549.2	2017.7	3350.7	0.4
Potatoes	923.7	361.7	1177.2	0.7
Sugar Cane	2201.2	-341.9	1846.3	1.2
Sugar Beet	530.1	560.4	1376.0	0.6

Rotations	Financial Net Return	Economic Net Return	Value Added	Domestic Resource Cost
Short Berseem	478.7	162.8	505.2	0.7
Cotton	1549.2	2017.7	3350.7	0.4
Total	2027.9	2180.5	3855.8	0.4
Wheat	991.6	935.8	1699.2	0.4
Maize	983.0	832.5	1649.9	0.5
Total	1974.7	1768.3	3349.1	0.5
Wheat	991.6	935.8	1699.2	0.4
Rice	793.4	299.0	1626.8	0.8
Total	1785.0	1234.8	3326.1	0.6
Long Berseem	1175.1	602.0	1197.6	0.5
Maize	983.0	832.5	1649.9	0.5
Total	2158.1	1434.5	2847.5	0.5
Sugar	2201.2	-341.9	1846.3	1.2

ARAB REPUBLIC OF EGYPT

AN AGRICULTURAL STRATEGY FOR THE 1990s

National Accounts Summary at Constant 1987 Prices
(in millions of national currency)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
GDP at market prices	31,043	32,209	35,400	38,020	40,336	42,999	44,137	45,249	47,023	48,421	49,652
Net Indirect Taxes	2,596	2,659	2,518	2,704	2,868	3,059	3,140	3,218	3,300	3,406	3,550
GDP at factor cost	28,447	29,550	32,882	35,316	37,468	39,940	40,997	42,031	43,723	45,015	46,102
Agriculture	7,222	7,349	7,645	7,866	8,031	8,288	8,463	8,640	8,856	9,033	9,187
Industry	8,871	9,196	9,408	10,057	10,990	11,857	12,057	12,329	12,876	12,726	13,291
Mining and quarrying	-	-	-	-	-	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-	-	-	-	-	-
Services, etc.	12,354	13,005	15,829	17,393	18,447	19,795	20,477	21,062	21,992	23,256	23,624

Source: World Bank Data

APPENDIX III
Table 2

ARAB REPUBLIC OF EGYPT

AN AGRICULTURAL STRATEGY FOR THE 1990s

Public Sector Investments in the Second Plan and Proposed Investments for the Third Plan in Agriculture Sector
(LE million)

	Second Plan[1/] FY88 to FY92 (actual)	Third Plan[2/] FY93 to FY97
Ministry of Agriculture and Land Reclamation		
Vertical Expansion		
Administration Sector	244	421
Services Authorities	295	1,261
Economic Authorities	166	530
Economic Units	678	-
Subtotal	1,383	2,212
Horizontal Expansion		
Administration Sector	)1,766	51
Economic Authorities	)	2,525
Subtotal	1,766	2,576
MALR Total	3,149	4,788
Ministry of Public Works and Water Resources		
Administration Sector	1,093	2,109
Services Authorities	738	1,501
MPWWR Total	1,831	3,610
North Sinai Development	-	1,200
SECTOR TOTAL	4,980	9,599

1/ In current prices.
2/ In constant prices of 1991/92.

Sources: MALR and MPWWR Third Plan Proposals and MOP.

APPENDIX III
Table 3

ARAB REPUBLIC OF EGYPT

AN AGRICULTURAL STRATEGY FOR THE 1990s

Sources of Third Five-Year Plan Financing:
Agricultural Sector
(LE million)

	Financing				Final Plan Total
	NIB		Grants/		
	Local	Foreign	Loans	Other	
Ministry of Agriculture & Land Reclamation					
Vertical Expansion	974	69	688	481	2,212
Horizontal Expansion	1,820	166	372	218	2,576
Ministry of Public Works and Water Resources	1,844	65	1,552	149	3,610
North Sinai Development	679	10	511	0	1,200
Total	5,317	310	3,123	848	9,598

Source: MOP and Staff estimates.

(a) Share of Agricultural Exports in Total Exports: 1981-89

YEAR		1981	1982	1983	1984	1985	1986	1987	1988	1989
						(Million US$)				
Total Exports	(Nominal)	3,232	3,120	3,215	3,140	1,838	2,214	2,037	2,120	2,648
	(Real)[a/]	3,069	2,009	3,170	3,165	1,838	1,878	1,573	1,527	1,919
Agricultural Exports[b/]	(Nominal)	729	670	726	752	325	508	444	390	537
	(Real)[a/]	692	646	716	758	325	430	343	281	389
Agriculture's Share (%)		22.5	21.5	22.6	24.0	17.7	22.9	21.8	18.4	20.3

(b) Share of Agricultural Imports in Total Imports: 1981-89

YEAR		1981	1982	1983	1984	1985	1986	1987	1988	1989
						(Million US$)				
Total Imports	(Nominal)	8,839	9,078	10,275	10,766	5,495	8,680	7,596	8,657	7,448
	(Real)[a/]	8,395	8,754	10,134	10,853	5,495	7,362	5,866	6,233	5,397
Agricultural Imports[b/]	(Nominal)	3,440	3,190	3,071	3,447	1,845	3,003	2,453	2,774	2,845
	(Real)[a/]	3,267	3,076	3,028	3,474	1,845	2,547	1,894	1,997	2,061
Agriculture's Share (%)		39	35	30	32	34	35	32	32	38

a/ Deflated by the Bank's MUV (1985=100)
b/ SITC 0+1+2+4-27-28-233-251

Source: UN Trade Tapes

ARAB REPUBLIC OF EGYPT

Table 3: Exports of Major Agriculture Commodity Exports

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Average Value For 1989-90	share (%)
COTTON	(000 TONS)	164.1	177.6	200.1	208.9	174.3	143.8	145.6	129.9	79.9	58.4	35.0		
	(000 US$)	423,413	457,091	408,724	441,239	485,949	427,247	440,762	388,872	287,039	274,502	170,000	222,251	58.4
ORANGES	(000 TONS)	110	114	101	148	161	161	75	111	97	154	170		
	(000 US$)	38,940	47,157	52,637	72,395	76,390	86,521	44,146	69,980	49,174	71,379	85,000	78,190	20.6
POTATOES	(000 TONS)	144	96	151	140	133	128	108	123	166	156	180		
	(000 US$)	32,501	25,619	41,101	30,632	36,787	26,974	21,917	24,280	31,505	26,884	53,000	39,942	10.5
RICE	(000 TONS)	98	93	23	19	71	16	40	101	71	33	82		
	(000 US$)	35,223	42,609	11,617	7,081	22,522	5,400	16,022	39,657	17,635	8,291	20,500	14,396	3.8
ONIONS	(000 TONS)	42	20	13	35	17	22	21	33	50	51	35		
	(000 US$)	11,646	6,771	5,287	11,715	5,706	7,661	6,554	11,857	12,442	9,692	8,800	9,246	2.4
TOMATOES	(000 TONS)	2	3	9	17	9	14	17	23	15	15	15		
	(000 US$)	986	1,623	4,254	7,000	2,831	3,590	5,458	4,908	2,927	4,227	5,200	4,714	1.2
GREEN BEANS	(000 TONS)	0	6	13	11	11	9	16	11	10	9	12		
	(000 US$)	29	3,578	8,381	5,352	4,762	3,425	7,969	3,357	2,881	3,936	5,100	4,518	1.2
WATERMELON	(000 TONS)	8	11	7	21	23	18	20	12	11	8	8		
	(000 US$)	3,685	4,093	3,894	7,592	8,787	6,535	11,133	4,181	3,150	2,737	2,737	2,737	0.7
DATES	(000 TONS)	0	0	1	1	1	1	1	1	1	3	3		
	(000 US$)	137	205	525	976	350	253	593	863	252	1,056	1,200	1,128	0.3
GARLIC	(000 TONS)	10	6	4	8	5	2	1	2	3	2	2		
	(000 US$)	6,062	4,859	3,635	6,659	3,191	837	1,015	1,080	1,414	704	1,200	952	0.3
ARTICHOKE	(000 TONS)	1	1	2	2	1	1	2	2	1	2	2	2	
	(000 US$)	400	383	997	1,103	754	762	826	586	332	685	630	658	0.2

Table 3 (contd.)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Average Value For 1989-90	share (%)
OTHER CITRUS	(000 TONS)	0	0	1	2	2	1	1	1	1	2	2	2	
	(000 US$)	0	0	269	461	342	341	483	231	171	467	450	459	0.1
PEACHES & NECTARIN	(000 TONS)	0	0	0	0	0	0	0	0	0	0	0	0	
	(000 US$)	0	0	0	0	1	1	34	42	245	299	280	290	0.1
GRAPES	(000 TONS)	1	0	0	0	0	0	0	0	0	0	0	0	
	(000 US$)	349	49	91	174	114	136	236	51	34	12	135	74	0.0
BROAD BEANS	(000 TONS)	0	0	0	0	1	1	1	0	0	0	0	0	
	(000 US$)	0	0	0	0	328	264	236	148	85	80	80	80	0.0
PLUMS	(000 TONS)	0	0	0	0	0	0	0	0	0	0	0	0	
	(000 US$)	0	0	0	0	104	34	436	88	166	51	51	51	0.0
TANGERIN,ETC	(000 TONS)	0	0	0	2	0	0	0	56	0	4	0	NA	
	(000 US$)	0	207	179	1,386	11	20	34	35,864	109	1,613	0	NA	NA
ORANGE JUICE	(000 TONS)	0	0	0	0	0	0	0	0	0	0	0	0	
	(000 US$)	0	0	0	0	0	0	0	0	0	32	32	32	0.0
PEARS	(000 TONS)	0	0	0	0	0	0	0	0	0	0	0	0	
	(000 US$)	3	19	14	16	16	27	4	9	8	28	28	28	0.0
CARROTS	(000 TONS)	0	0	0	0	0	0	0	0	0	0	0	0	
	(000 US$)	0	0	0	0	11	12	5	9	3	15	15	15	0.0
GRAPE JUICE	(000 TONS)	0	0	0	0	0	0	0	0	0	0	0	0	
	(000 US$)	0	0	0	0	0	0	0	0	0	12	12	12	0.0

Source: FAO Tradetapes

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Table 6

ARAB REPUBLIC OF EGYPT

AN AGRICULTURAL STRATEGY FOR THE 1990s

Trends of Agricultural Commodity Exports, 1980-1990[a]

	Quantity	Value		Unit Value	
		Nominal US$	Real[b]	Nominal US$	Real[a]
		------ (% p.a.) ------			
Total of Commodities given in Table 1	-	-4.3**	-7.2	-	-
Total excluding cotton	-	1.1	-1.8	-	-
Cotton	-13.6**	-7.0**	-9.9**	3.7**	0.8**
Oranges	1.8	4.3	1.4	2.5	-0.4
Potatoes	2.6	0.8	-2.1	-1.8	-4.7
Rice	0.1	-4.5	-7.4	-4.6	-7.5
Onions	6.3	2.5	-0.4	-3.8	-6.7
Tomatoes	18.9*	10.5*	7.6*	-8.4*	-11.3*
Green Beans	1.9	-0.3	-3.2	-2.2	-5.1
Watermelon	-1.3	-4.3	-7.2	-3.0	-5.9
Dates	28.7**	15.1**	12.2**	-13.6	-16.5
Garlic	-13.8*	-19.2**	-22.1**	-5.4	-8.3
Artichoke	5.3*	0.1	-2.8	-5.2	-8.1
Lemons & Lime	17.6*	12.4	9.5	-5.2	-8.1

Source: Table 1 and IECIT, World Bank
Notes: * implies the trend is significant at more than 90% level
** implies the trend is significant at more than 99% level
a Trends calculated by long-linear regression with time trend as explanatory variable.
b Deflated by the World Bank's MUV.

ARAB REPUBLIC OF EGYPT

AN AGRICULTURAL STRATEGY FOR THE 1990s

Recent Trends in Imports of Agricultural Commodities: 1980-1990

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	TRENDS 1990-90 (% P.A.)
WHEAT+FLOUR	(000 T)	5,423	5,878	5,503	6,591	7,034	6,996	6,333	7,076	7,239	6,971	6,615	2.3 *
	(MILL US$)	1,035	1,398	1,266	1,246	1,369	1,260	906	897	1,177	1,345	1,189	-1.0
MAIZE	(000 T)	596	1,289	1,297	1,523	1,582	1,907	2,028	2,200	1,300	1,500	1,960	7.1 **
	(MILL US$)	102	314	300	221	324	290	239	189	143	210	255	0
SUGAR	(000 T)	500	690	772	807	903	726	744	672	685	524	595	-1.0
	(MILL US$)	239	426	222	194	211	138	215	134	200	183	262	-3.5
FATS AND OILS	(000 T)	543	560	528	598	580	718	668	632	814	708	838	4.3 **
	(MILL US$)	418	488	395	429	460	576	501	354	532	519	585	2.3
BEEF	(000 T)	65	109	97	78	157	138	176	143	139	118	90	7.0 *
	(MILL US$)	84	167	168	110	208	171	233	172	194	175	120	6.0 *
BUTTER AND MILK	(000 T)	56	87	43	59	60	69	81	102	116	58	49	1.9
	(MILL US$)	83	167	116	133	134	144	176	143	157	127	107	1.4

Note: ** Significant at 95% level of significance.

* Significant at 90% level of significance.

Source: FAO Tradetapes

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ARAB REPUBLIC OF EGYPT

Import Regulations for Agricultural Products

Commodity	Tariff (%)	Import Ban	Approval Required
Grains			
Wheat	1	--	Yes
Corn	1	--	--
Rice	--	Banned	--
Sorghum/barley	5	--	--
Grain Products			
Wheat Flour	5	--	--
Semolina	10	--	--
Starches	30	--	--
Bread/pasta/cookies	--	Banned	--
Pulses			
Beans	1	--	--
Lentils	1	--	--
Peas	1	--	--
Other	10	--	--
Feed			
Straw/bran/premixes	5	--	--
Hay/forage products	5	--	--
Tapioca	5	--	--
Oilseeds			
Cotton	--	Banned	--
Sunflower	1	--	--
Soybeans	1	--	--
Peanut (for sowing)	5	--	Yes
Sesame	1	--	--
Palm nuts/kernels	1	--	--

Commodity	Tariff (%)	Import Ban	Approval Required
Vegetable Oils			
All refined	--	Banned	--
Crude/semi-refined	1	--	--
Cotton, sun, sesame, soy, palm, corn, rape, Linseed, other	5	--	--
Vegetables & Vegetable Seeds			
Fresh/frozen/preserved	--	Banned	--
Potato seed	5	--	Yes
Other seeds	5	--	Yes
Tomato Concentrate	1	--	--
Fruit			
Fresh fruits (except melon, grapes, figs & guavas)	--	Banned	--
Above fresh fruits	50	--	Yes
Dried fruits	50	--	Yes
Peanuts	--	Banned	--
Dried nuts	60	--	Yes
Juices/Concentrates	110	--	Yes
Sugar			
Granulated-beet/cane	1	--	--
Other sugars/syrups	--	Banned	--
Molasses	50	--	--
Honey	--	Banned	--
Jams/jellies/etc.	110	--	--
Live animals			
Feeder cattle/steers	--	Banned	--
Bred heifers/cows	1	--	--
Sheep/goats/camels	1	--	--
Live poultry	--	Banned	--
Swine	--	Banned	--
Chicks (1 day old)	1	--	--

Commodity	Tariff (%)	Import Ban	Approval Required
Meats			
Beef/veal	--	Banned	--
Lamb/goat	1	--	Yes
Poultry	--	Banned	--
Edible Meat offals	1	--	Yes
Other meats	--	Banned	--
Eggs			
Table and hatching	--	Banned	--
Dairy products			
Dry milk	1	--	--
Milk casein	1	--	--
Butter (for retail)	10	--	--
Butter (manufacturing)	1	--	--
Butter Oil/shortening	1	--	--
Lard	--	Banned	--
Processed cheese	--	Banned	--
Other cheese	1	--	--
Margarine	--	Banned	--
Fish			
Fresh/frozen/canned (except tuna)	--	Banned	--
Tuna	5	--	--

Source:

1) Ministry of Economy, various decrees
2) Ministries of Agriculture, Supply, Industry and Health decrees, and internal regulations.

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Table 9

ARAB REPUBLIC OF EGYPT

AN AGRICULTURAL STRATEGY FOR THE 1990s

EC's Tariffs and Quotas on Egypt's Major Horticultural Commodities

		Tariffs (%) From	
		Jan. 1, 1992	Jan 1, 1993
Oranges	Within the quota of 7,000 tons	2.8	0
	Beyond the quota	5.2	5.2
Mandarines		4.4	0
Lemons		1.7	0
Potatoes	Within the quota of 105,000 tons and for period Jan. 1 -Mar. 31	1.8	0
	Beyond the quota for the period Jan. 1 - Mar. 31	9.0	9.0
	For the period Apr. 1 - Dec. 31	15.0	15.0
Onions	Within the quota of 10,000 tons and for the period Feb. 1 - Apr. 30	4.3	0
	Beyond the quota for the period Feb 1 - Apr. 30	4.8	4.8
	Within the quota for the period May 1 - May 15	4.3	0
	Beyond the quota for the period May 1 - May 15	12.0	12.0
	For the period May 16 - Jan 31	12.0	12.0
Tomatoes	For the period Dec. 1 - Dec. 31	2.4	0
	For the period Jan 1 - Feb 28	1.2	0
	For the period Mar 1 - Mar 31	2.4	0
	Other periods	11.0	11.0
Artichokes	Within the quota of 100 tons and for the period Oct. 1 - Dec. 31	2.0	0
	Beyond the quota or for the period Jan. 1 - Sept. 30	13.0	13.0

Source: EC Office, Cairo

ARAB REPUBLIC OF EGYPT

TOTAL CULTIVATED AREAS AND MAIN CROPS (IN '000 FEDDAN)

	1952	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	% change 1952-80	% change 1980-85	% change 1985-90	annual % change 1952-80	annual % change 1980-90
Cultivated area																	
Winter Crops	4364	4927	5024	4963	4983	4945	5038	4944	5098	5050	5270	5593	12.9%	2.3%	11.0%	0.5%	1.4%
Summer Crops	3026	5045	4994	5007	4830	4818	4845	4799	4842	4919	4984	5055	66.7%	-4.0%	4.3%	2.4%	0.0%
Nile Crops	1824	803	795	821	880	845	880	890	863	882	864	791	-56.0%	9.6%	-10.1%	-2.0%	-0.1%
Orchards	94	361	368	390	404	435	457	593	616	646	655	660	284.0%	26.6%	44.4%	10.1%	8.3%
Total	9308	11136	11181	11181	11097	11043	11220	11226	11419	11497	11773	12099	19.6%	0.8%	7.8%	0.7%	0.9%
Main Winter Crops																	
Barley	137	96	91	108	121	126	125	130	112	89	118	127	-29.9%	30.2%	1.6%	-1.1%	3.2%
Beans	355	276	282	314	326	307	339	307	324	363	368	345	-22.3%	22.8%	1.8%	-0.8%	2.5%
Long Berseem	2202	1722	1756	1791	1866	1972	1923	1866	1707	1614	1685	1660	n/a	11.7%	-13.7%	n/a	-0.4%
Short Berseem		990	1022	914	870	835	918	870	814	790	802	796	n/a	-7.3%	-13.3%	n/a	-2.0%
Vegetables	63	272	275	272	273	286	291	314	330	348	354	338	331.7%	7.0%	16.2%	11.8%	2.4%
Wheat	1402	1326	1400	1374	1320	1178	1186	1206	1373	1422	1533	1955	-5.4%	-10.6%	64.8%	-0.2%	4.7%
Main Summer Crops																	
Cotton	1967	1245	1178	1066	998	984	1081	1055	980	1014	1006	993	-36.7%	-13.2%	-8.1%	-1.3%	-2.0%
Maize	27	1432	1434	1452	1397	1449	1396	1122	1353	1480	1534	1547	5203.7%	-2.5%	10.8%	185.8%	0.8%
Sorghum	378	398	400	366	378	351	331	352	308	308	298	312	5.3%	-16.8%	-5.7%	0.2%	-2.2%
Peanut	26	28	28	29	27	24	28	23	25	30	32	29	7.7%	0.0%	3.6%	0.3%	0.4%
Potato	0	84	74	69	63	62	81	78	71	94	66	70		-3.6%	-13.6%		-1.7%
Rice	362	970	954	1024	1011	983	924	1008	981	837	982	1036	168.0%	-4.7%	12.1%	6.0%	0.7%
Sesame	42	39	40	47	26	26	22	22	29	29	25	42	-7.1%	-43.6%	90.9%	-0.3%	0.8%
Soybean	0	83	109	144	147	125	119	110	113	117	92	99		43.4%	-16.8%		1.9%
Sugarcane	92	253	251	254	250	244	251	262	250	268	275	274	175.0%	-0.8%	9.2%	6.3%	0.8%
Vegetable	118	421	428	422	399	420	446	518	510	506	472	437	256.8%	5.9%	-2.0%	9.2%	0.4%
Main Nile Crops																	
Rice	12	2	2	2	2	1	1	1	2	1	1	1	-83.3%	-50.0%	0.0%	-3.0%	-5.0%
Sorghum	55	12	13	17	14	14	9	19	9	7	8	8	-78.2%	-25.0%	-11.1%	-2.8%	-3.3%
Maize	1677	473	489	483	555	526	518	361	458	480	470	428	-71.8%	9.5%	-17.4%	-2.6%	-1.0%
Potato	0	83	85	85	74	86	96	96	119	113	110	119		15.7%	24.0%		4.3%
Vegetable	71	187	165	188	188	170	185	209	184	183	185	164	163.4%	-1.1%	-11.4%	5.8%	-1.2%

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Table 10

ARAB REPUBLIC OF EGYPT
AVERAGE YIELDS OF MAIN CROPS (per fd)

	1952	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	% change 1952-80	% change 1980-85	% change 1985-90	annual % change 1952-80	annual % change 1980-90
Barley - ardeb	7.19	9.33	9.44	9.29	9.07	9.53	9.72	9.82	10.1	10.28	8.86	8.46	29.8%	4.2%	-13.0%	1.1%	-0.9%
Beans - ardeb	4.53	5.61	5.64	6.11	6.57	6.46	6.84	6.73	7.29	6.45	7.97	7.98	23.8%	21.9%	16.7%	0.9%	4.2%
Raw Cotton - m.q	4.19	7.18	7.14	7.8	6.83	6.77	6.76	6.54	6.15	5.35	5.03	5.21	71.4%	-5.8%	-22.9%	2.5%	-2.7%
Maize - ardeb	6.31	12.1	12.28	13.34	12.84	13.37	13.8	14	14.27	14.9	14.66	17.4	91.8%	14.0%	26.1%	3.3%	4.4%
Millet - ardeb	8.62	11.19	11.29	11.23	11.3	10.96	11.49	11.67	12.52	13.43	13.8	14.18	29.8%	2.7%	23.4%	1.1%	2.7%
Peanut - ardeb	10.13	11.97	11.99	10.93	9.91	11.44	10.96	10.26	10.25	11.96	11.87	11.93	18.2%	-8.4%	8.9%	0.6%	0.0%
Rice - daribe	1.46	2.59	2.49	2.38	2.6	2.4	2.6	2.6	2.45	2.69	2.72	3.01	77.4%	0.4%	15.8%	2.8%	1.6%
Sesame - ardeb	2.81	3.42	3.43	3.63	3.63	3.46	3.45	3.68	3.87	3.93	3.96	4.21	21.7%	0.9%	22.0%	0.8%	2.3%
Soybean - ton		1.1	1.2	1.2	1.1	1.1	1.18	1.21	1.18	1.1	0.99	1.08		7.3%	-8.5%		-0.2%
Sugarcane - qant	785	760	779.7	751.2	748	784.6	835.6	861	748	896.2	904.7	902.4	-3.2%	9.9%	8.0%	-0.1%	1.9%
Wheat - ardeb	5.18	9	9.23	9.79	10.08	10.27	10.53	10.66	13.22	13.31	13.85	14.56	73.7%	17.0%	38.3%	2.6%	6.2%

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AVERAGE YIELDS OF MAIN CROPS (t/fd)

	1952	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Barley	0.86	1.12	1.13	1.11	1.09	1.14	1.17	1.18	1.21	1.23	1.06	1.02
Beans	0.70	0.87	0.87	0.95	1.02	1.00	1.06	1.04	1.13	1.00	1.24	1.24
Raw Cotton	0.66	1.13	1.12	1.23	1.08	1.07	1.06	1.03	0.97	0.84	0.79	0.82
Maize	0.88	1.69	1.72	1.87	1.80	1.87	1.93	1.96	2.00	2.09	2.05	2.44
Millet	1.21	1.57	1.58	1.57	1.58	1.53	1.61	1.63	1.75	1.88	1.93	1.99
Peanut	0.76	0.90	0.90	0.82	0.74	0.86	0.82	0.77	0.77	0.90	0.89	0.89
Rice	1.38	2.45	2.35	2.25	2.46	2.27	2.46	2.46	2.32	2.54	2.57	2.84
Sesame	0.34	0.41	0.41	0.44	0.44	0.42	0.41	0.44	0.46	0.47	0.48	0.51
Soybean	0.00	1.10	1.20	1.20	1.10	1.10	1.18	1.21	1.18	1.10	0.99	1.08
Sugarcane	35.33	34.20	35.09	33.80	33.66	35.31	37.60	38.75	33.66	40.33	40.71	40.61
Wheat	0.78	1.35	1.38	1.47	1.51	1.54	1.58	1.60	1.98	2.00	2.08	2.18

ARAB REPUBLIC OF EGYPT
AVERAGE YIELDS OF MAIN CROPS (t/ha)

	1952	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Barley	2.05	2.67	2.70	2.65	2.59	2.72	2.78	2.81	2.89	2.94	2.53	2.42
Beans	1.67	2.07	2.08	2.25	2.42	2.38	2.52	2.48	2.69	2.38	2.94	2.95
Raw Cotton	1.57	2.69	2.68	2.93	2.56	2.54	2.54	2.45	2.31	2.01	1.89	1.95
Maize	2.10	4.03	4.09	4.45	4.28	4.46	4.60	4.67	4.76	4.97	4.89	5.80
Millet	2.87	3.73	3.76	3.74	3.77	3.65	3.83	3.89	4.17	4.48	4.60	4.73
Peanut	1.81	2.14	2.14	1.95	1.77	2.04	1.96	1.83	1.83	2.14	2.12	2.13
Rice	3.29	5.83	5.60	5.36	5.85	5.40	5.85	5.85	5.51	6.05	6.12	6.77
Sesame	0.80	0.98	0.98	1.04	1.04	0.99	0.99	1.05	1.11	1.12	1.13	1.20
Soybean	0.00	2.62	2.86	2.86	2.62	2.62	2.81	2.88	2.81	2.62	2.36	2.57
Sugarcane	84.11	81.43	83.54	80.49	80.14	84.06	89.53	92.25	80.14	96.02	96.93	96.69
Wheat	1.85	3.21	3.30	3.50	3.60	3.67	3.76	3.81	4.72	4.75	4.95	5.20

ARAB REPUBLIC OF EGYPT
PRODUCTION OF MAIN CROPS ('000)

	1952	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	% change 1952-80	% change 1980-85	% change 1985-90	annual % change 1952-80	annual % change 1980-90
Barley - ardeb	985.0	895.7	859.0	1003.3	1097.5	1200.8	1215.0	1276.6	1131.2	914.9	1045.5	1074.4	-9.1%	35.7%	-11.6%	-0.3%	2.0%
Beans - ardeb	1608.2	1548.4	1590.5	1918.5	2141.8	1983.2	2318.8	2066.1	2362.0	2341.4	2933.0	2753.1	-3.7%	49.8%	18.7%	-0.1%	7.8%
Raw Cotton - m.q	8241.7	8939.1	8410.9	8314.8	6816.3	6661.7	7307.6	6899.7	6027.0	5424.9	5060.2	5173.5	8.5%	-18.3%	-29.2%	0.3%	-4.2%
Maize - ardeb	10752.2	23050.5	23614.4	25812.9	25063.7	26405.8	26413.2	20762.0	25843.0	29204.0	29378.6	34365.0	114.4%	14.6%	30.1%	4.1%	4.9%
Millet - ardeb	3732.5	4587.9	4662.8	4301.1	4429.6	4000.4	3906.6	4329.6	3968.8	4230.5	4222.8	4537.6	22.9%	-14.8%	16.2%	0.8%	-0.1%
Peanut - ardeb	263.4	335.2	335.7	317.0	267.6	274.6	306.9	236.0	256.3	358.8	379.8	346.0	27.3%	-8.4%	12.7%	1.0%	0.3%
Rice - dariba	546.0	2517.5	2380.4	2441.9	2633.8	2361.6	2405.0	2623.4	2408.4	2254.2	2673.8	3121.4	361.0%	-4.5%	29.8%	12.9%	2.4%
Sesame - ardeb	118.0	133.4	137.2	170.6	94.4	90.0	75.9	81.0	112.2	114.0	99.0	176.8	13.0%	-43.1%	133.0%	0.5%	3.3%
Soybean - ton	0.0	91.3	130.8	172.8	161.7	137.5	140.4	133.1	133.3	128.7	91.1	106.9		53.8%	-23.9%		1.7%
Sugarcane - qent	72220.0	192280.0	195704.7	190804.8	187000.0	191442.4	209735.6	225582.0	187000.0	240181.6	248792.5	247257.6	166.2%	9.1%	17.9%	5.9%	2.9%
Wheat - ardeb	7262.4	11934.0	12922.0	13451.5	13305.6	12098.1	12488.6	12856.0	18151.1	18926.8	21232.1	28466.8	64.3%	4.6%	127.9%	2.3%	13.9%
Vegetables	1810.0	5675.0	6830.0	6981.0	7040.0	7322.0	8351.0	9527.0	9964.0	9074.0	8444.0	8717.0		47.2%	4.4%	7.6%	5.4%
Potatoes		1214.0	1195.0	1184.0	1095.0	1189.0	1478.0	1400.0	1801.0	3239.0	1657.0	1638.0		21.7%	10.8%		3.5%

ARAB REPUBLIC OF EGYPT
PRODUCTION OF MAIN CROPS ('000t)

	1952	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Barley	118.2	107.5	103.1	120.4	131.7	144.1	145.8	153.2	135.7	109.8	125.5	128.9
Beans	249.3	240.0	246.5	297.4	332.0	307.4	359.4	320.2	366.1	362.9	454.6	426.7
Raw Cotton	1298.1	1407.9	1324.7	1309.6	1073.6	1049.2	1150.9	1086.7	949.3	854.4	797.0	814.8
Maize	1505.3	3227.1	3306.0	3613.8	3508.9	3696.8	3697.8	2906.7	3618.0	4088.6	4113.0	4811.1
Millet	522.5	642.3	652.8	602.2	620.1	560.1	546.9	606.1	555.6	592.3	591.2	635.3
Peanut	19.8	25.1	25.2	23.8	20.1	20.6	23.0	17.7	19.2	26.9	28.5	25.9
Rice	516.0	2379.0	2249.5	2307.6	2488.9	2231.7	2272.7	2479.1	2275.9	2130.2	2526.7	2949.7
Sesame	14.2	16.0	16.5	20.5	11.3	10.8	9.1	9.7	13.5	13.7	11.9	21.2
Soybean	0.0	91.3	130.8	172.8	161.7	137.5	140.4	133.1	133.3	128.7	91.1	106.9
Sugarcane	3249.9	8652.6	8806.7	8586.2	8415.0	8614.9	9438.1	10151.2	8415.0	10808.2	11195.7	11126.6
Wheat	1089.4	1790.1	1938.3	2017.7	1995.8	1814.7	1873.3	1928.4	2722.7	2839.0	3184.8	4269.7
Vegetables	1810.0	5675.0	6830.0	6981.0	7040.0	7322.0	8351.0	9527.0	9964.0	9074.0	8444.0	8717.0
Potatoes	0.0	1214.0	1195.0	1184.0	1095.0	1189.0	1478.0	1400.0	1801.0	3239.0	1657.0	1638.0

ARAB REPUBLIC OF EGYPT

Comparative Average Yields of Major Crops in Egypt and Selected Countries

Crop	Country	1979-81	1988	1989	1990
		---------- kg/ha ----------			
Wheat:					
	Egypt	3,192	4,751	4,941	5,209
	Morocco	894	1,735	1,493	1,365
	China	2,047	2,968	3,043	3,179
	Turkey	1,852	2,186	1,758	2,120
	*Netherlands	6,280	7,227	7,598	7,716
Corn:					
	Egypt	3,947	4,965	5,380	5,301
	Morocco	602	903	993	1,160
	China	3,038	3,928	3,879	4,142
	Turkey	2,168	4,014	3,929	4,000
	USA	6,474	5,311	7,300	7,434
	*Netherlands	12,912	23,811	25,714	25,714
Rice (Paddy):					
	*Egypt	5,707	6,064	6,488	7,288
	Morocco	3,937	4,451	6,300	4,125
	China	4,244	5,281	5,500	5,728
	Turkey	4,706	5,150	5,000	4,700
Barley:					
	Egypt	2,688	3,210	2,784	2,418
	Morocco	785	1,382	1,250	885
	China	2,418	3,061	3,333	3,229
	Turkey	1,924	2,189	1,351	2,090
	*France	4,120	5,263	5,360	6,499
Sorghum:					
	Egypt	3,724	4,443	4,673	4,580
	Morocco	445	601	685	609
	China	2,493	3,164	2,743	2,795
	Turkey	-	-	-	-
	*Spain	4,702	5,356	5,462	5,463
Potatoes:					
	Egypt	17,399	37,247	22,413	20,946
	Morocco	14,167	20,424	16,706	16,923
	China	10,888	11,518	11,067	11,588
	Turkey	16,681	22,397	21,711	21,622
	*Netherlands	37,752	41,974	41,532	40,206

APPENDIX III
Table 13
Page 2 of 3

Crop	Country	1979-81	1988	1989	1990
		---------- kg/ha ----------			
Dry Beans:					
	Egypt	2,035	2,262	2,456	2,500
	Morocco	694	607	612	612
	China	1,008	1,193	927	1,351
	Turkey	1,495	1,200	1,090	1,147
	*Puerto Rico	4,583	5,600	5,660	5,660
Faba Beans:					
	Egypt	2,134	2,374	2,976	2,641
	Morocco	560	1,123	784	713
	China	1,161	1,471	1,176	1,529
	Turkey	1,748	1,858	1,875	1,867
	France	3,063	3,878	3,378	3,875
	*Switzerland	3,354	4,156	3,333	5,000
Soybeans:					
	Egypt	2,669	2,625	1,717	2,143
	Morocco	333	1,017	1,000	1,000
	China	1,099	1,435	1,270	1,509
	Turkey	893	2,274	2,141	2,105
	Italy	2,697	3,260	3,402	3,282
	*Ethiopia	2,860	4,615	4,357	4,133
Peanuts (in shell):					
	Egypt	2,115	2,540	2,957	3,000
	Morocco	1,210	1,935	980	1,333
	China	1,487	1,911	1,821	2,127
	Turkey	2,246	2,553	2,500	3,150
	*Israel	4,429	5,938	6,515	6,452
Sesame:					
	Egypt	996	1,149	923	929
	Morocco	650	586	586	582
	China	484	575	468	583
	Turkey	594	479	379	419
	*Iran IR	990	1,000	1,000	1,000
Seed Cotton:					
	Egypt	2,646	2,071	1,921	2,296
	Morocco	1,623	2,232	2,646	1,288
	China	1,613	2,251	2,186	2,395
	Turkey	1,967	2,284	2,098	2,418
	*Israel	3,547	3,437	3,448	3,848

APPENDIX III
Table 13
Page 3 of 3

Crop	Country	1979-81	1988	1989	1990
		---------- kg/ha ----------			
Tomatoes:					
	Egypt	12,247	24,942	23,238	24,571
	Morocco	40,657	33,814	32,588	32,982
	China	14,254	15,881	15,831	16,089
	Turkey	32,941	37,500	38,333	39,000
	USA	42,629	49,753	54,720	55,577
	*Netherlands (greenhouses)	155,236	333,529	365,176	361,111
Cucumber:					
	Egypt	15,792	16,604	15,847	16,216
	Morocco	-	-	-	-
	China	12,412	15,846	16,054	16,292
	Turkey	15,968	17,391	17,391	18,826
	*Denmark (greenhouses)	117,892	384,615	384,615	384,615
Grapes:					
	Egypt	11,762	11,945	12,938	11,600
	Morocco	4,033	4,209	5,539	4,659
	China	5,046	5,827	6,794	6,671
	Turkey	4,378	5,678	5,745	5,700
	India	19,135	20,741	20,929	21,189
	*Netherlands (greenhouses)	24,474	28,571	28,571	28,571
Sugar Cane:					
	Egypt	82,996	95,887	97,065	94,737
	Morocco	83,563	73,020	64,537	73,057
	China	54,170	56,118	54,003	59,897
	Turkey	-	-	-	-
	*Zimbabwe	103,775	100,423	116,839	115,323
Onions:					
	Egypt	33,158	26,480	17,451	21,154
	Morocco	11,991	17,964	18,023	18,286
	China	12,522	15,256	15,758	15,853
	Turkey	14,247	17,936	17,215	19,620
	*Korea Rep.	34,597	47,459	54,026	50,875

* Country with highest average yield in 1990

Source: FAO Yearbook, Production, Vol.44,1990

APPENDIX III
Table 14

ARAB REPUBLIC OF EGYPT

AN AGRICULTURAL STRATEGY FOR THE 1990s

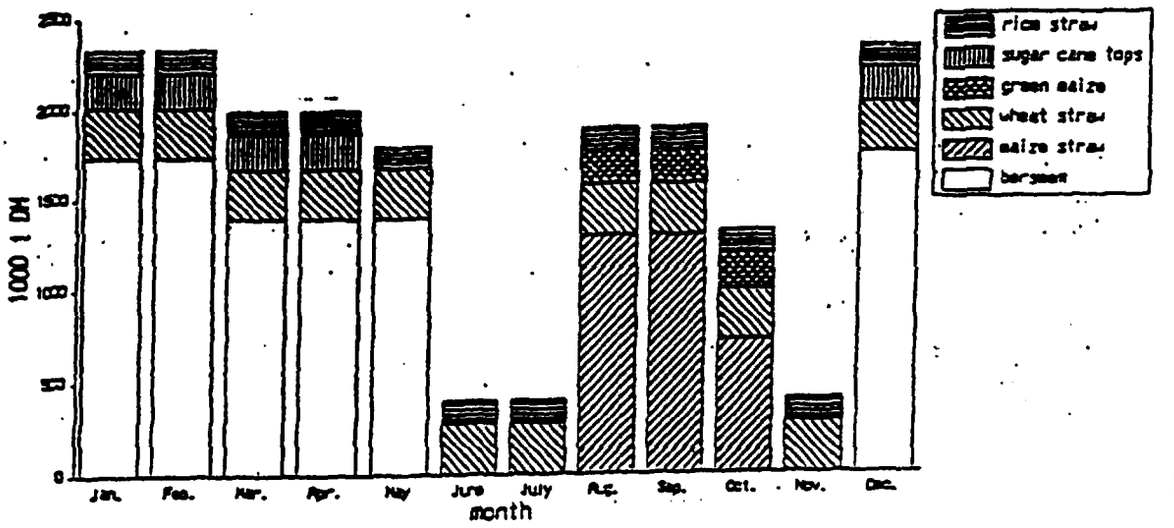
Animal Population in Different Agro-zones

SPECIES	YEAR	DELTA	UPPER EGYPT	NEW LAND	DESERT PROVINCES
Buffaloes	1982	1,404,495	932,908	28,806	12,352
	1991	1,620,566	1,436,282	86,016	22,136
Cattle	1982	1,673,616	1,109,490	66,865	56,236
	1991	1,315,666	1,222,500	90,175	90,435
Sheep	1982	1,085,181	1,863,570	47,086	375,248
	1991	1,131,838	1,556,842	113,487	869,728
Goats	1982	584,555	1,779,748	49,539	333,716
	1991	654,401	1,584,070	60,712	578,773

APPENDIX III
Table 15

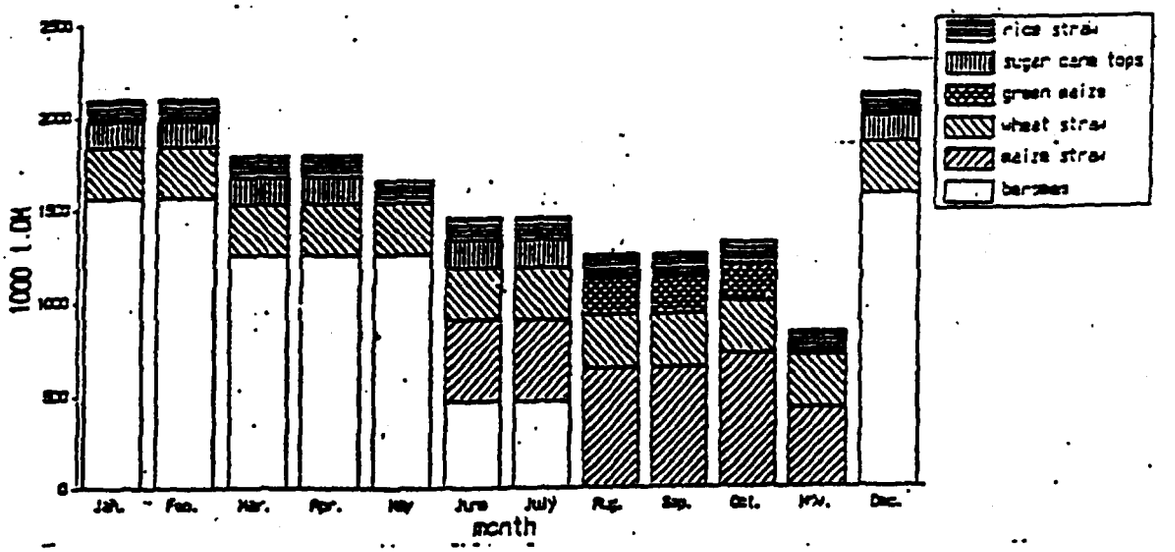
ARAB REPUBLIC OF EGYPT

Seasonal Availability of Roughages and By-Products, 1989-90
(1000 t Dry Matter)



Source: NTF-Drawing based on MOA figures

Seasonal Availability of Roughages and By-Products, 1989-90
(1000 t Dry Matter)
(when applying different conservation techniques 1/)



Source: NTF-Drawing based on MOA figures

1/ Assuming that:
50 % of the maize straw (August and September harvested) is urea treated and fed in June and July.
30 % of the sugar cane tops are converted into silage for June and July.
10 % of berseem is converted into silage for June and July.

ARAB REPUBLIC OF EGYPT
AGRICULTURE SECTOR STRATEGY

Summary of Economic Analysis of Crops

Old Lands

Crop	Gross Farm Revenue	Net Farm Revenue	Financial Net Return	Economic Net Return	Value Added	Return on Water	Domestic Resource Cost	Nominal Rate of Protection	Effective Rate of Protection	FNR-ENR over Val Add
Sugar Beet	1020.0	487.4	230.1	137.9	953.5	0.4	0.9	-0.3	-0.3	0.1
Long Berseem	1231.3	873.1	802.8	181.5	777.2	0.5	0.8	0.1	0.3	0.8
Short Berseem	590.0	342.3	292.5	-47.5	294.9	0.3	1.2	0.1	0.4	1.2
Wheat	1342.5	782.5	684.1	525.6	1289.0	0.8	0.6	-0.2	-0.2	0.1
Maize	1243.4	639.5	489.6	216.2	1033.5	0.4	0.8	-0.2	-0.2	0.3
Rice	1501.0	724.2	609.4	35.1	1362.9	0.2	1.0	-0.3	-0.2	0.4
Cotton	1757.2	850.0	737.0	740.0	2073.0	0.7	0.6	-0.4	-0.3	0.0
Sugar Cane	3105.2	1836.4	1836.4	-636.2	1552.0	0.1	1.4	0.2	0.6	1.6
Beans	1247.9	735.5	628.1	134.2	903.0	0.7	0.9	0.0	0.1	0.5
Tomatoes	3644.2	2465.3	2140.7	1480.2	2665.2	0.8	0.4	0.0	0.1	0.2
Oranges	2600.0	1237.3	1237.3	604.4	1433.3	0.5	0.6	0.0	0.1	0.4
Potatoes	2872.6	1181.1	923.7	361.7	1177.2	0.4	0.7	0.0	0.1	0.5
Sunflowers	1026.0	616.3	616.3	198.7	830.9	0.4	0.8	0.0	0.1	0.5

CROPBUDG.WK1 CN1.CX19

New Lands

Crop	Gross Farm Revenue	Net Farm Revenue	Financial Net Return	Economic Net Return	Value Added	Return on Water	Domestic Resource Cost	Nominal Rate of Protection	Effective Rate of Protection	FNR-ENR over Val Add
LONG BERSEEM	940.0	n/a	612.4	-228.3	410.6	0.1	1.6	0.1	0.8	2.0
GROUNDNUTS	1200.0	n/a	650.5	-44.7	843.3	0.2	1.1	0.0	0.2	0.8
WHEAT	680.0	n/a	214.5	-167.6	512.3	0.2	1.3	-0.2	-0.1	0.7
MAIZE	554.6	n/a	67.3	-329.1	464.1	0.1	1.7	-0.2	-0.1	0.9
W MELONS (fr)	2400.0	n/a	1888.1	1313.5	2055.1	0.6	0.4	0.0	0.1	0.3
TOMATOES (w)	2730.0	n/a	2122.5	1650.2	2325.2	1.1	0.3	0.0	0.1	0.2
BROAD BEANS	632.3	n/a	222.3	-128.7	480.5	0.4	1.3	0.0	0.1	0.7
PEAS (green)	1426.0	n/a	855.6	371.6	964.9	1.4	0.6	0.0	0.2	0.5

NEWLANDS.WK1 CN3.CX16

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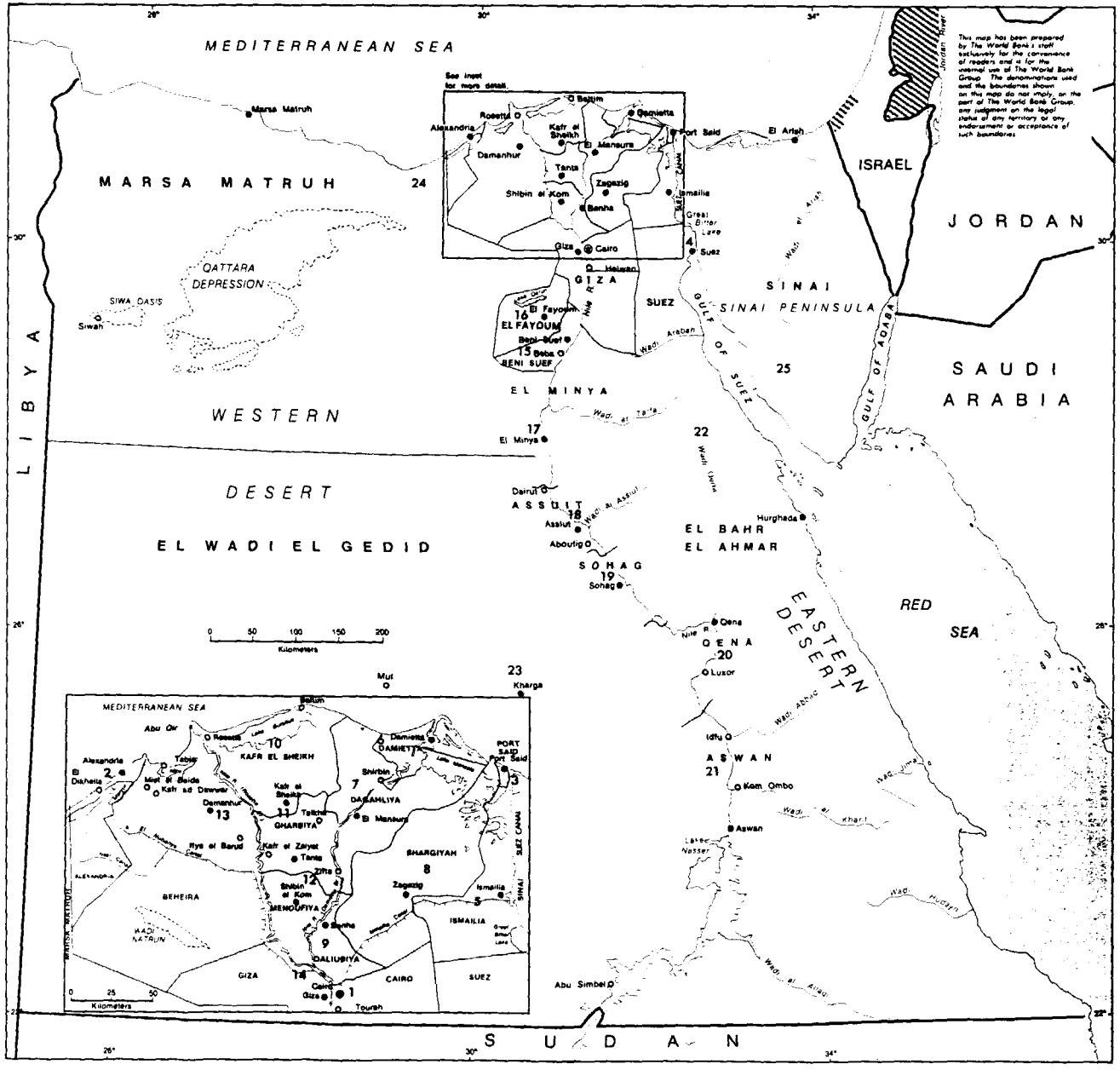

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ARAB REPUBLIC OF EGYPT

BANK/IDA ASSISTED PROJECTS IN AGRICULTURE SECTOR

	Fiscal Year Approved
• Upper Delta Drainage	1970
• Upper Egypt Drainage I	1973
• Upper Egypt Drainage II	1976
• Fruit and Vegetable Development	1976
• Nile Delta Drainage II	1977
• Agricultural Development	1978
• Agroindustries I	1980
• Technical Assistance	1981
• Fish Farming	1981
• New Land Development	1981
• Agroindustries II	1983
• Irrigation Pumping Stations Rehabilitation	1983
Agricultural Development II	1985
Drainage V	1985
Channel Maintenance	1986
Agricultural Storage	1988
Pumping Stations Rehabilitation II	1990
National Drainage	1992

• Indicates project completed

POPULATION BY GOVERNORATE
(1986 DATA)

1	CAIRO	6,068,695
2	ALEXANDRIA	2,926,859
3	PORT-SAID	401,172
4	SUEZ	327,717
5	ISMAILIYA	545,259
6	DAMIETTA	740,365
7	DAKAHLIYA	3,484,102
8	SHARKIYA	3,414,308
9	QALIUBIYA	2,515,924
10	KAFR-EL-SHEIKH	1,809,221
11	GHARBIYA	2,884,599
12	MENOUFIYA	2,221,315
13	BEHEIRA	3,248,829
14	GIZA	3,725,420
15	BENI-SUEF	1,449,229
16	FAYOUM	1,551,214
17	MINIA	2,645,112
18	ASSIUT	2,215,679
19	SOUHAG	2,447,033
20	QENA	2,258,926
21	ASWAN	809,204
22	RED-SEA	89,724
23	EL-WADI EL-GEDID	113,405
24	MATROUGH	161,163
25	NORTH SINAI	170,835
	SOUTH SINAI	28,929
	TOTAL	50,504,238*

*Excludes Egyption population out of the country (2,250,000)

- Cultivated Areas
- Canals
- Wadis
- Physical Features
- National Capital
- Governorate Capitals
- Town and Villages
- Governorate Boundaries
- Occupied Territories

JULY 1992