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IDENTIFYING POLICY BARRIERS FOR FISHERIES DEVELOPMENT



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Report No. 76

***IDENTIFYING POLICY
BARRIERS FOR
FISHERIES
DEVELOPMENT***

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GLOSSARY

Artemia:

Brine shrimp, which live in highly saline waters and produce eggs (cysts) which can be stored dry; the cysts are used as food for juveniles (fry) fish culture.

Capture Fisheries:

Harvesting of fish from open waters ("hunting")

Culture Fisheries:

Harvesting of fish from enclosed waters ("farming")

Demersal Fish:

Marine fish, which live in, and are captured from deeper waters or from the sea bottom.

Euryhaline (Species):

Species that can reproduce in waters with strongly varying salinity levels.

Eutrophic (water):

Water with a high nutrient content.

Fingerlings:

Young fish, after nursing.

Fry:

Very young fish generally used for stocking in aquaculture (from nature or from hatcheries).

Pelagic Fish:

Marine fish living in and captured from surface waters.

Mariculture:

Aquaculture of sea (marine) organisms.

MSY:

Maximum Sustainable Yield: the maximum amount of fish that can be captured from a stock (on a yearly basis) without damaging the resource.

EXECUTIVE SUMMARY

This study was undertaken by APRP/RDI Unit in collaboration with GAFRD, in order to identify policy constraints and barriers to fisheries development in Egypt, and to generate consensus, among stakeholders, on the need for objectives of policy reform for fisheries development. A team of three experts, with the help of GAFRD technical experts and RDI / Resource Economic staff, carried out this study. During the course of the study, three stakeholder workshops were conducted, with a total of 260 participants, in Kafr El Sheikh, Damietta, and Cairo.

The study team made visits to Cairo, Kafr El-Sheikh, El-Arish, Fayoum, Damietta, Port Said, Ismailia, Abbassa and Aswan. Interviews were conducted, during these visits, with the representatives of GAFRD, the regional directors, fishing vessel owners, fishermen, fish farmers, cooperatives, fish processors, fish marketers and other concerned entities, both private and public.

The study report includes three sections in addition to the executive summary, first section deals with the fish resources and production, while the second section covers fish processing, and third section deals with fish marketing.

The study points out the following:

- Fish is a traditional and important component of the Egyptian diet. Per capita consumption of fish is exceeded 11.0 kg in 1998. Fish contributed 19.7% to the national consumption of animal protein in 1996.
- The domestic fish harvest in 1998 was about 546,000 tons, mostly from the Nile, Mediterranean, Northern Lakes, Lake Nasser, and Red Sea. Over 25 percent of this production were produced by aquaculture. This includes fish harvested from fishponds, cages, and rice fields.
- The fourth Five-Year Development Plan of Egypt (1996/97 – 2001/2) indicates that the fisheries sector accounted for 7.1% of the total value of agricultural production in 1996/97 and 32.2% of the total value of animal production in the same year. The estimated production for year 2001/2 is about 7.9% of the total value of agricultural production and about 37.7% the total value of agricultural production.
- In 1996 the fisheries sector accounted for 15.4% of the total value of animal production. Nevertheless, domestic fish production has for some years been insufficient to meet the requirements of the growing population of Egypt and has had to be supplemented by increasing quantities of imported fish.
- There are about 321,000 licensed fishermen and probably more than twice as many who are not licensed. It is believed that an additional 300,000 persons work in fish farming, handling and transportation, processing, marketing and other related activities. Total employment in the fisheries sector is close to one million persons. Employment in fisheries accounted for about 3.7% of total agricultural employment. Of these fishermen 46% worked in marine fisheries and 54% on inland waters. There is no information regarding employment in fish farming or in fisheries support activities.
- Motorized fishing vessels operate only in marine fisheries, since their use is not permitted in inland waters. In 1997 there were 6,010 fishing vessels in marine fisheries.

of which 48% were motorized and 52% non-motorized. In the same year there were 31,495 non-motorized fishing vessels working on inland waters. The total fleet consisted of 37,405 fishing vessels. Most of the owners of fishing vessels and gear are members of fishermen's cooperatives. Statistical information indicates an increase in licensed vessels from 1980 to 1997, except for those fishing in the Gulf of Suez.

- It is the general opinion that most marine and inland fisheries resources are fully exploited and in need of reduction of fishing effort and other management measures to ensure that sustainable production can be maintained. In the short term, it is unrealistic to expect any substantial increases in production from most marine and inland areas. Aquaculture production, on the other hand, can likely be increased substantially, on a sustainable basis, if certain development measures (principally, improvements in the water quality used by fish farms and in fish farm management technology) can be implemented.
- Landings from marine capture fisheries increased by 56% from 80,000 tons in 1989 to 125,000 tons in 1998, of which the Mediterranean Sea contributed 68,000 tons (54%) and the Red Sea 57,000 tons (46%). The study team notes that a number of owners have taken their fishing vessels to work in other countries (e.g., Yemen, Libya, Sudan and Eritrea) attracted by the prospect of less competition, higher catch rates, and thus more profitable operations. Marine capture fisheries in 1998 accounted for less than one-quarter (23%) of total fish production.
- Landings from inland fisheries grew by 57% from 179,000 tons in 1989 to 281,000 tons in 1998, of which the northern lakes (Lake Manzala, Lake Burullus, Lake Idko, and Lake Maryott) contributed 152,000 tons (54%). Inland capture fisheries in 1998 accounted for just over half (51%) of total fish production.
- Production from aquaculture has increased by 107% from 67,000 tons in 1989 to 139,000 tons in 1998, of which extensive private aquaculture operations contributed 106,000 tons (76%). Aquaculture production in 1998 accounted for just over one quarter (26%) of total fish production.
- The most important group of species are the tilapias which, between them, accounted for 181,200 tons of production, of which 128,400 tons (71%) was produced from wild resources and 52,800 tons (29%) was farmed. The tilapia species accounted for one-third (33%) of total fish production. Other important species in 1998 were grass carp with a production of 51,700 tons (this is the production of 2 types only), almost all of which (98%) was from aquaculture, and mullet with a production of 46,400 tons, the major part (61%) of which was farmed. Grass carps (9.5%) and mullet (8.5%) each accounted for less than one-tenth of total fish production.
- Egypt plays an insignificant role in world exports of fisheries products. In 1997 a total of 1,848 tons was exported, with a value of L.E. 8.9 million. The principal market area was Europe (60%), followed by the Middle East (34%). Exports have shown no growth in the past 10 years. Imports, principally of small pelagic species in frozen form, constituted an important share (24%) of total supply to the Egyptian market in 1998. Holland was the leading supplier (40%), followed by Norway (17%) and the United Kingdom (16%). Imports of fishery products almost doubled (87%) in volume from 110,700 tons in 1989 to 207,400 tons in 1997, but dropped to 176,300 tons in 1998. The balance of fisheries trade is heavily negative, with the value of fisheries imports (L.E. 256.5 million) more than 28 times the value of products exported (L.E. 9.0 million) in 1997.
- Fish processing, in 1994 there were 2 fish canneries, 11 smoking plants, 3 fishmeal plants and an undetermined number of freezing and cold storage facilities. It appears that

there has since been a trend by the private sector to increase the number of processing facilities, but precise information is not available. Both privately and publicly owned processors of canned fish, when interviewed by the team, claimed they are unable to compete with imported canned products.

- Egyptian consumers prefer fresh (unfrozen) whole fish, while frozen and canned products are considered to be inferior. Tilapia is the most popular species, followed by mullet, while carps are less desirable. Studies of consumer preferences have shown that about 40% of consumers prefer red meat, 35% prefer fish and 25% prefer chicken. Per capita consumption of fish has increased from 7.9 kg in 1989 to more than 11.0 kg in 1998. Domestic production alone is insufficient to meet demand in Egypt and has been supplemented by increasing levels of imported fish, which in 1998 accounted for 24% of total supply. Marketing is chiefly in the hands of the private sector and prices varying according to supply and demand. However, there is one area (Lake Nasser) where the Ministry of Supply sets the prices. This causes difficulties as fishermen sell part of their catches to so-called smugglers, to avoid selling, under what they perceive as less favorable conditions, to the two companies designated by decree to buy all the fish caught on Lake Nasser.
- Most marine waters and inland lakes suffer from varying degrees of pollution, including pollution from oil extraction in the Gulf of Suez, while northern lakes and the Mediterranean Sea are polluted, in varying degrees, by agricultural drainage water, industrial effluents and municipal sewage. The rate of evaporation in Lake Qaroun is greater than the supply of replacement water, which increases salinity.
- A number of government institutions have responsibilities regarding fisheries, some of which overlap, frequently without the necessary coordination between them. A conflict in the use of land occurs between GARPAD, which undertakes land reclamation in northern lakes and other water bodies, thus reducing the areas available for fishing, and GAFRD, one of the responsibilities of which is to protect and maintain fishing areas. Another example is the debate between GAFRD and MPWWR over the use of fresh water for fish farming and on the placing of fish cages in the Nile River and its channels.
- Government policies regarding fisheries are expressed in the Five Year Plans (FYP). The fourth FYP (1997/98 to 2001/02) anticipates that domestic production should reach 535,000 tons in the last year of the FYP, with a total value of about L.E. 5,360 million. This is to be achieved by:
 1. protecting the fish resources,
 2. maintaining the existing inlets from the sea to the northern lakes, and the opening of new inlets,
 3. expanding hatchery capacity,
 4. establishing marine fish farms,
 5. constructing ice production facilities,
 6. improving existing fish harbors and building new fishing ports, and
 7. improving slipways for fishing vessel maintenance as well as establishing new slipways.

Other government policies, which apply to fisheries, include:

- Promotion of investment and provision of credit facilities.
- Encouragement of small-scale investment by preferential interest rates.
- Support private sector activities,

Other government policies, which apply to fisheries, include:

- Promotion of investment and provision of credit facilities.
- Encouragement of small-scale investment by preferential interest rates.
- Support private sector activities,
- Evaluation of public sector companies with a view to improving them through joint ventures or privatization, or closing companies, which cannot be made profitable.
- Modification of legislation in line with new policy requirements, including those for cooperatives.
- Control of markets to avoid monopoly practices and dumping of products at less than cost in order to protect domestic production.
- Control of quality.
- Protection of consumers.

Findings and recommendations:

During field visits, interviews and workshops, the team solicited the stakeholders' views on policy barriers to fisheries development. At the final workshop, which was held in Cairo, the opinions of those present were that the following are the most important issues:

- Agricultural drainage, industrial effluents and sewage, and inadequate mixing of fresh and salt water in coastal lakes and Lake Qaroun adversely affect the quality of water in many water bodies.
- The lack of coordination between and within responsible Ministries.
- Most wild resources are considered to be fully exploited.
- Fresh water is a limited resource and, because fish farms are permitted to use only agricultural drainage water, the water supply to fish farms is generally polluted.
- On Lake Nasser fish a government body sets fish prices.
- Enforcement of existing legislation is generally inadequate and insufficient, especially Law No. 124 (Fisheries Law) and Law No. 4/94 (Environment Law).

At the final workshop, the working groups discussed these issues. The table, which follows summarizes the proposals and recommendations:

Opportunities

Recommendations

Production

Capture fisheries

1. Estimates of Maximum Sustainable Yield (MSY) for marine and inland waters are needed.

Develop proposals to enable the relevant institutions to make such estimates.

2. Existing legislation does not mention certain fishing gear introduced in recent years.

Develop proposals for appropriate modification of legislation and regulations.

3. Most wild resources are fully exploited.

Develop programs for actions designed to ensure optimum sustainable yields for each water body.

4. Agriculture drainage, industrial effluents and sewage; and inadequate mixing of fresh and salt water in coastal lakes and Lake Qaroun adversely affect the quality of the water in many water bodies.

Develop proposals for all affected water bodies to eliminate or treat polluted water before it reaches them to ensure appropriate levels of quality and salinity.

Aquaculture

5. Because fresh water is a limited resource and because fish farms are allowed to use only agricultural drainage water, the water supply to fish farms is generally polluted.

Develop programs to intensify sustainable aquaculture production, including the first use by fish farms of fresh water that subsequently can be re-used for agriculture.

6. Land suitable for aquaculture is generally leased by GAFRD for a period of 5 years, which is insufficient for the fish farmers to take a long-term view of the business.

Develop a proposal to modify legislation to increase the term of aquaculture leases to appropriate periods, applying safeguards to ensure that land and water are used in accordance with the terms of each lease.

7. Fishermen complain that the heavy catches of fries of mullet and other species for use in fish farms adversely affects capture fisheries and causes high mortality due to poor handling of fries.

Develop proposals for the sustainable management of fries of mullet and other commercially important species.

Institutional Aspects

8. Lack of coordination between and within responsible Ministries. For example, the Ministry of Environment has declared Lake Burullus a protected area, which may not be modified or changed, while GAFRD is actively changing the lake by controlling the reeds and weeds that affect fisheries. Another example is that while GAFRD's mission is to maintain water bodies and increase fisheries production, GARPAD is actively reclaiming parts of the lakes for agriculture.

Work with the Ministries of Agriculture and Land Reclamation, Environment, Public Works and Water Resources, Transportation and others to document current procedures and regulations and develop recommendations for a consistent and integrated program, with appropriate arrangements for enforcement.

9. Generally inadequate enforcement of existing legislation, especially Law No.124 (Fisheries Law) and Law No. 4/94 (Environment Law).

Develop proposals to determine requirements for monitoring control and surveillance (MCS) of each water body, including facilities, equipment, personnel, training and incentives, with programs ensuring that the users are aware of their responsibilities and obligations.

10. The majority of the owners of fishing vessels, fishing gear and fish farms, are members of cooperatives, which represent their members in dealing with authorities and provide social services, equipment, loans in cash and kind. However, they are constrained by funding shortages because they are no longer allowed to import fishing inputs.

Develop a proposal to strengthen the cooperatives.

Processing

Quality

11. Lack of coordination regarding quality levels required for domestic production of canned fish and for imported canned fish.

Import duties and other taxes

12. Industry sources assert that domestic processors pay higher taxes than the import duties and taxes paid by importers; import duties are not calculated on transaction prices.

Competitiveness

13. Domestic processors, in general, cannot compete with imported products.

Marketing

Ice

14. Shortages of ice needed to ensure adequate quality and to reduce losses.

Identify location and quantity of ice shortages in relation to demand for ice, with a view to encouraging the private sector to invest in this business.

Fish prices

15. On Lake Nasser fish a government body sets the prices of fish.

Eliminate government intervention in pricing of fish on Lake Nasser.

Losses

16. The quantities and value of fish lost through spoilage have not been estimated and may be significant.

Assess the extent of post-harvest losses, both in weight and value. The assessment will serve as the basis for designing programs to prevent or reduce such losses.

Exports

17. Lack of preferential access to the EU for Egyptian fisheries products.

18. High relative cost of freight to major overseas markets and uncertainty in availability of airfreight.

SECTION 1

Fish Production

1. Introduction:

This study was undertaken by APRP/RDI Unit, in collaboration with GAFRD, in order to identify policy constraints and barriers to fisheries development in Egypt, and to generate consensus, among stakeholders, for the need for objectives of policy reform for fisheries development (the Terms of Reference are given in Annex 1). A team of three experts, with help of technical experts from GAFRD and of the Resource Economics Section of RDI / TAT, carried out this study. During the course of the study, three stakeholder workshops were conducted for 260 participants- in Kafr El Sheikh, Damietta, and Cairo.

The study team visited, with representatives of the General Authority for Fish Resources Development (GAFRD), fishery sites and organizations in Cairo, and governorates of Kafr El-Sheikh (Abbassa), El-Arish, Fayoum, Damietta, Port Said, Ismailia, and Aswan. The team interviewed GAFRD staff at these governorates, in addition to fishing vessel owners, fishermen, fish farmers, cooperatives, fish processors, fish marketers and other concerned entities, both private and public. A list of persons met is attached (Annex 2). Due to lack of time, visits were not made to Alexandria, Suez and Hurghada.

This section contains an overview and assessment of the present status of fish production in Egypt, points out the constraints and obstacles facing fisheries development, and provides recommendations for improving fish resources efficiency.

2. General Background:

2.1 Resources:

The aquatic resource base in Egypt is extensive, consisting of marine water, fresh water and brackish water. The Mediterranean and Red Seas border the country and the Suez Canal and the Great Bitter Lake connect the seas. The Nile River, which runs through the Delta into the Mediterranean Sea, provides an immensely important source of fresh water. There are four littoral brackish water lakes: Manzala, Burullus, Edku and Maryott and two lagoons (Bardawil and Port Fouad Depressions to the west of the Delta). Three important drainage basins are present in the Fayoum Region: Lake Qaroun and Wadi Rayan Depressions I and III. Lake Nasser is a large man-made lake in upper Egypt. Various smaller lakes are also found in the country.



2.2 Fish Production:

Fish production, from all aquatic resources, has increased by 69% in the period 1989-98. The production increased from 323,000 tons to 546,000 tons. In 1998, about 23% come from marine fisheries, 28% from northern lakes and coastal depression, 23% from inland lakes and the Nile River and its branches, and 26% was produced by aquaculture (Tables 1 and 2).

Tilapia species are the dominant fish in Egyptian production. They accounted for 181,200 tons (33%) of the 1998 production, of which 128,400 tons (71%) was produced from wild fisheries and 52,800 tons (29%) came from fish farms. Grass carps are the second most important species in terms of volume, with production of 51,700 tons (9.5%), almost all (98%) of which was farmed. Mullet, with a production of 46,400 tons (8.5%) occupy third place in total fish production. The bulk of mullet production was produced by aquaculture. These three species represent about 52% of total fish production.

Recent estimates of the maximum sustainable yield (MSY) for marine and inland fisheries are not available. It is a general opinion, however that most marine and inland fisheries resources are fully, or close to fully, exploited and require a reduction in fishing effort as well as other management measures to ensure that sustainable production can be maintained. However, the GOE focuses on the means and ways of increasing fish production through the efforts of GAFRD, which include, among others, better and more efficient management of fish resources. In the short term, it is considered unrealistic to expect any substantial increase in production from most marine and inland areas.

Production from aquaculture can likely be increased substantially on a sustainable basis, if certain development measures (principally, changing the water use policy, improving the quality of water used by fish farms, and developing fish farm management technology) can be implemented.

2.3 Catch Statistics:

Generally, catch statistics need to be improved and better quality of data is required. Current statistics, in many cases, are based on estimates and may vary widely depending on the source. This is mainly due to the following reasons:

- (i) The fishing activities are scattered over a large area, making effective collection of statistics difficult.
- (ii) The estimates of the amount of fish consumed and/or sold by the fishermen and lakeside farmers and their families need to be improved. However, GAFRD, during the period 1985 – 1987, estimated the average of fish consumed. The estimate adds 10% to the recorded landings to cover these aspects. This might well be underestimated, therefore these data need to be improved and up dated.

- (iii) In some cases (e.g., at Lake Nasser and Lagoon Bardawil), fishermen are obliged to surrender their catch at a set price. Since market forces will ensure that the free market price will be higher; part of the catch will find its way to the consumer unrecorded.
- (iv) Statistics on production from private fishponds, cages and rice fields are not accurate. Published statistics are most likely obtained by means of broad estimates rather than scientific methods.

3. Capture and Culture Fisheries:

3.1. Marine Fisheries:

First. The Mediterranean Fishery:

The Mediterranean Sea coast is about 1,100 km long, extending from Sallum in the west to Rafaa in the east. The continental shelf of 200-m depth along the coast is largely composed of salty mud and muddy sands. It widens up to a maximum of 70 km in front of the Delta. The fishing grounds along this coast can be divided into the following three distinct zones:

- 1st. Western Zone: from Sallum to Alexandria, 600-km length
- 2nd. Central Zone: from Alexandria to Port Said, 300-km length
- 3rd. Eastern Zone: from Port Said to El-Arish, 200-km length.

Most of the fishing operations are concentrated in the central zone, using principally trawlers, at depth of 10 to 100m. The rest of the shelf is hardly exploited.

The Mediterranean fishery has been influenced by the construction of the High Dam, which strongly reduces the outflow of nutrient carried by Nile floods. Production of demersal fish, sardine and shrimp has declined considerably over the last 30 years. However, due to the increased outflow of Nile water in the last two years, a significant increase occurred in sardine production.

Fish production from Mediterranean Sea fisheries has increased by about 70% in the period 1988-1998 from 40,000 tons to 68,000 tons (Table 2). Sardine accounted for 24,000 tons (35%) in 1998 production; silverside and mullet species accounted together for 9,000 tons (13%); and shrimp accounted for 5,071 tons (8%). Table 3 illustrates the catch composition of the Mediterranean in 1998, and Table 9 shows the production by fishing areas.

There are 2,600 motorized fishing vessels with inboard engines (10 hp up to 800 hp) which operate in the Mediterranean fisheries. The main fishing gears used are trawls, purse-seines, long-line and trammel nets (Tables 11,12).

□ **Development Opportunities and Constraints:**

- At present, the fishery appears to be grossly over-exploited. Reducing the number of vessels, as one of possible solution, would likely result in higher catches per vessel and in higher total landings.
- A large part of the fish production in the Egyptian sector of the Mediterranean has always been based on the discharge of nutrients by in-flowing Nile waters. The decreased sea fertility caused by the construction of the Aswan High Dam was partly compensated for by an increased drainage of domestic waste nutrients via Lake Manzala.
- Conversely, potential new resources exist. The Institute of National Planning is in the process of studying data from Italian surveys, which indicated unexplored source of demersal and pelagic fish at a depth of more than 150 meters. This will allow an extra 20,000 tons of demersal species and 40,000 tons of pelagic fish (mainly sardine and anchovy) after developing suitable deep-water trawling gear. However, it is important to update these estimates.
- It is believed that marine culture activities could be developed in the western part of the Egyptian Mediterranean territory.

Second.Red Sea Fisheries:

The Egyptian Red Sea coast can be geographically divided into three regions: Gulf of Suez, Gulf of Aqaba and the main Red Sea. Fish production from Red Sea fisheries has increased by about 36% in the period 1988–1998 from 42,000 tons to 57,100 tons (Table 2). Spanish mackerel accounted for 10,000 tons (17%) in 1998 production; twin spot snapper accounted for 9,000 tons (16%), lizard fish 8,000 tons (14%) and sardine 5,000 tons (9%) (Table 4).

There are 550 motorized fishing vessels with inboard engines (10 hp. up to more than 1500 hp.) operating in the Red Sea fisheries. The main fishing gear used are long- lines, trawls and purse-seines (Table 6).

▪ **Development Opportunities and Constraints:**

According to FAO studies of 1984, the total sustainable catch in the Egyptian part of the Red Sea has been estimated at 27,000 tons from pelagic, demersal and coral reefs fisheries. Actual catch in 1998 was recorded at 57,000 tons. The increase in the actual is primarily due to Egyptian vessels operating in the waters of neighboring countries. However, the Red Sea fisheries are over-exploited, especially in the Gulf of Suez. It was reported that the average catch per fishing vessel has declined since 1988. Further, the fisheries may be subject to oil pollution resulting from oil extracting activities, industry and maritime transportation. Tourism development along the Red Sea coasts adversely

influences coastal fishing operations. Therefore, attention should be given to conserve the environment and maintain fisheries activities.

Opportunities exist to develop marine aquaculture in the Red Sea region for supplying fish to the Egyptian luxury tourism industry. This development would decrease the need for importing such products and it will increase the number of jobs in the Red Sea region, which is one of the objectives of the country's development policy.

3.2 Inland Fisheries:

Inland resources include four lakes on the Mediterranean coast of the Delta: Lake Manzala Lake Brulous, Lake Idko and Lake Maryott. They represent about 25% of the total area of the wetland in the whole Mediterranean basin. These lakes produce about 152,000 tons of fish, more than 28% of the total fish production in 1998. The lakes are generally shallow with a rich aquatic life. Large parts of the lakes are overgrown with emergent aquatic vegetation, speeding up the process of becoming land. The lakes are extensively used for various types of low-technology aquaculture. The first three lakes are connected with the sea by passes (boogase), while Lake Maryott is closed and discharges its water into the sea through a discharge station in El-Max.

Prior to the High Dam construction, the Nile discharged 90 billion cubic meters of fresh water into the sea annually. A major portion of this water flowed through the northern delta lakes, flushing out saline water and wastes accumulated since the last flooding period. The High Dam has regulated this flow, making irrigation water available year-round. However, this has resulted in reducing the annual flows into Lower Egypt. The annual discharge to this area has decreased considerably. The major part of this discharge is drainage water, the bulk of which flows through the four lakes into the sea. It must be mentioned, however, that a considerable increase in fish production was achieved from Mediterranean Sea, as sort of compensation to the production losses from the Nile. The increase was accounted for about 70% in the last ten years.

Consequently, the environments of the lakes have changed substantially. Whereas previously the lakes were largely marine in character (with periodic flushing), they are now characterized by the steady inflow of brackish drainage water. This has brought about a change in the species composition in the lakes from one with a significant marine fish and crustacean component to one largely dominated by euryhaline freshwater species, especially tilapias and typical brackish water species (mainly mullets). This species change was encouraged by the altered water regime which increased the amount of aquatic vegetation in the lakes, providing protected areas for spawning and nurseries, as well as by a high production of fish food organisms. The development of the production of the four lakes is shown in Table 2. Species composition of the catches from these lakes in 1998 is given in Table 5.

Since 1953, widespread public and private reclamation efforts have reduced the open-lake areas by more than 30%. Private land reclamation efforts on the lakes'

margins are generally preceded by hoshas, a fish-capture technique harvesting all fish trapped in a periodically drained, dyked enclosure in the lake. Hoshas now occupy significant parts of Lake Manzala and Lake Burullus open water areas, despite the fact that hoshas have traditionally been illegal and most of the existing hoshas operations are unlicensed and unregulated.

According to the interviews with Hoshas owners, the productivity of Hoshas operations is about 2.5 times the fish catch per hectare produced in the open lake. Most of the hoshas fish yields consist of fish grown in the open lake. Following the introduction of fish culture practices, hoshas--as a small-scale, low technology, indigenous modified fish farming technique--offers promise for improving fish yields.

More than 18,000 rowboats are operating in the littoral lakes. Trammel nets, gill nets, veranda nets, line and traps are the principal fishing gears used in the lakes.

□ **Development Opportunities and Constraints:**

Northern lakes have considerable fish production potential. The present capture fisheries yield can be substantially increased by implementing an efficient weed control program, which would also diminish water evaporation losses, which are substantially higher from a surface covered in vegetation than from a clear one.

The main importance of northern lakes, however, is in their great potential for developing semi-intensive in-lake aquaculture. The currently used hoshas-type culture activities can produce more fish once they are declared legal; only then will hoshas fishermen be ready to invest part of their return in more expensive inputs (e.g., fertilizer, feed, seed, chemicals), converting hoshas away from a harvesting system towards a culture system.

The traditional open-lake fishermen are quite antagonistic to the hoshas operations, for they fear that hoshas are reducing their potential yields while encroaching on traditionally assigned fishing grounds and reducing the available open-lake areas. Accordingly, a new fisheries management regime must respect the rights of traditional fishermen in seeking an equitable solution to their conflicts with the encroaching hoshas operators. Well-managed legal hoshas will also play a positive role in keeping the lakes' borders fixed. It should be noted that Hoshas have negative social impacts on the human communities located close to the lakes.

Agricultural, industrial and sewage pollution is the main constraint for fisheries development in the northern lakes. Further, the decrease of drainage water discharged in Lake Manzala to supply water to Salam Canal will influence fisheries in the lake. Prohibiting both governmental and private land reclamation activities is crucial to maintain water surface of the lakes.

□ **Lagoons (Coastal Depressions):**

The Port Fouad and Bardawil depressions, or lagoons, to the east of Port Said. These Lagoons do not have any inflow of Nile water or drainage water, and have open connections to the sea.

The Port Fouad depression is located on the eastern side of Suez Canal near Port Said. The surface area is about 12,600 hectares and is connected to the Mediterranean and to the Suez Canal. Annual fish production from the lagoon is only about 200 tons.

The Bardawil depression is much larger with an area of around 67,000 hectares and is located in the northern part of the Sinai. Average depth is 1 to 1.5 m and it is connected to the sea through two booghases. Production from this depression increased from 1,700 tons in 1988 to 1,900 tons in 1998. Table 6 shows the species composition of the catches in 1998. About 1,000 small fishing boats operate in the lagoon using primarily trammel nets, gill nets and veranda nets.

□ **Development Opportunities and Constraints:**

Port Fouad Depression is suitable for development of aquaculture. However, further investigation is necessary to adopt more suitable technology. Bardawil Lagoon is fully exploited. The more important concern for fisheries development is to retain booghases connecting the Lagoon to the sea opening.

□ **Inland Lakes:**

These include Nasser, Qaroun, Rayan, Bitter and Tamsah Lakes.

Lake Nasser:

Lake Nasser is the largest lake in the country, resulting from the Aswan High Dam closing in the late 1960s. Filled with fresh water, its surface area is 7,000 square kilometers, of which 500,000 hectares lie in Egypt. The lakes officially recorded fish production has increased from 25,000 tons in 1988 to 54,000 tons in 1998. However, the lake's fish production depends chiefly on its water level.

Around 4,000 fishermen are licensed to fish in Lake Nasser. The principal gears used are drift nets, catching mainly tilapia. The fishermen are obliged to sell their catch to the Egyptian Fish Marketing Company and Masr Aswan Company at a set price. It is more than likely that part of the catch from the Lake find its way to the consumer outside the official system. Actual catches are therefore likely to be at least 50% higher, making the total catch from the lake in 1998 an estimated 60,000 tons. Some inlets (khors) in the lake are stocked with tilapia fry from a recently established hatchery near the lake. Catch composition is shown in Table 7.

□ **Lake Qaroun:**

Lake Qaroun is a natural depression in the Fayoum, lying about 45 m below sea level with a surface area of 23,000 hectares. The lake has been filling with agricultural drainage water. Salinity has been steadily increasing, resulting in a change in the fish fauna from brackish water species to marine species. Mullet fry have been introduced annually since 1939 and shrimps since 1979. Production declined from 1,400 tons in 1988 to 1,000 tons in 1998 (Table 2). A local company has recently extracted salt from the lake. Table 7 illustrates the catch composition of Lake Qaroun.

□ **El Rayan:**

El Rayan I & III are depressions of a similar nature to Qaroun, with an area of about 18,000 hectares. Production increased from 700 tons in 1988 to 1,100 tons in 1998 (Table 2). El Rayan I & III are regularly stocked with mullet fry from the Mediterranean. Table 7 illustrates the catch composition from El Rayan.

□ **Bitter and Tamsah Lakes:**

These lakes are expanded areas from the Suez Canal. Fish production has increased from 300 tons in 1988 to around 3,000 tons in 1998 (Table 2).

□ **Development Opportunities and Constraints:**

Lake Nasser:

Fish production from Lake Nasser can be developed by stocking program of multi-species, and by developing aquaculture activities in shallow enclosures. The quality of the present catch can be improved by constructing more and better landing sites, by organizing a better collection system for landed fish, by providing ice and refrigeration facilities, and by providing better housing in stable settlements.

Lake Qaroun:

The increasing salt content of the lake is the major constraint for fisheries development in Lake Qaroun, making the lake unsuitable for aquaculture development. However, a group of Chain's experts (Sept. 1999) indicated that the Lake is good environment for marine fisheries. A realistic goal would be slowing down the salinity content by increasing salt extraction activities and by stocking fry of very euryhaline species, and imported milkfish (*Chanos Chanos*).

In the future, when the salinity of the lake has reached levels of over 50%, the water can be used for mass production of biomass of *Artemia* as a protein base for fish and/or livestock feed.

El Rayan:

It is believed that fish production from El-Rayan Depression is underdeveloped. An higher yield may be possible by increasing stocking operations. Opportunities exist to develop fish farming in the area between the two depressions.

□ The Nile and its branches:

Fishing in the Nile and its branches is a traditional activity. Fish production increased from 39,000 tons in 1988 to 61,000 tons in 1998 (Table 2). Tilapia and catfish constitute the bulk of the catch (Table 8).

The canals are fished by a large number of private fishermen. They use many kinds of gear, including seine nets, gill nets, and hook and line. Most of the catch goes to the fishermen's household and small village markets; catches are generally not recorded.

The Ministry of Public Works and Water Resources (MPWWR) finances programs for weed control, which are carried out by GAFRD. The implementation of these programs includes restocking Grass Carp fingerlings in these waters.

□ Development opportunities and constraints:

The general consensus is that not much extra capture fish production can be expected from these resources. However, opportunities exist to increase fish production from the Nile and its related water channels through continuous effort to introduce Grass Carp on a large scale; and to develop intensive cage culture in the Nile itself, its branches and canals having suitable dimensions to avoid obstructing water movement in an unacceptable manner.

Developing cage culture in these resources, however, faces some obstacles. One is that the Ministry of Public Works and Water Resources prohibits such activities. Another is that the run-off of agricultural pesticides, industrial and power stations effluents can be expected to have a negative effect on cage culture development.

3.3 Aquaculture:

Fish culture is an old activity in Egypt. Currently, fish farming ranges from the traditional village-type ponds and the hoshia system in the northern lakes to modern private and governmental fish farms. Also included are governmental and private hatcheries and governmental fry collection centers for the restocking of water bodies

and fishponds. Further, fish culture in rice fields has become more popular recently with private farmers.

The contribution of aquaculture to fishery production has progressively increased. The production of 12,400 tons in 1977 (8.3% of total fishery production for that year) increased to 36,700 tons by 1988 (12.7% of total fishery production). In 1998, fish production from aquaculture reached 139,400 tons, when it accounted for about 26% of the total fish production (Table 1). The different types of fish culture activities are briefly discussed below.

3.3.1 Governmental Sector:

□ Fish Farms:

There are 14 governmental fish farms belonging to GAFRD, to governorates and to various ministries. The area of these fish farms is about 14,000 feddans, and they produced 7,076 tons in 1998 (Table 13). Most of these fish farms are operated for commercial production. Most of the governmental fish farms currently operate under the semi-intensive culture system where relatively high production inputs are used. Plans for privatization are being made, with the object of leasing or selling some of the governmental fish farms.

□ Fish Hatcheries:

Fourteen fish hatcheries are currently in operation, 10 of which belong to GAFRD and produce more than 94% of the total fingerling production in the country. Hatcheries are well distributed to provide their production of fingerlings to fish farmers, rice fields and many water bodies. Carp is the major species group produced at the hatcheries. Tilapia fingerlings are not yet produced in a sufficient number necessary for fish farms and cages.

There are two small-scale marine governmental hatcheries for fry of marine fish species: mullet, sea bass, sea bream, and shrimp.

□ Collecting Stations:

There are several collecting stations located in seven governorates where wild caught fingerlings are collected for distribution. Mullet is the major species group collected followed by sea bass and sea bream. Harvesting and distribution of wild caught fingerlings are carried out and supervised by and/or under the control of GAFRD.

3.3.2 Private Sector:

□ Fish Farms

The technology used in private sector fish farming varies significantly and ranges from the primitive (e.g., hoshu system, shallow ponds) to the intensive types. Acreage of private fish farms leased from GAFRD was about 38,000 feddans,

which produced about 35,000 tons in 1998. Moreover, around 3,700 owned feddans are used for fish farms. A vast area of land (about 157,000 feddans) is temporarily used for fish culture before shifting to agriculture upon the completion of the infrastructure. Around 106,000 tons or 76% of the total aquaculture production were produced through private fishponds in 1998 (Table 13). Private fish farms are rapidly growing. Growing interest is evident in producing highly marketable fish species such as tilapia and mullet in fresh water and sea bass, sea bream and mullet in marine waters.

□ **Cages:**

A significant increase was noted in the number of established cages. Where only eight cages were established in 1985, in 1998 there were 1,294 cages with a total volume of 285,490m³ producing 2,855 tons (Table 13).

□ **Rice-Fish Culture:**

More than 233,000 feddans of rice have been cultured with fish during 1998, producing about 12,000 tons of fish (Table 13).

□ **Fish Hatcheries:**

Twenty fresh water fish hatcheries produced about 29 million fingerlings in 1998; tilapia comprised 94% of that total. One marine fish hatchery is located in South Sinai and produces about 0.5 million shrimp post larvae.

The major cultivated species are tilapia and carp, each representing around 35%, followed by mullet at around 24% of total fish farm production in 1998. The shortage of tilapia seed is a major constraint facing development of tilapia culture. As the aquaculture sector grew, demand for the mullet fry began to exceed their supply and led to heavy harvesting of fry from the wild. Other species started to contribute more in the culture system (e.g., sea bass, sea bream and shrimp). Tables 14,15 and 16 illustrate indicative cash flow and profitability for different aquaculture systems in Egypt.

□ **Development Opportunities and Constraints**

Aquaculture is the object of significant support from the government, in the belief that aquaculture can make an essential contribution to reaching the targeted fish consumption of 14.25 kg per capita by year 2017.

Although there is continuous development in aquaculture practices, average production for most fish farms is still low and there is room for further development exists. The present average farm production (1,500 kg/feddan) could be doubled by improved pond management and input supply.

Egyptian rice fields are producing a substantial amount of fish. Due to water use restrictions, the paddy area may decrease in some years; consequently, total fish production will also decrease. But at the same time per feddan production of fish paddies could be increased through better stocking and management procedures.

Additionally, the extension services must play a crucial role in advising on pesticide use.

It was reported that reforming semi-extensive farms into semi-intensive and intensive farms could affect a large number of small-scale farmers. Such farmers usually run family units with a very low investment level and limited revenue. The income from their business is satisfactory for their requirements, but leaves no extra capital for development.

In fact, these groups of farmers contribute no more than 43% of production, even though they exploit more than 70% of the aquaculture land in the country. The area of such farms varies between 20 and 100 feddans and its production ranges between a minimum of two to a maximum of 30 tons. This maximum production can be reached from an area of less than four feddans of developed farm. Support of such farmers to reform part of their farms and lease the other parts to investors for profit may push aquaculture development.

To insure aquaculture development, the following constraints must be overcome:

□ **Water**

Water resources are by far the most important factor, which limits aquaculture development. Only agricultural drainage water is used for fish farms. The Ministry of Public Works and Water Resources has begun to implement a water reuse program.

In the future, drainage water could be regulated as farmers are starting to reuse this water for crops as well. Moreover, a new water policy has been set targeting greater control on water use crop production, which in turn will lead to reducing the quantity of drainage water available for aquaculture (especially since the use of water for crop production has priority over aquaculture). Further, drainage water allowed for fish farms negatively affect the farmed fish due to bioaccumulation of pollutants. If fresh water is allowed for use, the effluents from fish farms carrying the nutrients will greatly benefit agricultural crops and will reduce the need for fertilizers. This approach could be justified when aquaculture is evaluated, by having the outcome based on per unit of water and land rather than evaluating aquaculture as an industry using the unused resource. The same approach could be applied to the restriction on cage culture in the Nile and other water bodies.

□ **Hatchery Production:**

The production mode of existing governmental hatcheries should address the actual needs of the sector. This could be achieved through the following approaches:

- Tilapia could be promoted to contribute to the private sector effectively. The existing infrastructure may allow better management of the hatchery operations such as early spawning of tilapia, which will assist some aquaculture sectors. Although the number of tilapia fingerlings currently produced has increased several folds compared to a few years ago, the private sector was

responsible for the increase in tilapia production. Even though the production of tilapia fry increased several fold, there are potential outlets exist capable of absorbing such production before reaching equilibrium by increasing several times.

- Carp could contribute more effectively in aquaculture if older fingerlings become the product of such hatcheries. Hatchery managers should know that 10 million carp fingerlings are more beneficial to the sector than 100 million small fry. If excess tilapia exists, it could be stocked in rice fields since different sizes of tilapia are edible. Production of other carp species (e.g., Grass Carp, Snail Carp, or Silver Carp) may remain under control of governmental hatcheries.

□ **Lease term for fish farms**

Current lease terms are five years, and do not give investors enough security to upgrade their farms. The lease system should be reviewed to consider extending lease terms and also developing a pricing system that matches the length of the lease term, bearing in mind that most fish farms are leased. Also, some agencies (e.g., Environmental Affairs Agency) permit up to 20 years for a lease term. The current short-term leases used also reduce the chances of getting loans from credit systems and thus are a constraint to potential development.

4. Government Policies:

The fourth Five-Year Plan (FYP) for Economic and Social Development extends over the period 1997/98-2000/02. In the FYP more emphasis has been put on both capture and culture fisheries, as well as for maximum use of water resources and protecting these resources from pollution.

□ **The targets laid down in the plan are as follows:**

- Increase the degree of self-sufficiency in fish production;
- Achieve surplus production for export;
- Increase the number of jobs in the fishery sector;
- Lay the groundwork for the success of subsequent development plans;
- Fish production of 535,000 tons in 2001/02 (according to GAFRD statistics, fish production in 1998 was 546,000 tons).

□ **The means of implementation means identified in the plan are as follows:**

- Renewing and replacing existing hatcheries and establishing new ones for fresh water and marine water species;
- Renewing and replacing existing fish meal plants, fry collection stations and GAFRD fish farms;
- Developing traditional fish farms;
- Developing semi-intensive and intensive fish farms;
- Developing cage culture;
- Planting fish in rice fields;
- Maintaining northern lakes passes;

- Controlling weeds and properly managing the lakes;
- Establishing extension and training centers for fish farmers and fishermen;
- Developing fish farming, hatcheries and fishing ports on Lake Nasser;
- Developing fishing activities through cooperation with neighboring countries.

In addition to these medium-term targets, GAFRD has created a fisheries development strategy. GAFRD's aim is to raise the per capita consumption of fish to 14.25 kg annually by the year 2017. The emphasis is on intensifying fish farming activities, improving fisheries management, and expanding cooperation in fishing activities with neighboring countries.

5. Fishery Legislation:

GAFRD was created by Presidential Decree No. 190 of 1983. The Chairman of the Authority was given the status of First Secretary, directly responsible to the Ministry of Agriculture. Presidential Decree No. 465/83 gave GAFRD the right and obligation to supervise, administer and monitor Egypt's water areas. The decree gave GAFRD the right to lease out all lands within 200m of Lake Shores. Presidential Decree No. 362 of 1984 declared that all license fees due from fishermen and fishing vessels are the property of the Authority.

In 1983, two acts were created which dealt with the fisheries sector. The first was Act No. 123, dealing with fisheries cooperative societies. The second was Act No. 124, regarding fishing, oceanography, living aquatic resources and fish farms.

Act No.123 regulates the fishermen's cooperative societies, in which the majority of Egypt's fishermen are now members. The Act deals with administration, meetings, elections of the board of directors, distribution of profits, credit arrangements and the relationship with banks. It also regulates the Fishermen Cooperative Union, of which all the cooperative societies are members. Additionally, the Act details the rules for holding shares and the distribution of income.

Regarding shareholders, the Act states that:

- Motorized boats have at least one share for each horsepower;
- Non-motorized boats have at least one share for each crewmember;
- Fishermen without vessels have at least one share each;
- Fish farmers pay at least LE 100 each.

Regarding distribution of income, Act No. 123 allocates the following:

- 20% - administration;
- 5% - social affairs;
- 5% - incentives;
- 5% - general affairs;
- 5% - training;
- 5% - support to cooperative societies which are weak;
- 10% - production incentives for the board of directors;
- 6% - fishermen according to their shares;

- The remainder is divided among shareholders according to a method to be decided by the board of directors.

Act No. 124 deals with all living aquatic resources, distance for fishing activities, depth, vessels and methods, pollution, licensing, fees, penalties, fish farming and related matters. Three articles are of import here: Numbers 42, 48 and 49.

Article 42 deals with the following license fees:

- Marine waters, Mediterranean, motorized vessels
 - " Trawlers LE 20 for first 25hp, then LE 0.20 for each consecutive hp.
 - " Other gear: LE 10 for first 25hp, LE 0.20 for each consecutive hp.
- Marine waters, Gulf of Suez, motorized vessels
 - Trawlers and purse seiners: LE 20 for first 25hp, LE 0.70 for each consecutive hp.
 - Others: LE 15 for first 25hp, LE 0.10 for each consecutive hp.

Marine waters, Red Sea, motorized vessels

- All vessels: LE 10 for first 25hp, LE 0.10 for each consecutive hp.

Marine waters, all waters, unmotorized vessels

- LE 8/ vessel for class I vessels (27 persons)
- LE 4/ vessel for class II vessels (12 persons)
- LE 2/ vessel for class III vessels (4 persons)

Lake Nasser, motorized vessels:

- LE 12 for first 25 hp plus LE 0.20 for each consecutive hp.

All other inland waters (including Lake Nasser), unmotorized vessels:

- LE 16 for class I Vessels (12 persons)
- LE 8 for class II vessels (6 persons)
- LE 4 for Class III vessels (3 persons)

All license fees are discounted 50% for cooperative society members.

Article 48 states it is forbidden to construct fish farms except on wastelands which are not suitable for planting and where the water supply comes from drains and lakes, and not from irrigation water. Exempt from this rule are government hatcheries. To obtain a license for a fish farm, formal agreement must be obtained from the Ministries of Agriculture and Irrigation in addition to the agreement of GAFRD.

Article 49 states that fish farming areas will be declared by decision of the Minister of Agriculture. The Chairman of the Authority has issued two decisions regarding Articles 48 and 49: Decision No. 70 of 1986, and No. 431 of 1987.

The Minister of Agriculture's Decree No. 303 of 1987 was issued to implement Act No. 124. The decree deals with details on fishing methods, fishing distances, fees and penalties. Additionally, the Chairman of GAFRD has issued a number of decisions regarding closed seasons and closed fishing grounds for various water bodies.

While GAFRD has full responsibility for the implementation of the acts and decrees, enforcement of the law is the responsibility of the Military Force for Marine and Related Affairs and the Police Force for Inland Water Fisheries Affairs.

Law No. 4/94 (Environment Law) insures protection and conservation of aquatic resources and water bodies. More advantages are given to aquaculture enterprise according to the Law of Investment No. 230 issued in 1989.

6. Conclusion and Recommendations:

- Proper fisheries management is the key issue for sustainable development. No estimations of maximum sustainable yield (MSY) for marine and land waters are available to design the proper management policies. The Government of Egypt must give it priority and provide the required inputs, funding and development programs for actions taken to ensure optimum sustainable yields for all water bodies.
- The water quality in most water bodies is being adversely affected by agricultural drainage, industrial effluents and sewage, as well as inadequate mixing of fresh and salt water in the coastal lakes and Lake Qaroun. Thus, it is imperative that proposals be developed and implemented for all affected water bodies to eliminate or treat polluted water before it reaches them and to ensure appropriate levels of quality and salinity.
- Aquaculture plays an increasing role in fish production in Egypt; fresh water is a limited resource. Since fish farms are allowed to use only agricultural drainage water, the water supply is generally polluted. Programs must be developed to intensify sustainable aquaculture production, including initial use of fresh water by fish farms; the water can then be reused for agriculture. Development of private sector support and motivation for intensive production is necessary, as is modifying legislation to permit use of fresh water by fish farms and developing fish cages in the Nile and its channels.
- Land suitable for aquaculture is generally leased by GAFRD for a lease period of five years, which is insufficient for the fish farmers to obtain appropriate funding from banks and to take a long-term view of the business. Legislation must be modified to increase the terms of aquaculture leases for appropriate periods, with safeguards ensuring that land and water are used in accordance with the terms of each lease.

- Increasing demand on mullet fry leads to heavy catches of fry from the wild, which in turn may adversely affect capture fisheries. Further, there is a high mortality rate due to poor handling of fry. Proposals should be developed for the sustainable management of mullet fry and other commercially important species.
- Lack of coordination between and within responsible ministries must be addressed. For example, the Ministry of Environment has declared Lake Burullus a protected area, which may not be modified or changed, while GAFRD is actively changing the Lake by actions to control the reeds and weeds which affect fisheries. Another example is although GAFRD's mission is to maintain water bodies and increase fisheries production, the Authority of Land Reclamation is effectively reclaiming parts of the lakes for agriculture. The Ministries of Agriculture and Land Reclamation, Environment, and Public Work and Water Resources, Transportation and others will establish a uniform national policy with appropriate arrangements for enforcement.
- Enforcement of legislation, especially Law No. 124/83 (Fisheries Law) and Law No. 4/94 (Environment Law) is inadequate and insufficient. Appropriate modification of Law No. 124 is needed. Requirements for monitoring control and surveillance (MCS) of each water body, including facilities, equipment, personal, training and incentives must be determined.
- The majority of the owners of fishing vessels, fishing gear and fish farms are members of cooperatives. They represent their members in dealing with authorities and provide social services, equipment, and loans in cash and kind. However, they are constrained by funding shortages, since they are no longer allowed to import fishing inputs. Modifying legislation to permit cooperatives the right to import fishing equipment and to encourage financial institutions to provide financial facilities through the cooperatives is recommended.

Storage of raw fish is the main constraint facing fish processing plants. They start operations only after receiving the raw catch, which may adversely affect their efficiency and increase the cost of the production.

2. Forms of processing:

The forms of processing include salted, smoked, canned, gutted and fishmeal.

2.1 Salted Fish:

Salted fish is produced in areas where fresh fish transportation is not available (e.g., the southern part of Lake Nasser). Also, mullet was salted to be consumed at certain Egyptian festivals where Egyptians ate salted mullet (Fyseakh) on such occasions.

In recent years about 7-12% of fish caught in Lake Nasser is salted. The four main fishes salted are Raya, Lebis, Kalb and Shilba. The fish caught are exposed to direct sunlight in open air for about 24 hours. The large-sized fish are gutted before being salted while small fishes are salted whole. The fish are rubbed with salt and then packed in tins. These tins are transported to the salted fish-marketing center where fishes are separated by species and packed in separate tins. At this stage the fish salt is adjusted. The tins are then tightly sealed and stored. After three months the fish is ready for consumption.

Salted fish from Lake Nasser are subject to spoilage and heavy losses and are considered low-grade products. This is primarily due to poor processing facilities and packing. Improving the quality of salted fish is strongly recommended as well as adopting other fish processing methods.

Salted fish processing factories are distributed as follows:

- Cairo 700 tons/year
- El-Suez 700 tons/year
- El-Fayoum 700 tons/year
- El-Ismaia 700 tons/year

2.2 Smoked Fish:

Several companies smoke fish products. Imported herring is the only species used as raw material for this industry. The processors obtain raw fish from local importers. They primarily use the left-over wood from the furniture processors in Domiatta. Few of the fish-smoking plants have quality control systems or trademarks, and they are supervised by the Ministries of Industry, Supply & Trade and Health. Many other plants operate illegally far from the control or supervision of the concerned authorities.

The study team visited El Delta, a smoked-fish plant in Kafr El Sheikh governorate. This plant has production capacity of 700 tons of smoked herring and operates 10 months per year. The price of the raw material (frozen herring) varies between L.E. 2,100 and 2,900, and the cost of processing each ton is L.E. 600. The

bulk of the production is marketed in Egypt while smaller quantities are exported to some Arab countries. The main constraint facing this plant is competition from illegal processors with similar products, which are low in quality and price.

The smoked-fish industry is comprised of the following companies, with the production amounts for each also listed:

EFMC:

Cairo factory – production: 120 tons/year
Damietta Factory – production: 120 tons/year
Tanta factory – production: 120 tons/year

Misr-Aswan Company: 10th of Ramadan – production: 10 tons/day

El-Kanal Co. – fish processing
El-Ismaia Factory – production: 300 tons/year
El-Delta Co. – fish processing
Kafr El-Shiekh – production: 50 tons/year

El-Neg. Factory – fish processing
10th of Ramadan factory – production: 150 tons/year
Mahalet El-Roh factory – production: 8 tons/day
Kafr El-Shiekh factory – production: 50 tons/year
Edfina Co. -Alexandria factory – production: 60 tons/year.

2.3 Canned Fish:

Several private companies carry out canning of fish. There are only two large governmental canning companies: Kaha and Edfina. Both companies operate under governorate control through the Ministry of Industry.

The study team visited Edfina Company Cannery at Domiatta, which processes 3,000 tons of imported sardine, mackerel and herring. It was reported that sardine produced from Egyptian waters is not suitable for canning due to its small size. At present the plant loses about 45% of round weight in the canning process; this loss is directed to the fishmeal unit (total capacity :10 tons per day). The company directly imports the raw fish from Ireland and Holland and stores it in its cold store (capacity of 3,000 tons).

Edfina Company produces its own cans and supplies fish in standard can sizes: 145 gm and 340 gm. It was reported that one carton contains 24 cans of mackerel, which cost L.E. 45-46, while the company sells it for L.E. 44 with an approximate loss of L.E. 1 so that the company can compete with the imported canned mackerel. Because the company is in the public sector, many constraints exist, which make it difficult to reduce production costs. Privatization may be a viable solution.

The study team also visited Loalaa in Ismailia, a private sector plant. This plant processes meat, vegetables, fruit and canned fish. The cannery has a capacity

of 30 tons daily. The plant loses about 50% of the round weight of the large-sized fish and about 75% of the small-sized fish. Loaloe directly imports the frozen tuna and mackerel and stores them in its cold store in Port Said. About 360 workers are involved in fish processing. The plant is well established, uses a quality control system, and is under control of the Ministries of Industry, Supply & Trade and Health. As does the Edfina Company, Loaloe faces competition from imported canned fish. However, production costs have been reduced by various means, such as importing large quantities of fish at lower prices and decreasing the cost of carton packages. Table 17 illustrates prices and marketing margins of canned tuna from this plant.

2.4-Gutted fish and filet

The Egyptian Fish Marketing Company and Misr Aswan Company produce frozen filet and gutted fish from Lake Nasser and sell it in a carton package of 30 kg each. The Egyptian Fish Marketing Company manufactures fish caviar in a production unit in Cairo with a production capacity of 5 tons per year.

2.5-Fish meal production:

According to the available information, fishmeal is produced in three main factories, which are as follows:

- Misr- Aswan Company in Aswan - production: 35 tons/day
- Shebeen El-Kom in Shebeen El-Kom City – production: 3 tons/day
- El-Ismaia Factory – production: 5 tons/day.

3.-Package Manufacturing:

Specialized companies manufacture packages that serve other industries. These factories are located mainly in Cairo-Tenth of Ramadan and Ismaia. They produce plastic packages, fish handling boxes and trays, preservation barrels, carton boxes and tin cans.

Packaging Use:

For fish packing of fresh fish produced locally, most of the private sector uses wooden boxes with a capacity of 20kg during the cycle of fish distribution. One man can handle these boxes. For fresh fish sold to the Egyptian Marketing Company and Misr Aswan Company, they pack it in plastic boxes with the same capacity. No information (e.g., species, quantity, expiry date, etc.) is displayed on either type of container.

Frozen fish comes in containers made of a strong cardboard. These containers hold plastic bags carrying fish and lists basic information (e.g., type of fish, weight, etc.).

Packaging for smoked fish are wooden containers manufactured by private sector companies. These containers list the name of the company and the weight of the fish. Some of these units also pack salted fish in glass containers along with the company name and fish weight.

In packaging canned fish, different volumes of tins are used. These volumes are as follows:

- 150-340gm to pack mackerel
- 120-220gm to pack sardines
- 165gm to pack tuna.

Listed on each tin are the manufacturer, type of fish, its weight, and the production date.

The following companies and units produce fish packaging used in Egypt:

Helmy Co. Factory - wooden package production

Pharmaceutical Co. and Abr El-Khalig - plastic container production

Yerkerteh Co. and Moharam Co. - carton package production

El- Kanal Co. for fish production and Edfina Co. - both produce tin cans.

4. Foreign trade:

Table 18 illustrates the imported processed fish products in 1997, while Table 19 illustrates the exported fish and processed fish products for the same year. It was reported that in 1997 the total exported quantity was 1,923 tons while the imported quantity was 155,753 tons.

5. Consumer preference and consumption habits:

In general, fish is one of the Egyptian consumer's favorite products, especially in winter. The quantity of fish available in the market increases during the period between April and October. Egyptian people prefer fresh fish over frozen fish and they least prefer canned fish.

6. Food control and inspection:

The Ministry of Health and the Health Department within each governorate carries out food control and inspections. The Food Control Section of the Ministry of Health is chiefly concerned with fish quality in three areas: imported fish products, processing of fish, and consumer food protection (retail). A number of regulations governing fish quality exist in these areas, but there appears to be little enforcement of standards for the following reasons:

- Lack of understanding of the regulations by importers and shippers.
- Inadequate coordination among the Ministries of Supply, Industry and Health.
- Excessive bureaucracy exists between concerned authorities regarding importation of food.

7. Recommendations:

- 1) Better coordination is required regarding the levels of quality in both domestic canned fish production and imported canned fish.
- 2) Review of custom duties is needed as Industry sources assert that domestic processors pay higher taxes than the import duties and taxes paid by importers, and that import duties are not calculated on transaction prices.
- 3) Encourage domestic processors to compete, as they are facing now many constraints, which are preventing fair competition with imported products. So necessary actions must be taken to overcome these constraints.

SECTION 3

Fish Marketing

1. Introduction:

This chapter contains a review and assessment of the market aspects of the Egyptian fishery industry. It also assesses the quantity and quality of fish products in demand in both domestic and foreign markets. Recommendations are made with a view to improving producers' incomes, improving export earnings and reducing post-harvest losses.

2. Domestic Market:

2.1 Domestic production:

Domestic fish production has increased by over two-thirds (69%) in the period 1989-98 from 323,000 tons to 546,000 tons, of which 406,000 tons (74%) came from marine and inland capture fisheries, while 139,000 tons (26%) were produced by aquaculture (Table 20).

The most important group are the various species of tilapia, which accounted for 181,200 tons of production (33%) in 1998, of which 128,400 tons (71%) came from wild resources and 52,800 tons (29%) were farmed. The species next in volume in 1998 was grass carp with a production of 51,700 tons (9.5%), of which almost all (98%) was from aquaculture; and mullets with a production of 46,400 tons (8.5%), of which the major part (61%) was farmed (Table 21).

2.2 External trade:

Egypt is a net importer of fish and fishery products, with imports greatly exceeding exports in both quantity and value, even though the unit value of exports is many times higher than the unit value of imported products (Table 22).

2.3 Supply to the domestic market:

The supply of fish to the domestic market (domestic production and imports, less exports) has increased in the period 1989-98 by 67% from 432,000 tons to 720,000 tons (Table 23). In this period domestic production increased in quantity by 69%, while net imports (imports, less exports) grew by 60%.

2.4 Population:

The population of Egypt has increased by 19.1% from 55.0 million in 1989 to 65.5 million in 1998. It has been estimated that it will increase to 80.3 million in 2010 and to 95.8 million by 2025 (Table 23).

2.5 Consumption:

As a result of increases in domestic production and imports, supply has grown at a slightly faster rate than the rate of increase in the population. As a result, annual per capita supply increased by 39% from 7.9 kg in 1989 to over 11.0 kg in 1998 (Table24).

This consumption rate is, nevertheless, well below the world average annual per capita consumption of 14.5 kg for the period 1993-95 (FAO Fishery Statistics: Commodities, Volume 83, 1998).

2.6 Prices:

The average annual wholesale prices of six of the most important commercial species reportedly showed little or no change from 1997 to 1998 (Table 24).

The monthly average wholesale prices of selected species (Table25) showed that tilapia varied between L.E. 7.00/kg and L.E. 7.79/kg during the first 11 months of 1998, but in December dropped to L.E. 6.21/kg. Mullet sold at between L.E. 9.25/kg and L.E. 10.00/kg, except in August when the price reached L.E. 12.94/kg. While fresh sardine from local fisheries remained steady between L.E. 2.30/kg and L.E. 2.41/kg in the first half of the year, it dropped to L.E. 2.00/kg in September, but then rose to L.E. 2.97/kg in October and L.E. 2.96/kg in November before dropping to L.E. 2.43/kg in December. Frozen imported sardine remained at L.E. 1.80/kg virtually throughout the year. Both catfish and shrimp were reported as having relatively stable monthly average prices.

The market prefers fresh (unfrozen) fish of national origin. Imported (frozen) fish sells at an appreciable discount in relation to domestically harvested fresh fish.

The private sector markets fish with prices basically determined by the effects of supply and demand. When the public sector has intervened in marketing, it has done so by setting prices to the fishermen which, at times, have been substantially below the market, with the object of providing fish at prices which are affordable to lower-income consumers. This has caused the fishermen to try to avoid selling at least a part of their catch to the designated buyers in order to obtain higher prices in the open market.

As a general rule the larger sizes of fish attract higher prices than the smaller sizes. Consumers prefer to eat fish in winter, when increases in demand may coincide with reduced levels of supply, causing prices to rise.

2.7 Fish Quality:

Not all fish in Egypt is produced to the appropriate standards of quality. A major cause of inferior quality products is poor handling on fishing vessels, at aquaculture sites and during unloading, handling and transportation to the markets. Constraints include insufficient use of ice and the use of containers (wooden boxes, chiefly) which provide inadequate protection during handling and transportation. In some cases, the initial handling is undertaken in facilities, which are unsanitary and totally unsuitable.

2.8 Marketing arrangements:

Although some fishermen and fish farmers may sell directly to the public, it is likely that fish changes hands several times before it reaches the consumers or final users. Fish is sold to private buyers at prices set by local committees, by direct negotiation between sellers and buyers, and at auctions.

Intermediaries may advance funds to producers, who are usually required to pay back such loans by deduction from the value of products delivered to the intermediaries. The marketing margins or commissions charged by intermediaries—were not found, in international terms,—to be excessive. Nevertheless, in several cases producers interviewed felt that their buyers were taking them advantage of.

On Lake Nasser, fish is sold at set prices for purchase by Misr-Aswan Fishing and Fish Processing Company (previously entirely owned by the public sector, now with private and public shareholders and in process of complete privatization), (Misr-Aswan) and the Egyptian Fish Marketing Company (a public sector company, expected to be privatized) (FMC). Prices are set at infrequent intervals (prices current at the time of the team's visit were said to have been in force for six months) by the Ministry of Supply, on the basis of studies undertaken by the fisheries research arm of the Lake Nasser Development Authority. Fishing vessel owners are required by decree to sell 25% of their catch to Misr-Aswan and 75% to FMC.

Despite the fact that the net price paid by these companies (after deductions for transportation on the Lake, taxes, savings fund and others) for the principal species tilapia) is reportedly higher than the price paid by the so-called smugglers, the owners prefer to sell to the smugglers because they receive immediate payment for their fish, whereas the authorized buyers were reported, at the time of the team's visit, to be substantially in arrears in their payments of fish (Misr-Aswan by 15 days and FMC by 2-3 months). Misr-Aswan and FMC are obliged to make advances to Cooperatives at the beginning of each year (but reportedly failed to do so in both 1998 and 1999).

3. Foreign Trade:

3.1 World Imports:

World imports of fishery commodities increased in value by 59% from US \$35,846 million in 1993 to US \$56,864 million in 1996 (Table 28). In 1996, Japan, the US, and the nine leading importing countries of the European Union (EU), between them, accounted for 74% of the value of world imports.

3.2 Japan:

The catches of Japanese fishing vessels declined steadily from 11.9 million tons in 1989 to 7.5 million tons in 1995, since when they appear to have leveled off (Table 29).

The major decline in Japanese catches has been in sardines, which dropped from 4.4 million tons in 1989 to 0.6 million tons in 1997. Since an important part of the catch of sardines was used to make fishmeal, Japan has tended to increase imports of fishmeal, principally from major fishmeal-producing countries (e.g., Chile, Peru). Catches of the group of food fish

comprising cod, pollock and hake declined from 1.2 million tons in 1989 to 0.4 million tons in 1997, at least partly as a result of the exclusion of Japanese fishing vessels from certain traditional fishing grounds in the northern Pacific Ocean.

In 1998, the group of products consisting of shrimps, prawns and lobsters in fresh, chilled or frozen form accounted for 20% of the value of all imports, followed by the group of products consisting of skipjacks, bonitos, tunas and marlins in fresh, chilled or frozen form with 12%, while salmon and trout accounted for 7% and crabs for 5.5%.

Japanese imports, affected by national economic difficulties, declined in 1998 in both quantity and value as compared to earlier years (Table29). Despite this setback, Japan remained, by far, the leading importing country in the world. It is anticipated that, as and when the Japanese economy recovers, Japanese demand for imported fisheries products will likely revert to its earlier levels.

In 1997 Egypt exported 10 tons of fishery products, with a value of L.E. 116,000 to Japan (Table32). Egypt's share of the supply of imported fishery products to the Japanese market was substantially less than 1%.

Japanese consumers prefer species and products from Japanese sources to which they are accustomed. Imported species tend to be thought of, at least initially, as substitutes for domestic species. Higher prices are often paid for fish caught by Japanese (as opposed to non-Japanese) fishing vessels, since it is considered that the catches are more likely to have been handled and preserved as required by the trade and the consumers in Japan. Marine species are generally preferred to freshwater species.

Rising labor and other costs in Japan are leading to a tendency to undertake the processing of many seafood products in lower-cost countries, often under joint venture arrangements with major Japanese retailers (department stores and supermarkets). Such products are exported to Japan either in semi-processed form or prepared for direct sale to final users (consumers and institutional buyers).

Although the Japanese authorities intervene where imported fishery products present risk to the health of the consumer (e.g., unauthorized additives or cholera), the principal difficulty faced by overseas exporters is to satisfy the Japanese buyers' requirements for freshness, presentation and correct workmanship of the products. Nevertheless, it is likely that Japan will, in due course, follow the US, EU, Canada and other market countries in imposing some form of Hazard Analysis Critical Control Point (HACCP) system.

3.3 USA :

Commercial landings of edible species by US fishing vessels increased sharply from 2.8 million tons in 1989 to 3.7 million tons in 1993, but then declined slowly to reach 3.3 million tons in 1997 (Table 30). As catches increased in the period 1989-93 the volume of imports of edible species declined from 2.8 million tons to 2.5 million tons, but increased as catches trended down to reach 3.0 million tons in 1997.

In the US, as in Japan, the leading groups of imported fishery products are shrimps in fresh and frozen forms. In 1997 shrimp was imported to a value of US \$2,943 million and accounted for 43% of the value of fisheries imports.

In 1997 Egypt exported no fishery products to the US market (Table 32), while imports by Egypt from USA in the same year amounted to 769 tons with a value of L.E. 1,981,000 (Table 33).

It is probably correct to say that US consumers are generally less knowledgeable and less demanding of fishery products than Japanese consumers. There is a general perception that US consumers prefer fish with white flesh, no bones, and a bland or mild taste. The prices paid for fresh (chilled or unfrozen) fish are generally higher than those paid for the same species in frozen form.

US consumers and the trade, as in Japan and many other countries, prefer species to which they are accustomed. In the 1970s and 1980s, for example, the US market generally showed no interest in tilapia, even when it was offered at prices lower than the prices of other well-known species. The trade alleged that consumers did not know tilapia, so that it would need special promotion; that consumers preferred the taste of fish from the sea; and that tilapia had a lot of bones. Tilapia's reputation was not helped by the activities of some US traders, who tried to sell red tilapia under a number of illegal names, such as red snapper, in order to obtain higher prices. Nevertheless, when the supply of cod and other fish from Eastern Canada and Northeast USA dropped, as fisheries were closed or limited in an effort to permit the regeneration of the resources, the market began to find tilapia of interest. At the time of writing (1999) the prices of tilapia, in the form of skinless and boneless fillets, have weakened somewhat, but are still as high or higher than those of cod in the same form. Both the domestic production of tilapia (often sold in live form to Oriental markets in the US) and the imports of this fish (chiefly from farms in supplying countries in Latin America and Asia) have shown rapid growth.

Until some years ago, catfish was generally considered to be a fish eaten only in certain southern states of the US by lower-income consumers. Farmed catfish is now successfully sold throughout the country, chiefly as a result of cooperative promotional efforts, the development of processed products; and reasonable pricing policies.

Both tilapia and catfish meet the requirements of having white flesh. Purging the fish (by giving it no feed for an appropriate period of time) before harvesting has solved the perceived problem of tilapia's so-called muddy taste. Catfish have virtually no bones except the backbone. In general, however, it is considered that it was the shortage of other well-known species, rather than any specific characteristics or preparation of tilapia and catfish, which made it possible for tilapia and catfish to gain acceptance in the US market.

With the object of ensuring the safety of fisheries products, a HACCP-based system has been implemented in the US. It is obligatory, not only for the US domestic seafood industry, but also for all exporters in other countries who ship fishery products to the US market.

Apart from the requirement to implement a HACCP-based system, there are few absolute requirements (e.g., chemical additives, heavy metals, coloring agents, levels of decomposition) regarding quality. The standards of quality required are normally set by US importers or negotiated by them with their overseas suppliers.

The US Food and Drug Administration (USFDA) is responsible for ensuring, among other things, that seafood imported into the US is not adulterated or mislabeled, so that it neither causes those who eat it to become ill nor does it lead those buying it to believe they are acquiring something which it is not. Imported fishery products are randomly inspected by USFDA at ports of entry, except that shipments from suppliers or from exporting countries where products have previously been rejected by USFDA may be subject to more frequent inspection, while the initial shipments of new suppliers are generally all inspected.

3.4 The European Union (EU):

The EU is a very large market, whose member countries have widely differing preferences and needs. Common duty rates are applied to fishery products entering from outside the EU, while the member countries are working towards the harmonization of non-tariff rules and regulations. Within the EU fishery products circulate freely among the member countries.

The nominal catches of the nine leading European fishing nations have fluctuated, with an overall downward trend, in the period 1989-96. The catches reported for 1996 of 5.5 million tons were 10% lower than the catches of 6.1 million tons in 1989 (Table 31).

The nine leading importing countries showed, without exception, increased value of fishery products imported during 1994-96 (Table 9). The combined imports of these nine countries increased by 13% in that period from US\$ 15,912 million to US\$ 18,038 million.

The EU has introduced a HACCP-based system, which must be implemented by overseas exporters shipping to the EU countries.

3.5 Hazard Analysis Critical Control Point (HACCP):

The HACCP system mentioned earlier is the basis for recent regulations on fish inspection adopted by the US, EU, Canada and a number of developing countries. The object of the HACCP system is to assure the safety and sensory quality of fishery products and in addition, to reduce the failure costs in the fishery industry, including the reduction of post-harvest losses.

The principal elements of the USFDA Seafood HACCP regulations are as follows:

- Identify potential hazards; assess the risk or likelihood that they may occur.
- Determine Critical Control Points (CCPs); determine steps, which can be controlled to eliminate or minimize hazards.

- Establish criteria, target levels and tolerances, which must be met to ensure that each CCP is under control.
- Establish a monitoring system for each CCP.
- Determine corrective action to be taken when a CCP is not under control.
- Establish procedures for verification.

3.6 Egyptian Exports:

In 1997 Egypt exported 1,848 tons of fisheries products with a value of L.E. 8,980,000 (Table 32). The principal region to which Egyptian exports were directed was Europe, which accounted for over half (60%) of the value of products shipped. Within Europe the most important market country was Greece, which alone accounted for over one-third (36%) of the total value of Egyptian fishery exports, followed by Spain (12%). Countries in the Middle East, led by Saudi Arabia (23%) and Lebanon (10%), accounted for just over one-third (34%) of Egypt's export earnings.

Exports to European countries consisted primarily of fresh, frozen, salted fish or fish in oil, while the shipments made to the Middle East were chiefly of canned and smoked fish, of which tuna and herring were the leading species. Overall, Egypt plays an insignificant role in world exports of fishery products.

Although the quantity of imports in 1997 reported by GAFRD (2,200 tons) is relatively close to the amount (1,848 tons) given by CAPMAS, the value shown by GAFRD (L.E. 45.6 million) is over five times as high as the value given by CAPMAS (L.E. 9.0 million).

3.7 Fishery imports:

Imports of fishery products are a significant element in the supply of fish to the Egyptian market. In 1997 Egypt imported 145,062 tons, with a value of L.E. 256,483,000 (Table 14). Holland was the most important supplier, accounting for over one-third (40%) of the value of Egyptian fishery imports, followed by Norway (17%) and the United Kingdom (16%). Small pelagic species in frozen form were the leading products imported, while canned fish was brought in smaller quantities.

The volume of imports reported by GAFRD for 1997 (207,356 tons) was substantially higher (43%) than the quantity shown by CAPMAS (145,062 tons), while the value of imports given by GAFRD (L.E. 414.7 million) was proportionally higher (62%) than the value reported by CAPMAS (L.E. 256.5 million).

4. Assessment and Conclusions:

4.1 Commercially important species:

In 1998 four species or groups of fish species--tilapias, grass carp, mullets and sardines-- accounted for over half (57%) of the domestic production utilized in the local market for direct human consumption.

Fish may change hands several times between fishermen and consumers. In many cases trade intermediaries perform functions (e.g., financing of producers, providing credit to customers, ensuring a ready market) which are not otherwise available. When fishermen can manage without such intermediaries, they are eliminated, with a consequent improvement in the fishermen's share of retail prices.

The indicated commission rates and margins of the trade intermediaries have not been found, in international terms, to be excessive. Nevertheless, encouraging competition at all levels in the marketing chain will tend to ensure that margins are reasonable and will benefit both fishermen and consumers.

Prices fluctuate, chiefly in accordance with supply levels. Where the public sector has intervened in setting prices to the fishermen at below market levels, a two-tier market has been created as fishermen try to avoid selling (at least a part of) their production at the lower prices.

Imported frozen fish, some of which is processed into canned products, accounts for an important share of the domestic market. Canned fish is also imported directly, chiefly from Southeast Asia. Imported products are generally appreciably cheaper than fish from domestic production.

4.2 Domestic demand:

The supply of fish to the Egyptian population increased from 7.9 kg per capita in 1989 to over 11.0 kg per capita in 1998 and has been able to keep somewhat ahead of the growth in population (Table 25). Wholesale prices have reportedly remained relatively stable (Table 26).

Egyptian consumers prefer native species, in fresh (unfrozen) form. Foreign fish available for import into Egypt are, in general, different species and are brought in frozen. On the other hand, they may be substantially cheaper.

The study team considers that, except in the event that unexpectedly large increases in aquaculture production are achieved, increasing quantities of fish will have to be imported in order to prevent prices from rising to levels at which fish will be beyond the reach of lower-income consumers. It is anticipated that imported species will become increasingly accepted in the Egyptian market, if native species become less available and more expensive, as imported species are seen to be

cheaper. Imported species will also gain acceptance, as consumers become aware that frozen fish, well handled, may be of equally good (or even better) quality than fresh unfrozen fish, although the taste may not be the same as that of native species.

In 1998, it was clear from reported prices (Table 27) that a two-tier market for sardine had developed, with local species in fresh form selling for substantially higher prices (27-65%) than imported frozen sardine. Nevertheless, increased quantities of imported fish can be expected to have a generally depressing effect on fish prices as a whole and will, as a result, have negative consequences for the incomes of fishermen and fish farmers.

If consumption is to be maintained at the 1998 level of more than 11.0 kg per capita, then total supply required in 2010 would be 883,300 tons and in 2025 1,053,800 tons for population levels of 80.3 million and 95.8 million respectively (Table 24). Thus, in 2010 domestic demand could be expected to require 163,300 tons of fish more (23%) than the total supply of 720,000 tons in 1998, while by 2025 there would be a requirement for 333,800 tons more (46%) than in 1998. Nevertheless, it should be noted that GAFRD's development strategy calls for annual per capita consumption to reach 14.25 kg by 2017.

4.3 Quality:

Producers, trade intermediaries, processors and others in the marketing chain generally respond more readily to economic incentives than to rules and regulations. There are, of course, absolute levels of quality required to ensure the safety of consumers.

For example, the use of ice by fishermen to conserve the catch on the fishing vessels undoubtedly means that the quality of fish landed is superior to the quality when no ice is used. However, if the price received by the fishermen for iced fish is not sufficient to cover at least the additional cost of the ice, then the fishermen will see that money spent on ice does not bring a corresponding benefit and will refrain from using it.

In other words, market forces (and not rules and regulations) tend to be the determining factor in regard to quality. The marketing chain supplies only the levels of quality needed to sell its products, since a higher level of quality will not make economic sense if the extra cost incurred is not compensated for by a correspondingly higher price.

The prospects for improvement in fish quality, in the light of anticipated increases in demand, do not look good. It can be expected that buyers will find it increasingly difficult to persuade their suppliers to improve, or even to maintain, their levels of quality as the suppliers find that demand is strong for the fish they offer at the same, or lower, levels of quality.

On the other hand, a stronger market should lead to a reduction in post-harvest losses as actors in the marketing chain sees the economic benefits which can be obtained by better handling and other measures.

4.4 Foreign markets:

World fisheries imports, in terms of value, increased by 59% in the period 1993-96. Japan, the US and the nine leading importing countries of the EU, which together accounted for 74% of the value of world imports in 1996, all reported increases in the value of their imports.

Japan has, by far, the highest value of fishery imports of any country and in 1998 imported products to a value of US \$13,275 million (down from a high of US \$18,445 million in 1995). Increases in imports have only partially compensated for the decline in landings by Japanese fishing vessels. In the period 1989-97, the value of Japanese imports increased by 53% as the tonnage caught by Japanese fishing vessels declined by 38%.

The value of US imports of edible fish products, conversely, increased by 41% during the period 1994-97 to US \$7,754 million in 1997, despite an increase of 18% in the volume of landings of commercial fishing vessels.

In the EU, the value of fishery products imported during the period 1994-96 by the nine leading importing countries increased by 13% to US \$18,038 million, while the catches of the fishing vessels of eight leading European countries declined by 10% in the period 1989-96.

Thus, each of the three major markets has shown increases in the value of imports of fishery products in recent years, whether as partial compensation for declines in domestic catches (Japan, the EU) or despite an increase in domestic production (the US).

It seems unlikely that domestic production in the three major markets, except possibly from aquaculture, will show any substantial growth and may decline. Growth in population and in consumer purchasing power in these markets can be expected to generate increased demand for fishery products, which will have to be met principally by increases in imports.

Although the anticipated strong demand for imported fishery products should be favorable for exporting countries, exporters are required to comply with increasingly strict regulations as the market countries try to ensure that fishery products are safe, wholesome, and honestly presented. The limitations of the traditional fish inspection and quality control methods, based on analysis of finished products, have been recognized. They are being replaced by HACCP-based systems, which overseas exporters must implement if they wish to export to markets such as (so far) the EU, Canada and the US, which recognize that hazards may exist at various points in the process and that measures can be taken to control the hazards.

4.5 Implications of the General Agreement on Tariffs and Trade (GATT):

Trade concessions negotiated during the Uruguay Round are recorded in and annexed to the Marrakesh Protocol to the General Agreement on Tariffs and Trade (GATT). These provide for increased market access by reducing or eliminating trade barriers, as well as providing legal security for market access through tariff bindings.

While the schedules of commitments provide security for market access, their value also depends on rules that limit other forms of protection. Multi-lateral Trade Agreements, by which all members of the World Trade Organization (WTO) will be bound, strengthen and expand the rules, procedures and institutions which govern measures which could be used to protect market access and thus offset all or part of the increased market access agreed. Agreements relevant to trade in fisheries products include:

- Sanitary and phytosanitary measures (SPS)
- Technical Barriers to Trade (TBT)
- Anti dumping measures
- Import licensing procedures
- Subsidies and Countervailing Measures (SCM) and safeguards.

Tariff reductions agreed upon are to be implemented in equal rate reductions, the first effective on 01 January 1995, with successive reductions effective on 01 January of each of the succeeding years and the final rate to be effective no later than four years after the date of entry into force of the agreement establishing the WTO. Reductions may, however, be implemented more quickly.

The principal implications of the GATT on fisheries in Egypt are as follows:

- **Opportunities to increase exports and economic activity:** Improved access to international markets should enable Egypt to increase exports in volume and value, which will generate increases in employment and incomes. More employment and increased purchasing power will increase demand for domestic goods and services, leading to increased economic activity.
- **A stable trading environment:** Stable and transparent trading rules should lead to improved planning and implementation of investment and trading activities.
- **Assurance of fair treatment:** Under the GATT, countries with less economic or political power can, under the principle of non-discrimination in international trade, receive equal treatment and access to the markets of other member countries.
- **Conversion of quantitative restrictions into tariffs:** Quantitative restrictions (e.g., import licensing requirements, quotas, and bans) are to be lifted by GATT member countries, which may impose tariff rates equivalent to the level of protection in place before the removal of such restrictions. A safeguard

provision allows an additional increase in tariff rates in the event that a surge in imports occurs as a result of the removal of quantitative restrictions.

- **Non-tariff barriers:** Agreement on non-tariff barriers will apply to all WTO members. Improved SPS and TBT rules should provide transparency and restrain the use of arbitrary and unjustified production standards, so that they cannot be used as disguised barriers to trade.
- **Subsidies:** Export subsidies and subsidies favoring the use of domestic over imported goods are to be prohibited, but the relevant agreement contains provisions for differential and more favorable treatment for developing countries, chiefly by allowing them an extended period to phase out such benefits.
- **Possible effect on resources:** While eliminating or reducing tariff rates on fishery products may have a positive effect on fish processing activities, the increases in the production of the raw material required to meet increased demand may lead to or exacerbate over-exploitation of fishery resources.
- **Competition from other products:** The Uruguay Round is designed to liberalize trade in agricultural products. Reduced tariff rates and greater market access for meat, poultry and pork products will improve their competitive position and can be expected to have a negative impact on trade in fishery products. In the long term, this should lead to a decrease in the prices of all food products.

Not all of the implications of the GATT are positive for the Egyptian fishery sector. Improved access to international markets should cause increased economic activity, as growth in exports results in more employment and higher incomes. Stable and transparent rules for international trade should lead to improved planning and implementation of investment and trading opportunities. Care must be taken, however, to ensure that increases in the demand for fish for export do not lead to over-exploitation of resources. Improved access to the Egyptian market for fish (and other competing foods) from overseas will tend to result in a decrease in price levels in the domestic market, which will reduce producers' incomes, but this will generally benefit consumers.

4.7 Post-harvest losses:

Losses in weight and quality occur from the time fish are harvested until the time they are marketed, chiefly as a result of inadequate handling. Apparently no precise estimates have been made in respect of Egyptian fisheries as to the extent of such losses, either in terms of weight or of value.

Post-harvest losses occur as fish lose body fluids and protein, unless they are handled with care. Such losses, in weight, are estimated at 10%.

Losses in value resulting from spoilage may be more substantial. However, the quantity of fish sold at reduced prices is likely to be relatively small except in periods of very heavy catches.

4.8 Prices:

The buying and selling of fish and fisheries products is largely carried out by the private sector, operating in a free market, so that prices are the result of the effects of supply and demand. There are exceptions to this general practice. In some areas, prices are set for relatively short periods (frequently, one month) by committees, on which the local Governorate, GAFRD, the Cooperatives and other stakeholders may be represented. On Lake Nasser the Ministry of Supply sets buying prices to the fishermen and all fish must be delivered to the authorized buyers (Misr-Aswan and FMC).

Where prices are set, for however short a period, distortions are created in the markets. The marketing chain will try to circumvent any obstruction, which prevents it from receiving the highest prices, which the market will bear at any given time. While the reason for setting prices--to put fish within reach of consumers from low-income groups--is unobjectionable, this rarely works well in practice. Producers and others in the market chain generally try to sell at least a part of their fish at free market prices and sell as little as possible, or none at all if they can get away with it, at the lower set prices.

It is generally true to say that the only practical way to ensure that supplies of fish are consistently available at prices which lower-income consumers can afford is by maintaining supplies in the market which are sufficient to hold prices down. Although such a strategy will benefit consumers, it generally means that producers will receive lower prices for their fish.

5. Recommendations:

5.1 To increase producers' incomes:

Generally, an increase in the incomes of primary producers (i.e., fishermen, fish farmers), except for exported products, causes a corresponding increase in market prices and is consequently detrimental to consumers as a whole. The desire to increase producers' incomes must be weighed against the need to ensure the supply of fish, at affordable prices, to the domestic market.

Encouraging, or merely permitting, imports of (relatively) cheap fish will increase supply to the local market and tend to hold down or depress market prices for all fish. This will benefit the consuming population in general, but will go against the interests of the primary producers.

A substantial increase in the volume of cultured fish may increase the incomes of fish farmers but, in depressing the overall market for fish, will be detrimental to fishermen, even though beneficial to consumers.

Marketing systems are, upon examination, usually found to be efficient and self-regulating. Excessive margins or profits generally attract new workers to the segment of the business where such high margins or profits are observed, resulting in competition among the workers which tends to bring margins and profits down to less than excessive levels. It is unlikely that Egypt is an exception to this rule. Consequently, competition at all levels in the marketing chain should be encouraged, even though margins and profits reported do not seem, in international terms, to be excessive.

Lack of capital needed to purchase assets, undertake repairs or finance operations is usually the weakness of fishermen, fish farmers and minor workers in the marketing chain, and causes them to depend on trade intermediaries. Since formal sources of capital and credit are frequently unwilling to finance them (because they have no equity of their own, no credit record, no acceptable collateral or because of the uncertain nature of their cash flow), producers and minor workers in the marketing chain are left with limited options in their search for financing. Informal lenders (e.g., relatives, friends or local potentates) may charge very high interest rates and require very rapid payment, so that the best option is frequently to borrow from one of the strong links in the marketing chain, often the wholesalers.

In return for providing financing and other services, such intermediaries usually require that producers market their production through them exclusively, which the intermediaries may abuse by giving the producers prices, which are below market and other disadvantageous marketing arrangements. The requirement of the intermediaries that producers deal with them on an exclusive basis gives them a better chance to recover the loans made and so, in commercial terms, is not unreasonable. Not all loans of this type are fully recovered by lenders, whose margins or commissions must consequently include an allowance for bad debts.

The producers, on the other hand, would be able to obtain better prices and marketing arrangements if they could create competition for their fish by selling to, or through, two or more outlets. Thus, the key to the problem is the producers' lack of capital and inability to obtain credit from other than informal sources.

It is considered that to provide debt financing alone to producers who have no equity capital of their own is to encourage them to be in business on an unsound footing. A normal rule of thumb for any business is that debt should not be more than two times equity and, in high-risk businesses such as fishing or fish farming, lenders may require an even higher proportion of equity capital to be put up by producers.

While it is recognized that an owner of a fishing vessel tends to take better care of it than a fisherman working on another's boat, it is nonetheless unwise to encourage or permit fishermen without capital or with insufficient capital to become owners, since this results in a structural imbalance which leaves them in a position of weakness and which is likely to drive them into the exclusive marketing arrangements described earlier.

It is not necessarily the case that, as an owner, a fisherman will have a greater net income than he can obtain by providing his fishing skill and experience in the form of labor to the owner of another vessel.

The principles expressed in this section are as valid for fish farming and marketing as they are for fishing activities. All are likely to be considered by potential lenders as risky ventures, with a high failure rate.

5.2 To improve export earnings:

To ensure the sustainable viability of the sub-sector processing fish for export, the study team recommends the following:

- Issue export licenses or permits only to exporters who own handling and processing facilities which are built, maintained and operated in accordance with the requirements of the export markets and the relevant regulations.
- Prohibit leasing or renting of processing facilities, so that only responsible plant operators, capable of consistent production of export quality products, are permitted to operate in their own facilities.
- Regulate access into the processing industry, so that processing capacity is in balance with, and does not generally exceed, supplies of raw material.
- Facilitate increases in the supplies of raw material for processing for export by encouraging fishing vessel owners to acquire modern and efficient vessels capable of fishing in offshore and international waters.
- Monitor the international competitive position of Egyptian exporters by studying, with sufficient frequency to ensure that comparisons remain valid, the costs of key inputs (e.g., raw material, electricity, fuel, import duties, ice, packaging material) and other factors (e.g., freight availability and cost, relative exchange rates) in Egypt and in important competing nations (Thailand, Indonesia, China, Taiwan), so that remedial actions may be taken where possible and appropriate.
- Provide training and assistance to Egyptian exporters and government officials as may be required to ensure the smooth implementation of the HACCP systems required by export markets.
- Facilitate pre-export inspection of fishery products by authorizing a single agency to undertake inspections and to issue export clearances as may be needed.
- Facilitate the preparation of export documents, preferably by means of a one-stop window at which all approvals can be obtained simultaneously, both in Cairo and at appropriate regional centers of export production.

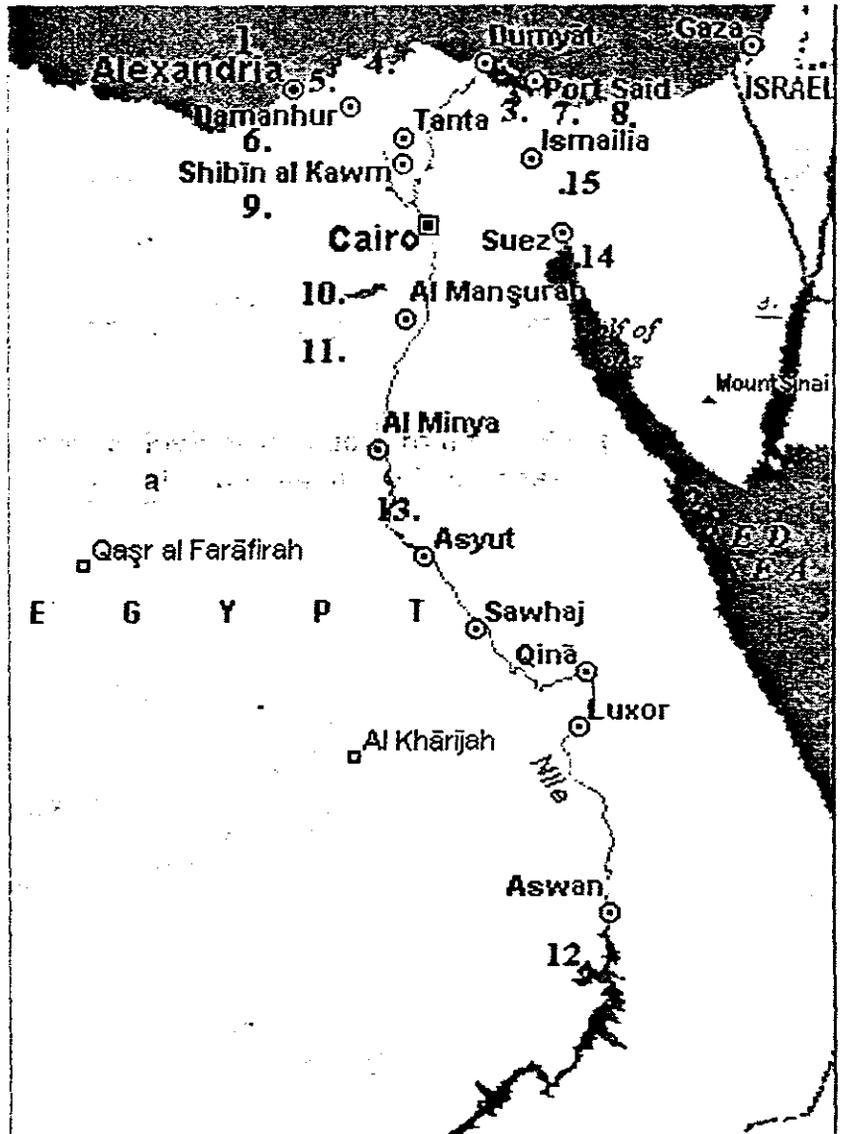
- Make available up-to-date market and price information to exporters, including details of changes in the regulations in the principal import markets.
- Encourage participation of Egyptian exporters at international seafood trade exhibitions, fairs and conventions.
- Encourage the development of close relations between Egyptian exporters and individual importers in the market countries, with a view to the development of value-added or further processed fishery products resulting in improved margins for both parties.

5.3. To reduce post-harvest losses:

A careful assessment should be undertaken on the extent of post-harvest losses, both in weight and in value. This assessment would serve as the basis for designing and implementing appropriate programs to prevent or reduce such losses. Particular attention should be paid to the availability and price of ice.

5.4 To ensure that all fish can be freely traded:

Because setting fixed buying prices generally causes distortions in the market and rarely achieves the objective of providing adequate supplies of fish at prices which low-income consumers can afford, it is recommended that all fish and fishery products, at whatever level in the marketing chain, should be freely marketed under normal commercial arrangements. Prices would fluctuate according to effects of supply and demand. Local committees, public sector bodies or other entities should not intervene to set fixed prices.



2. MEDITERRANEAN SEA
3. RED SEA
4. LAKE MANZALA
5. LAKE BURULLUS
6. LAKE EDKU
7. LAKE MARYUT

8. PORT FOAD DEPRESSION
9. LAKE BARDAWIL
10. WADI NUTRUN LAKES
11. LAKE QARUN
12. WADI RAYAN LAKES
13. LAKE NASER
14. THE NILE
15. BITTER LAKES
16. SUEZ CANAL

FIGURE 1 – OPEN WATER RESOURCES IN EGYPT

Table 1: Fish production from various resources in 1998 (in tons)

Resource		Production	%
Marine fisheries	Mediterranean Sea	68,000	12.46
	Red Sea	57,063	10.46
Northern lakes	Manzala	78,261	14.34
	Brolous	59,033	10.82
	Idko	10,280	1.88
	Maryott	4,521	0.83
Coastal Depressions	Bardawil	1,937	0.36
	Port Foad	189	0.03
Inland lakes	Qaroun	1,025	0.19
	Rayan 1 & 3	1,073	0.20
	Nasser	53,819	9.86
	Bitter & Tamsah	2,751	0.50
Inland waters	Nile & Branches	68,252	12.51
Fish culture	Grass Carp	10,900	2.00
	Governmental	7,076	1.30
	Private	106,118	19.45
	Cages	2,855	0.52
	Rice fields	12,440	2.28
Total		545,593	100.00

Source: Production Statistics, GAFRD, 1998.

Table 2: Fish production from various resources, 1988-1998 (thousand tons)

Resource		88	89	90	91	92	93	94	95	96	97	98
Marine Fisheries	Mediterranean	36	36	35.4	40.2	44	45	45.6	43.7	51	52.7	68.0
	Red Sea											
		28	44	39.9	41.9	43	51	48.3	47.3	48.4	57.4	57.1
Northern Lakes	Manzala	75	56	62.9	60	59	64	59	59.6	52.5	63.1	78.3
	Brulous	27	42	57.8	52	52	48	55.1	59.2	59.3	58.7	59
	Idko	9.5	8.3	8.9	8.9	8.3	8.3	9.7	8.2	10.1	10.8	10.3
	Maryott	7.7	3.5	1.9	2.2	3.5	3.9	3.8	3.5	4	4.4	4.5
Coastal Depressions	Bardawil	1.7	2.3	3	2.9	1.8	2.2	1.6	2.2	1.6	2.2	1.9
	Port Foad	0.6	0.3	1.5	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.2
Inland Lakes	Qaroun	1.4	0.6	1	1.5	1.4	0.8	0.4	0.7	0.9	0.9	1.0
	Rayan 1&3	0.7	0.8	0.8	0.8	0.6	0.5	0.5	0.6	0.7	0.9	1.1
	Nasser	25	25	24.2	34	33	28.7	32	50.9	45.4	52.6	53.8
	Bitter & Tamsah	0.3	0.3	0.4	0.5	0.7	1.3	1.3	1.5	1.8	1.7	2.8
Inland Waters	Nile & Branches	39	39	41.7	40.2	40	50	57.5	57.9	64.4	65.5	68.3
Fish Culture	Grass Carp								10	15.3	12.3	10.9
	Aquaculture	33	39	35	35	35	35	35	41.9	54.6	66.5	116
Total		306	323	339	345	347	357	368	407	432	457	546

Source: Production Statistics, GAFRD, 1998

Table 3: Fish production from Mediterranean Sea by main species in 1998 (In tons)

Species	Quantity	% of total
Sardine	23,920	35.17
Shrimps	5,071	7.45
Flathead Grey Mullet	2,304	3.38
Bogue (Indian Mackerel)	1,957	2.87
Others	34,748	51.1

Source: Extracted from Fish Production Statistics, GAFRD, 1998.

Table 4: Fish production from Red Sea by main species in 1998 (In tons)

Species	Quantity	% of total
Narrow	9,933	17.4
Twins pot Snapper	8,784	15.39
7994 (name of fish?)	7,994	14.01
Sardine	4,973	8.71
Others	25,379	44.4

Source: Extracted from Fish Production Statistics, GAFRD, 1998.

Table 5: Fish production from Northern Lakes by main species in 1998 (In tons)

Species	Lake Manzala		Lake Broious		Lake Idko		Lake Maryott	
	Qty.	%	Qty.	%	Qty.	%	Qty.	%
Tilapia	40,050	51.1	35,700	60	8,165	79	2,948	65.2
Cat fish	5,218	6.7	2,940	5	687	6.6	1,138	25.17
Forskalse cat fish	631	0.8	910	1.54				
Nile perch	252	0.32	840	1.42				
Others	32,110	41.02	18,643	31.6	1,428	13.89	435	9.62

Source: Extracted from Fish Production Statistics, GAFRD, 1998.

Table 6: Fish production from Lagoons (Depressions) by main species in 1998 (In tons)

Species	Lake Bardawil		Lake Port Fouad	
	Quantity	%	Quantity	%
Flathead	495	25.5	47	24.86
Crabs	425	21.9	3	1.5
Glithead Sea Bream	195	10.07	55	29.0
European Sea Bass	38	1.96	109	57.7
Others	784	40.47		

Source: Extracted from Fish Production Statistics, GAFRD, 1998.

**Table 7: Fish production from northern lakes
by main species in 1998 (In tons)**

Species	Lake Qaroun		Rayan 1 & 3		Lake Nasser		Bitter & Tamsah	
	Quantity	%	Quantity	%	Quantity	%	Quantity	%
Tilapia	400	39.04	366	34	14,195	26.37	56	2.03
Flathead	226	22.01	252	23.5			896	32.56
Sole	134	13.1					39	1.41
Nile perch			121	11.27	819	1.5		
Others	265	25.85	334	31.12	38,805	72.13	1,760	63.97

Source: Extracted from Fish Production Statistics, GAFRD, 1998.

**Table 8: Fish production from Nile River
by main species in 1998 (In tons)**

Species	Nile River	
	Quantity	%
Tilapia	26,566	38.9
Cat fish	11,613	17.1
Shield	5,723	8.38
Nile perch	1,223	1.79
Others	23,127	33.88

Source: Extracted from Fish Production Statistics, GAFRD, 1998.

**Table 9: Mediterranean Sea production
by fishing area in 1998 (In tons)**

Fishing area	Quantity	%
El Borg	21,088	31.01
Meadeea	17,979	26.40
Port Said	9,856	14.49
Alexandria	7,121	10.40
Arish	5,674	8.34
Rashid	4,212	6.19
Abu Keer	939	1.39
Balteem	711	1.04
Matrouh	420	0.60
Total	68,000	100.00

Source: Extracted from Fish Production Statistics, GAFRD, 1998.

Table 10: Red Sea production by fishing area in 1998 (In tons)

Fishing area	Quantity	%
Suez Gulf	27,392	48.00
Main Red Sea	15,730	27.60
Hurghada	6,357	11.14
Barnis	5,527	9.68
El Tour	1,063	1.86
Dahab	476	0.83
Shalateen	413	0.72
El Qusaer	105	0.18
Total	57,063	100.00

Source: Extracted from Fish Production Statistics, GAFRD, 1998.

Table 11: Total number of vessels operated in marine waters by fishing gear in 1998

Source \ Gear	Trawling	Purse Seining	Long Line	Trammel nets	Others	Total
Mediterranean Sea	1,226	217	542	600	15	2,600
Red Sea	192	83	280			555
Total	1,418	300	822	600	15	3,155

Source: Production statistics, GAFRD, 1998.

**Table 12: Distribution of vessels
operated according to engine power and fishing gear in 1998**

Engine power/ horse power (hp)	Mediterranean Sea						Red Sea						Total
	Trawling	Purse seine	Long line	Trammel nets	Others	Total	Trawling	Purse seine	Long line	Trammel nets	Others	Total	
Up to 10 hp			64	2		116			5			5	121
10:20			99	107	1	207			25			25	232
20:30			72	137	1	210			63			63	273
30:50	30	24	114	178	8	354			78			78	432
50:100	164	72	185	124	5	550			77			77	627
100:150	414	78	8	2		502	1		28			29	531
150:200	340	31				371	7	4	2			13	384
200:250	237	10				247	13	16	2			31	278
250:300	13					13	2	7				9	22
300:400	12	1				13	16	11				27	40
400:500	14	1				15	85	41				126	141
500:600	1					1	39	2				41	42
600:700						0	2					2	2
700:800						0	1	1				2	2
More than	1					1	26	1				27	28
Total	1226	217	542	600	15	2600	192	83	280	0	0	555	3155

Source: Production statistics, GAFFD, 1998.

Table 13: Aquaculture in Egypt - 1998

Fish Culture	Water Environment						Production tons
	Fresh		Brackish		Marine		
	M ³	Feddans	M ³	Feddans	M ³	Feddans	
Grass Carp Culture							10.
Extensive Culture							
Governmental							
Private							
Own				3,711			3.
Rent				38,329			34.
Temporary				156,625			67.
Semi-Intensive							
Governmental				13,832			7.
Private							
Intensive							
Cage Culture							
Private Cages	285,490						2.8
Governmental Cages							
Integrated Fish culture							
Private rice Culture		233,600					12.4
Total	285,490	233,600	0	212,497			139.3

Source: Production statistics, GAFRD, 1998.

Table 14: Indicative cash flow and profitability of medium size semi extensive fish farm

Investment cost (L.E.,000)			
Farms are 30 Feddans: water area 4-5 ponds 24 Feddans			
Excavation, dykes and pond construction		36-50	
Sluices, inlets and outlets		2-3	
2 pumps		20	
Stores and staff accommodation building		20	
Total investment			
Production and price			
Annual production		3,600-7,200 kg	
Species		Mostly mullet with some Tilapia	
Average price, farm gate		LE 8/kg	
Income		High	Low
Land lease		(750)	(750)
Feed		(10,000)	(5,000)
Seed		(9,000)	(5,000)
Workers	1 chief LE 6,000 2 skilled 7,200 4 unskilled 9,600		
Fertilizer		(1,500)	(1,500)
Energy		(6,000)	(6,000)
Cash flow		7,550	12,250
Depreciation of machinery		(4,000)	(4,000)
Profit (loss)		3,550	(16250)

Information provided by Dr. Magdi Abbas, Aquaculture Biologist, GAFRD.

Table 15: Indicative cash flow and profitability semi-intensive fish farm

Investment cost	(L.E.,000)
Farms are 500 Feddans; water area 300 Feddans	
Excavation, dykes and pond construction	2,402-2,802
Sluices, inlets and outlets	320
Machinery-pumping station	120
3 tractors and trailers	135
Electrical wiring and connections	35
Total investment	3,252,3652
Production and price	
Annual production	405,000kg
Species	Mostly mullet and Craps
Average price, farm gate	LE 7/kg
Income	283,500
Land lease	(25,000)
Feed	(810,000)
Seed	(72,000)
Workers 1 Manager LE 18,000	
5 field engineers 42,000	
8 unskilled (permanent) 25,000	
30 unskilled (seasonal) 7,200	(92,200)
Fertilizer	(35,000)
Energy	(8,1000)
Chemical, medical and others	(3,000)
Cash flow	1,715,900
Depreciation of machinery	(87,000)
Profit (loss)	1,628,900

Information provided by Dr. Magdi Abbas, Aquaculture Biologist, GAFRD.

Table 16: Indicative cash flow and profitability average cage culture fish farm

Investment cost (L.E.'000)		
6-8 cages, 10x10x10 meters each		
Steel frame	6.4	
Welding and connecting materials	0.6	
Nets	32.0	
Anchorage	4.0	
Floats	4.5	
Service boat	3.0	
Catwalk and lodge	4.5	
Total investment	55.0	
Production and price		
Annual production	60,000-80,000kg	
Species	Tilapia	
Average price, farm gate	LE 6/kg	
	High	Low
Income	480,000	360,000
Feed	(180,000)	(135,000)
Seed	(60,000)	(45,000)
Workers 1 Manager LE 18000		
4 unskilled 19200		
Maintenance	(20,000)	(20,000)
Cash flow	182,800	122,800
Depreciation	(18,250)	(18,250)
Profit (loss)	164,550	104,550

Information provided by Dr. Magdi Abbas, Aquaculture Biologist, GAFRD.

**Table 17: Indicative prices and marketing margins
Have canned tuna in Loaloe Factory (Ismailia)**

	Prices (L.E./carton of 24 cans)	Margins
Cannery sells to distributor	46.00	
Distributor's mark-up	0.50	1%
Distributor sells to retailer	46.00	
Retailer's mark-up	19.50	30%
Retail store sells to consumer ³	66.00	
Supermarket's mark-up ⁵	25.50	35%
Supermarket sells to consumer	72.00	

**Table 18: Imported fish by variety and origin in 1997
(Quantity in tons and the value in L.E.'000)**

Country	Frozen		Canned Sardine		Canned Tuna		Smoked Herring	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Europe	125,380	218,218	134	809	16	234	49	259
America	3,439	7,035						
Asia	118	768	24	186	5,941	43,018	16	129
Arab countries	10,826	18,839	1	44				
Africa	228	1,809						
Australia	2	44						

Source: CAPMAS

**Table 19: Exported fish according to the destination
and the fish type in 1997 (Quantity in tons and value in L.E.'000)**

Country	Frozen		Canned Sardine		Canned Tuna		Smoked Herring	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Europe	1,198	5,348						
America	0	0						
Asia	25	302						
Arab countries	366	3,087			32	126	26	109
Africa	1,848	8,980	3	20	32	126	26	109

Source: CAPMAS

Table 20: Fish Production from wild resources and agriculture, 1989–98
(' 000 tons)

	1989	1991	1993	1995	1996	1997	1998
Wild resources							
Mediterranean Sea	36	40	45	44	51	53	68
Red Sea	44	42	51	47	48	57	57
Total Marine fisheries	80	82	96	91	99	110	125
Northern Lakes	110	123	124	131	126	137	152
Coastal depressions	3	3	2	2	2	2	2
Inland lakes	27	37	31	54	49	56	59
Inland waters	39	40	50	58	64	66	68
Total inland fisheries	179	203	207	245	241	261	281
Total from wild resources	259	285	303	336	340	371	406
Aquaculture							
Grass carp culture							11
Extensive culture, private							106
Semi-intensive culture, Government							7
Intensive culture, private (in cages)							3
Integrated culture, private (in rice paddies)							12
Total from aquaculture	67	60	54	72	91	86	139
Total fish production	323	345	357	407	432	457	546

Notes:

Fresh water resources

Northern lakes	Lake Manzala, Lake Brulous, Lake Idko, Lake Maryott
Coastal depression	Bardawil Lagoon , Port Fouad
Inland lakes	Lake Qaroun , Lakes Rayan 1and 3 , Lake Nasser , Bitter Lake and Lake Timsah

Inland waters	Nile River and branches
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Data

Totals, in some cases, do not agree because of rounding off production figures.

Source: Derived from " Report on Fish Production 1998 ", GAFRD

Table 21: Fish production from wild resources and aquaculture, by principal species, 1998 (' 000 tons)

<i>Species</i>	<i>Wild resources</i>	<i>Aquaculture</i>	<i>Total</i>
Tilapia	128.4	52.8	181.2
Grass carp	0.9	50.8	51.7
Mulletts	18.0	28.4	46.4
Sardines	29.0	-	29.0
Catfish	21.6	0.2	21.8
Shrimp	8.4	-	8.4
Others	199.9	7.2	207.1
Total	406.2	139.4	545.6

Source: Derived from " Report on Fish Production 1998", GAFRD

Table 22: Exports and Imports during the period 1989 - 1998

<i>Year</i>	<i>Exports</i>			<i>Imports</i>		
	<i>Quantity in 000'tons</i>	<i>Values LE million</i>	<i>Value per Unit LE/kg</i>	<i>Quantity in 000'tons</i>	<i>Values LE million</i>	<i>Value per Unit LE/kg</i>
1989	2.1	38.3	18	110,726.9	243.6	2
1991	3.0	99.9	33	98,448.1	227.2	2
1993	1.7	45.6	27	105,756.1	155.9	1
1995	0.9	19.0	20	141,743.8	240.3	2
1996	0.6	11.8	20	144,109.5	490.0	3
1997	2.2	45.6	20	207,356.0	414.7	2
1998	2.1	41.0	19	176,300.7	310.0	2

Note: Figures may not agree, owing to rounding.

Source: Derived from " Report on Fish Production 1998 ", GAFRD

**Table 23: Supply to the domestic market,
by quantity, 1989 – 98 (' 000 tons)**

<i>Year</i>	<i>Domestic Production</i>	<i>Imports</i>	<i>Exports</i>	<i>Supply</i>
1989	323	111	(2)	432
1991	345	98	(3)	440
1993	357	106	(2)	461
1995	407	142	(1)	548
1996	432	144	(1)	575
1997	457	207	(2)	662
1998	546	176	(2)	720

Source: Derived from Tables 1 and 3

**Table 24: Egyptian population 1989–98 and projected growth
in population to 2010 and 2025 (millions)**

<i>Year</i>	<i>Population</i>
1989	55.0
1991	57.5
1993	59.8
1995	62.1
1996	63.3
1997	64.5
1998	65.5
2010	80.3
2025	95.8

Sources:

- “World Population Data Sheet 1998, Demographic Data and Estimates for the Countries and Regions of the World”, Population Reference Bureau.
- FAO database.

Table 25: Trends in per capita food fish supply, 1989 –98

Year	Supply ('000 tons)	Population (millions)	Per capita supply (kg)
1989	432	55.0	7.9
1991	440	57.5	7.7
1993	461	59.8	7.7
1995	548	62.1	8.8
1996	575	63.3	9.1
1997	662	64.5	10.3
1998	720	65.5	11.0

Source: Derived from table 4 and table 5

Table 26: Average annual wholesale prices of six important species at El Abour Market, 1997 – 98 (L.E. / kg)

Species	1997	1998
Tilapias	7.0	7.2
Grass carps	5.0	5.0
Mulletts	10.0	10.0
Sardines	2.5	1.9
Catfish	4.0	4.0
Shrimp	25.0	25.0

Source: " Report on Fish Production 1998", GAFRD

**Table 27: Monthly average wholesale prices
of selected species at El Abour Market, 1998 (L.E. / kg)**

Species	Tilapia	Mullet	Sardine	Sardine	Catfish	Shrimp
Grade or size	Medium	Medium	Fresh	Frozen		Medium
January	7.56	9.45	2.38	1.80	4.27	29.90
February	7.06	9.25	2.34	1.80	4.11	25.00
March	7.37	9.87	2.30	1.80	4.00	25.00
April	7.09	10.00	2.35	1.80	4.04	25.00
May	7.29	10.00	2.41	1.80	4.00	25.00
June	7.13	10.00	-	1.80	4.00	25.00
July	7.79	10.00	-	1.80	4.00	25.00
August	7.40	12.94	-	1.80	4.00	25.23
September	7.03	9.93	2.00	1.80	4.05	25.00
October	7.00	10.03	2.97	1.80	4.00	25.00
November	7.20	10.00	2.96	1.83	4.00	25.00
December	6.21	9.55	2.43	1.80	3.85	25.00

Source: " Report on Fish Production 1998", GAFRD

Table 28: World imports of fishery products by value by leading importing countries, 1989 – 96 (US\$ millions)

Country or Area	1989	1993	1994	1995	1996
Japan			16,140	17,853	17,024
USA			7,043	7,141	7,080
EU					
France			2,797	3,221	3,194
Spain			2,639	3,106	3,135
Italy			2,257	2,281	2,591
Germany			2,316	2,479	2,543
United Kingdom			1,880	1,910	2,065
Denmark			1,415	1,574	1,619
Netherlands			1,017	1,192	1,142
Belgium			921	1,036	966
Portugal			670	763	783
Subtotal (9 countries)			15,912	17,562	18,038
Others			11,976	13,489	14,722
Total	35,846	44,622	51,071	56,045	56,864

Source: "Fishery Statistics: Commodities", FAO Yearbook.

Table 29: Trends in Japanese catches and imports, 1989 – 98

<i>Year</i>	<i>Catches by Japanese fishing vessels (million tons)</i>	<i>Imports into the Japanese market</i>	
		<i>Quantity (million tons)</i>	<i>Value (US\$ millions)</i>
1989	11.9	2.3	10,548
1991	10.0	2.9	12,513
1993	8.7	3.1	14,662
1995	7.5	3.6	18,445
1996	7.4	3.4	17,636
1997	7.4	3.4	16,178
1998	n /a	3.1	13,275

Source: "Japanese Imports of Marine Products (Statistics)", Japan Marine Products Importers Association.

**Table 30: Trends in US catches and imports
of edible fishery products, 1989 – 97**

Year	Commercial landings by US fishing vessels (million tons)	Imports into the US market)	
		Quantity (million tons)	Value (US\$millions)
1989	2.8	2.8	5,498
1991	3.2	2.7	5,672
1993	3.7	2.5	5,849
1995	3.5	2.7	6,792
1996	3.4	2.8	6,730
1997	3.3	3.0	7,754

Source: "Fisheries of the United States", National Marine Fisheries Service.

**Table 31: Nominal catches of leading European countries
1989 – 96(million tons)**

	1989	1991	1993	1995	1996
Denmark	1.9	1.8	1.6	2.0	1.7
Spain	1.3	1.0	1.1	1.1	1.1
United Kingdom	0.9	0.8	0.9	0.9	0.9
France	0.6	0.6	0.6	0.6	0.5
Netherlands	0.4	0.4	0.5	0.4	0.4
Italy	0.4	0.4	0.4	0.4	0.4
Portugal	0.3	0.3	0.3	0.3	0.3
Germany	0.3	0.2	0.3	0.2	0.2
Total (8 countries)	6.1	5.5	5.7	5.9	5.5

Source: "Fishery Statistics: Capture Production", FAO Yearbook.

Table 32: Egyptian exports of fishery products,
by quantity and value, 1997

<i>Market destination</i>	<i>Quantity (metric tons)</i>	<i>Value (L.E. ' 000)</i>
Europe		
Greece	531	3,227
Spain	433	1,120
Italy	123	332
Others	111	669
Sub – Total	1,198	5,348
North America		
USA	0	0
Canada	0	0
Sub – Total	0	0
Asia		
Turkey	6	38
Japan	10	116
Others	9	148
Sub – Total	25	302
Middle East		
Saudi Arabia	209	2,025
Lebanon	133	893
Others	24	169
Sub – Total	366	3,087
Africa		
Zaire	259	241
Others	0	2
Sub – Total	259	243
Total	1,848	8,980

Source: CAPMAS

Table 33: Egyptian imports of fishery products
by quantity and value, 1997

<i>Source of supply</i>	<i>Quantity (metric tons)</i>	<i>Value (L.E. ' 000)</i>
Europe		
Norway	24,156	43,851
United Kingdom	21,521	40,501
Germany	4,504	8,373
Italy	200	495
Holland	64,294	103,759
Russia	2,286	4,190
Ireland	7,314	14,284
Others	1,105	2,765
Sub- Total	125,380	218,218
North America		
USA	769	1,981
Canada	2,670	5,054
Others	0	0
Sub- Total	3,439	7,035
Asia		
Thailand	71	276
Taiwan	24	94
Others	23	398
Sub- Total	118	768
Middle East and N.Africa		
Morocco	5,982	10,852
Yemen	52	208
Palestine	101	1,616
Mauritania	4,666	6,056
Others	24	107
Sub- Total	10,825	18,839
Sub-Saharan Africa		
Kenya	148	1,417
Others	80	392
Sub- Total	228	1,809
Other Sources		
Investment Authority	1,404	2,877
Ship supply	3,666	6,893
Others	0	0
Sub - Total	5,070	9,770
Total	145,060	256,439

Source: CAPMAS

Annex (1)

Agricultural Policy Reform Project REFORM DESIGN AND IMPLEMENTATION UNIT

Proposed Terms of Reference

Study on Identifying Policy Barriers for Fisheries Development

Justification for these terms of reference:

Fish is a traditional and important component of the Egyptian diet. Per capita consumption of fish exceeded 10 kilograms in 1997. The domestic fish harvest was about 457,000 tons in 1997, most of which came from fishery resources in the Nile, Lake Nasser, the Red Sea and the Mediterranean, and the Northern Lakes. Almost 74,000 tons of this total, or 16 %, was harvested from aquaculture farms. This includes fish harvested from fishponds, cages, and rice fields. There are about 100,000 full time fishermen managing nearly 52,183 fishing vessels, of which 3,415 are motorized. These are organized into 92 specialized cooperatives. More than 90% of fisheries and fish farming activities are private, but more support is still needed to strengthen the private sector in terms of technical, financial, and institutional support for fishermen's co-operative unions.

Fishery resources in Egypt have yet to be exploited in an economic and sustainable way. In spite of the 12 million feddans of available fisheries, domestic fish production does not fully meet demands. In 1997, more than 200,000 tons of frozen fish were imported. Yet, many in the fisheries industry note that the fisheries industry could be important in increasing the consumption of animal protein in Egypt. Good potential for expansion of fish production exists in inland and brackish waters, especially in lakes and fish farming.

Increased fish production to meet ever-increasing demands is constrained by a number of factors. Improper fisheries management and lack of effective coordination among governmental institutions related to fisheries led to ineffective use of fish resources. Inadequate marketing and transport facilities cause considerable losses of fish. Additionally, the GOE from time to time intervenes in the market through applying administrative prices for Lake Nasser and Bardual fish production, causing disincentives to investment in production and processing facilities as well as market distortion. Fishermen's Cooperatives, which include more than 100,000 private fishermen and generate more than 90% of total fish production, need to be strengthened. The fishing industry also lacks the proper infrastructure for processing. Fisheries policy could be improved to promote fisheries development and encourage the private sector to invest in fish production and industry. Fishing policy is the responsibility of the Ministry of Agriculture and Land Reclamation and is implemented through the General Authority for Fish Resource Development (GAFRD). Plans, programming, and management for overall fishing development and fisheries resources exploration are the responsibility of the GAFRD in co-ordination with the Institute of Oceanography and Fisheries (IOF), which is under the supervision of the Ministry of Higher Education and Scientific Research (MHESR). The Ministry of Public Works and Water Resources is also important to the fishing industry, and sometimes, the objectives of this Ministry are not consistent with the objectives of the MALR.

The purpose of this Terms of Reference is to conduct a structure, conduct and performance study of the fishing industry in Egypt. This study is to identify the policies and regulations which prevent the full and sustainable exploitation of the fisheries industry in Egypt. Efficient and economic utilization of the development potential of fish resources requires proper, clear, well identified policies for fisheries management, water and land use, credit, marketing and pricing, extension & research, and investment. This includes an investigation of the numbers of companies and individuals which constitute this industry, the costs of harvesting fish in the various segments of the industry, and the wholesale prices.

The main short-term objectives of the fisheries development policies are to help generate jobs and incomes from fisheries and to ensure adequate supplies of food for the Egyptian consumers. Subsidiary objectives are to improve food quality, earn foreign currency by exporting certain high-value fisheries products, and improve the processing capacities of Egyptian fish industries. A longer-term objective is to improve the policy environment to support the GOE intention to make Egypt self-sufficient in fisheries and increase its exports of fisheries products.

Objective of this short term assignment:

To identify policy constraints and barriers to fisheries development in Egypt.
To conduct a study of the Egyptian fishing industry.
Generate consensus among stakeholders on the need for objectives of policy reform for fisheries development.

Outputs:

Identification of current fisheries policies and proposals for further development of the fisheries industry.
Identification of possible policy benchmarks for the next tranche.
Report on the fisheries industry.
Three stakeholders workshop; one in Aswan, one in the Delta, and one in Hurghada.
Presentation of results and recommendations, based on the Final Report of the study.

Timing:

June - September 1999

Team and resources:

Dr. Robin Rackowe (Level of effort 24 working days plus 3 days travel),
Dr. Ahmed Barrania, Fish Resource Economist and Planner (Level of effort 20 working days),
Dr. Medhat Mohamed A. Abdelaal, Statistician (Level of effort 10 working days),
Officials (3 persons) from GAFRD/MALR as OTJ trainees.

RDI Unit Responsibility:

Resource Economics: Dr. Sayed Hussein, Dr. Jane Gleason

Tasks:

Review laws, ministerial decrees, and regulations regarding fisheries and fish farms. Conduct literature review including the up-to-date studies in the area of development policies for fisheries in Egypt. This includes summary of statistical information on production, costs of production, prices, and other data pertinent to fisheries development.

Conduct meetings with decision-makers at MALR and its affiliated agencies regarding policies of fisheries and fish farms development.

Conduct field trips to interview stakeholders (including private sector, managers, and others decision makers) regarding policy barriers and constraints for development of fisheries sector.

Arrange meetings to interview fishermen leaders and fish farm operators (including small and large investors), and if possible foreign investors. These meetings aim to open dialogue and to identify the problems facing each of them.

Conduct three stakeholders workshops.

Prepare a draft report of the study.

Conduct a seminar to present the main findings and discuss the recommendations.

Annex (2)

List of Persons Met

In Cairo

Dr. Mohammed Saif Abdullah, Senior Fisheries Officer, Food and Agriculture Organization of the United Nations (FAO)

Eng. Abdulla M. Hammad, Chairman, General Authority for Fish Resources Development (GAFRD)

Mr. Mohamed Abdel El-Hameed El-Shenawy, Under Secretary (retired) and International Cooperation Counselor, GAFRD.

Dr. Magdy A. Saleh, Aquaculture Biologist, GAFRD

Dr. Mohamed Hamdy Salem, Executive Director, Egyptian Export Promotion Center.

Mr. Ahmed Shawky, Chairman, Misr Aswan Fishing and Fish Processing Company.

Mr. Mohamed Soliman Mansour, Chairman, Egyptian Fish Marketing Company.

Mr. Magdy M. Abou Ghalli, Director, Migo Fish International Company.

Mr. Mohamed Ghaffar, Fish Wholesaler, El-Abour

Kafr El-Sheikh

Eng. Fawzy Bedear El-Shenawy, General Director, Fisheries Department, GAFRD, Kafr El-Sheikh.

Mr. Mohamed Mowafi, Fish Farm of Mohamed Mowafi and Company, Kafr El-Sheikh.

Eng. Mohamed El-Kady, Delta Company for Fish Processing.

Major Khalid Shafik Ibrahim, Chief, Water Bodies and Environment Police, Lake Burullus.

Mr. Ahmed Reda Sharaby, Secretary, Fishermen Cooperative, Borg El-Burullus.

Mr. Mohamed Safwat, Chairman, Cooperative, Lake Burullus.

North Sinai

Mr. Ismail Riad, Director, Fisheries Department, GAFRD, North Sinai Region.

Eng. Nasser Arif El-Shaarawe, Marine Engineer, Bardawil Lagoon.

Professor Dr. Samir Ghoneim, Director of Fish Research Center and Dean of Faculty of Environmental Agricultural Sciences, Suez Canal University.

Mr. Rashad El-Motary, Deputy Chairman, Fishermen Cooperative, El-Arish

Fayoum

Mr. Saied Said, General Director, Fisheries Department, GAFRD, Nile Valley Region.

Mr. Moustafa El-Sharif, Accounting, GAFRD

Mr. Mahmoud Wali, Fish Farmer.

Eng. Wael Sobhy, Fish Farmer.

Mr. Moustafa Mahmoud Yussef, Chairman, Fishermen's Cooperative, Lake Qarun.

Abbassa

Dr. Roger Rowe, Deputy Directory General, Africa and West Asia, International Center for Living Aquatic Resources Management (ICLARM).

Dr. Abdel Rahman El-Gamal, Researcher, ICLARM.

Damietta

Tech.Eng. Ahmed El-Baghdady, Sector Chief of Plants, EDFINA Company.

Mr. Hassan El-Kashawi, Fishing Vessel Owner and Chairman, Fishermen's Cooperative.

Mr. Hassan El-Raghy, Director, Fisheries Department, GAFRD

Mr. Abdel Latif Sheashea, Advisor, GAFRD.

Mr. Hosni Abdel Samad, Director, Fish Ponds Division, GAFRD.

Mr. Reda El-Hamamsy, Fish Ponds Division, GAFRD.

Mr. Moustafa Foda, Fish Farmer, Tiba Fish Farm.

Port Said

Mr. Khairy Moustafa Saleh, Director of Fishing Port.