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FISHERIES DEVELOPMENT OF LAKE NASSER

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EGYPT

Technical report: Assessment of the fisheries resources in Lake Nasser\*

Prepared for the Government of Egypt  
by the United Nations Industrial Development Organization

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579

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## C O N T E N T S

	<u>Page</u>
Introduction .. .. .	1
Course of the mission .. .. .	3
Background information and summary .. .. .	4
Organization of fishery in Lake Nasser .. .. .	10
Fish resources	
Boats and fishing gear and equipment	
Fishermen and fishing companies	
Ice production and transportation of iced fish ..	17
Ice production	
Transportation of fish to the handling and processing base in the High Dam port	
Handling at landing places and fish preservation	20
Fish salting	
Handling in High Dam port	
Delivery of fish to market	
Fish processing .. .. .	23
Production of fish meal	
Utilization of fish meal	
Further utilization of fish offal	
Other economic activities in the region of Lake Nasser and plans for development of the region ..	25
Background	
Development of agriculture and food industry	
Mining industry	
Development of fishery and fisheries industries	
Final remarks and recommendations .. .. .	29
Annex 1 - List of persons met .. .. .	34
Annex 2 - Terms of reference for pre-feasibility study for a fishery complex .. .. .	36
Annex 3 - Fisheries Co-operatives in the Lake Nasser Region, current situation and proposed organizational changes .. .. .	46

## INTRODUCTION

At the end of 1986 the Government of Egypt applied to the Secretariat of UNIDO in Vienna for assistance in carrying-out the pre-feasibility studies with the aim to explore the possibilities of fostering the economic development of the Lake Nasser region (Aswan), mainly with respect to the development of the fisheries and fish processing facilities and - in this connection - of the animal-feed production (on the basis of fish meal) for the live-stock, of marketing, transportation and the like.

The Secretariat of UNIDO applied to the Polish Central Union of Work Co-operatives - (within the framework of the Agreement with this Union on the Joint Programme for International Co-operation in the Development of Industrial Co-operatives in Developing Countries) - for the designation of two experts to carry out the foregoing studies in Egypt in a two week mission.

The Central Union of Work Co-operatives has co-operated with UNIDO for over 10 years and organized a number programmes of assistance relative to the development of small-scale industries in the developing countries, therein in the field of fisheries development. In June 1987 the First Consultation on the Fisheries Industry was convened in Poland by the Secretariat of UNIDO in co-operation with the Central Union of Work Co-operatives. Apart from industrial and service co-operatives - 24 fishery and fish processing co-operatives are associated with the Union and organized in the National Union of Fishery Co-operatives in Gdynia.

The Central Union of Work Co-operatives appointed two experts Mr. Cz. Stefaniak and Mr. Z. Kossakowski, whose candidatures were

The objectives of the mission were to elaborate an analytical assessment of the fisheries resources in Lake Nasser in respect of the development possibilities, in particular to:

- (I) take stock of present fishing boats and gear and form an estimate with regard to capability of existing fishermen to respond to potential catch with available fish-catching equipment;
- (II) survey existing facilities for ice production and transportation of ice to fishing bases, as well as haulage of iced fish to fish handling, processing and/or packing centre(s);
- (III) assess premises and equipment at hand with regard to sufficiency and suitability for fish handling, storage and preparation for shipping to market(s), whether at fishing bases or at the High Dam port;
- (IV) evaluate iced-fish transportation means to market(s) and handling of iced fish at marketing outlets, in particular with respect to containers, ice-to-fish ratio, and storage rooms and holding periods;
- (V) examine the possibility of filleting the fish at the High Dam port, utilization of offals and marketing of deep-frozen fillets;
- (VI) prepare Terms of Reference for a pre-feasibility study or studies involving upgrading co-operative fishing in the lake, fish processing and marketing of the processed fish. Furthermore, attention would be given to the possibilities of establishing an integrated agro-industrial complex based on fishing, fish processing (including fish meal production), agricultural production, cattle fattening stations, slaughter houses, meat cutting and wrapping, leather tanning, etc.

Course of the mission

The experts spent in Egypt altogether 15 days (11 working days only), thereof 5 days in Cairo and 9 days in Aswan and the Lake Nasser region.

The mission of the experts proved to be rather difficult, since, except for general materials concerning the economy of Egypt and a brief report concerning the situation of fisheries in Lake Nasser from 15 years ago - they did not dispose of any actual materials concerning this region, both before and during the mission.

This report has been prepared mainly on the basis of the discussions with the responsible persons in the "Investment and Free Zone Authority" in Cairo, with the representatives of the "High Dam Development Authority" in Aswan as well as with the representatives of other institutions visited by the experts.

The list of persons and institutions met by the experts is given in Annex 1.

The experts wish to express their thanks to the UN Resident-Co-ordinator, to the UNDP staff in Cairo, to the Egyptian authorities as well as to other persons contacted during the mission for their valuable input data.

Enclosure Nr. 2 contains Terms of Reference for a pre-feasibility study on Fishery Complex in Abu Simbel which have been prepared by the experts.

Enclosure Nr 3 concerns proposals of reorganization of fishery co-operatives.

Background information and summary

1. The Arab Republic of Egypt covers a total land area of 1.002.000 square kilometers, of which 34.500 square kilometers are cultivated (3.4%), mainly along the Nile river and the Delta. The population of Egypt is about 50 millions; despite its rapid growth (6% during 1983/84 with a target of 8,5% in the Five-Year Plan) the Egyptian economy has not been able to provide sufficient employment opportunities. Oil export, tourism, Suez Canal receipts and remittances from Egyptian workers employed abroad are the main sources of hard currency. As a result of the oil price slide in 1986 the country suffered a loss of almost 1 billion US \$ in oil export, recently also the remittances from expatriate workers have fallen.

Petroleum and related products constitute nearly 70% of the total exports.

2. The growth of agricultural sector is lower than the population growth rate in recent years. At the same time there has been a rapid increase in the demand for agricultural products, which has brought about a substantial increase of imports as well as a decline in exports of agricultural commodities. Food imports now total four billion dollars annually, total imports 11 billion dollars.

The Government's future strategy for increasing agricultural production and production technique is based on increasing the productivity by improving agricultural infrastructure and expansion in cropped area based on land reclamation projects. Efforts are also made to redistribute the population from the densely populated areas such as Cairo and parts of the Nile Delta to the new cities being constructed in the desert and newly reclaimed areas.

3. Priority was also given to the region of Aswan along the High Dam Lake, the largest artificial lake in the world; the total length of the lake at the high water level is about 500 kilometers, of which 350 kilometers, known as Lake Nasser, are in Egypt and the rest, known as Nubian Lake, in Sudan.

With the construction of the High Dam in Aswan, which was completed in 1963, the upstream area was flooded. The Nubians, who had originally inhabited this region, were moved to locations elsewhere but most were settled (about 30.000) in Kom Ombo, a few kilometers north of Aswan. This population has now increased to about 150.000 which caused the employment and land problems.

In the last almost 25 years since the completion of the High Dam the Government of Egypt has undertaken many actions to foster the economic development of the Lake Nasser region as well as its fish resources.

4. The total area of the lake at a water level of 160 meters above sea (which was considered as the lowest level) is 3.074 square kilometers and at a water level of 180 meters above sea its area reaches as much as 6.220 square kilometers; 84% of the total area fall in Egypt and the rest is in Sudan. The highest upstream water level of the High Aswan Dam was 175,63 meters in 1977, to 176,89 meters in 1978, with seasonal fluctuations. Since 1982 the level of water in Lake Nasser fell from 170 meters to 162 meters in 1984. This very low water level in the Lake Nasser continued during the last years, which caused serious problems for the fisheries and agriculture (irrigation).

In the total area of the Lake Nasser there are a number of inlets or coves around the lake, important for fishing;



although they represent only 25% of the total area they are responsible for all of the fish catch.

The waters of the Lake Nasser are characterized by their remarkable natural fertility. According to the information obtained the annual productivity of biomass amounts to 5 mg per 1 m<sup>3</sup> of water. Attention is drawn to the non-existence of pollution, both of industrial or agricultural origin.

The population around the lake amounts to about 8.000, mainly fishermen, often employed only casually. Recently an asphalt road connecting Aswan with Abu Simbel was put into service. On the eastern side of the lake a road to El Allagi of a length of 200 kilometers is at present under construction.

5. After the completion of the High Dam the main occupation of the expatriate population was the agriculture and fishing. Despite the establishment of several processing plants in the region of Aswan the fishing continues to be - except for services - the main occupation of the population. However, the development of the fisheries was rather slow in the first years which was connected with the existing fish resources and shortage of fishing equipment.

The increase of the number of fishermen as well as improvement in their qualifications (a part of the fishermen came to settle down as far as from Alexandria, tempted by many facilities in procurement of fishing equipment as well as by possibilities of large catches), the establishment of fisheries co-operatives and fishing companies, which owned also transport vessels, brought about an increase of catches.

While the annual catches amounted to only 762 tons in 1966, they reached already 5.600 tons in 1970, 14.600 tons five years later and as much as 22.500 tons in 1978.

6. At the beginning of the eighties the catches reached a ceiling of 34.000 tons and then they began to decline - to 16.500 tons in 1986. Such a considerable decline of the catches was partly caused by the lowering of the water level in the lake as well as by decline of the number of fishermen due to decrease of their earnings resulting from low prices for the supplied fish. The number of fishermen decreased from 7.000 to 5.000. Their exact number is not known, as only fishing boat or fishing equipment owners are eligible for membership in the fisheries co-operatives. The remaining fishermen are employed as hired labour by the fishing boat owners, whose number is estimated to be actually 2.500. Such is also the estimated number of the hired labour.
7. The number of the registered fishing boats used in the lake is actually 1920, size of which varying between 5-6 meters of length and 1,2-2 meters of width.  
  
Vessels from 6 to 30 tons are used for the transportation of fish to the High Dam port; their total number is 77, of which 40 belong to the parastatal company "Misr Aswan for Fishing and Fish Processing Co." and 37 to 4 fisheries co-operatives responsible for 90% of the catches in the lake.
8. The main species of fish are the Tilapia Nilotica and Tilapia galelia (about 90% of catches). The fish resources in the lake are not known since the fishing operations are mainly carried out in shallow waters in coves, and the main sections of the lake are exploited minimally. It is estimated that the annual catches may reach as much as 85 thousands tons without harm to the fish population.

In connection with the lowering of the water level in the lake, "The Fishery Management Centre" acting within the framework of "The High Dam Lake Development Authority" - a Governmental

institution coordinating and sponsoring the development of the Aswan region - has undertaken a broad action aiming at stocking the lake with fry of Tilapia and other new fish species.

9. The economic development of the Aswan region was a subject of many studies by Egyptian and foreign experts. In this respect great assistance was granted by the Japanese Government, especially in the field of fisheries. In 1979, at the request of the Government of Egypt, 21 Japanese experts carried out studies on further development of the Aswan region.

The respective report provided for a substantial economic development of this region until 1997, the investment costs to be about 2,3 billion Egyptian pounds (as per 1979). The plan envisaged increase of catches, development of fish-processing, improving of servicing the fishermen and of their living conditions, but chiefly the development of agriculture through irrigation of the areas around the lake.

The plan provided for the construction of roads and industries based on local raw-materials.

10. The objectives of the plans have in some fields been fully implemented, and namely:

Misr Aswan for Fishing and Fish Processing Co. was established, which built a fish processing plant, and ice production unit as well as cold stores.

A road from Aswan to Abu Simbel was built, a marble and granite-working plant as well as a plant for the production of industrial ceramics were established.

Not much progress, however, was made with respect to irrigation of the area for cultivation purposes. In consequence of the lowering of the water level in the lake, the irrigation system should be changed, which involves additional costs.

The decline of the catches were also caused by non-adaptation of

the organization of catches to the present conditions in the lake lack of adequate infra-structure (ice production, fish transportation etc.) as well as inappropriate price policy for the fish caught by the fishermen.

11. The new five-year plan for the development of the Aswan region initiated by the High Dam Lake Development Authority within the framework of the National Development Plan 1987/88 - 1991/92 provides as first for the development of agriculture through the irrigation of over 23 thousands feddans<sup>x)</sup> of area for cultivation and settling of 4.500 families around the lake. Construction of about 4,500 houses is provided for on the basis of self-help, with some material assistance of the state. It is envisaged that the Nubian and the workers engaged in fishery activities will be settled on the irrigated areas.

UN/FAO World Food Programme will participate in the Project for the amount of 11 million US \$ (by distribution of food rations to settlers) and the Government of Egypt to the amount of 79 million US \$ (provision of infrastructure facilities).

12. Furthermore, within the framework of the five-year plan the following directions for development of the fisheries and fish-processing are provided for:

the erection of fishing port at Abu Simbel together with a fish processing plant including the filleting, ice production, deep-freezing and cold stores, production of fish meal as well as production of ice for the needs of the plant and fishing bases in the southern part of the lake. At the following stages construction of similar bases is provided for in the middle part of the lake (Garf Hussein and El Allagi).

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x) 1 feddan = 0,42 ha

## 1. Organization of fishery in the Lake Nasser

### 1.1. Fish resources

Of the many fish species to be found in the Lake Nasser only a few have essential importance for the fishing, and namely:

- *Tilapia nilotica* (Bolti)
- *Tilapia galelia*
- *Alestes* spp (Raya)
- *Hydrocynus* spp (Kalb)
- *Labeo* spp (Lobbais)
- *Bagrus bayad* (Bayadh)

*Tilapia* was the predominant fish in the catches since the existence of the Lake Nasser, lastly, however, it has a 90% share in the total catches (as against only 40% in 1973). After the creation of the lake the changes in the composition of ichthyo fauna result from its adoption to changed life conditions in the lake; species of typical fluvial art are disappearing.

2. Another factor that has an essential impact, not as much on the composition of ichthyo-fauna in the lake, as on the species of fish caught is the exploitation method based at present exclusively on trammel nets and gill nets, i.e. on fishing equipment characteristic of large selectivity.

Actually action is undertaken in order to change the composition of ichthyo-fauna and the character of lake's exploitation hitherto.

3. The "Fishery Management Centre" acting within the framework of the High Dam Development Authority has started the fish-culture (pisciculture) of new species brought from Alexandria with the aim of introducing them into the lake or for breeding in separate ponds. The species are: *Magules caphyllus* (Mulet), Silver carp *Burbas Binny* and mainly *Tilapia*.

For this purpose quite large investments were undertaken which include:

- 135 concrete tanks of the unit area from 4 m<sup>2</sup> to 50 m<sup>2</sup>
- 40 concrete tanks of the unit area of 100 m<sup>2</sup>
- 16 concrete tanks of the unit area of 150 m<sup>2</sup>
- natural ponds of the total area of 50 acres.

According to estimates the annual production obtained from the above mentioned undertakings will bring 5 millions of Tilapia fry and 30 millions of Silver carp as well as the fry of Burbas Binny.

It is estimated that stocking the lake with 1 million of Tilapia fingers fry should increase its population by 800 tons.

Experimental breeding of the fry of *Magales caphyllas* (Mulet) in a pond, at the lake shore, is also carried out. This species is to be introduced into the lake as well.

Breeding tests of Silver carp up to the commercial size are also performed in live-boxes.

The efforts aiming at the increase of the fish population in the lake result from fears that further exploitation, given the low water level in the lake, would be detrimental to the fish resources. A confirmation of it could be found in decreasing catches in the last years - from above 34 thousand to 16,5 thousand tons in 1986.

4. In spite of studies made by the Fishery Management Centre with employment of echo-sounder a precise determining of the fish resources in deep parts of the lake was a failure. The fishing operations take place so far mainly in coves which make for barely 25% of the lake area; the deep parts of the lake are not so far exploited.

Fishing tests carried out in deep waters brought positive results. Catch of the species *Hydrocynus* spp of the length of over 50 cm was obtained, while in the traditional coastal waters its size is up to 25 cm of length. In consequence of an increase of price paid to the fishermen for carnivorous fish endeavours are made to catch in deep waters where larger species exist; this already brings pretty good results.

It results therefrom that the fish resources in the lake are considerably larger than the estimates made in this respect; the decrease of the catches is to be explained by other reasons, reference to which is made at a subsequent part of this report. According to the estimates made by the FAO experts the annual catches can reach 85 thousand tons.

## 1.2. Boats and fishing gear and equipment

### Fishing boats

5. For fishing in the lake wooden rowing boats are used of a length of 5-6 meters, a width of 1,2-2 meters and a height of 0,43-0,75 meters.

Of the total number of 1919 boats registered in 4 fisheries co-operatives and 1 state company only 464 are equipped with engines of 15 to 50 HP, though there is a regulation prohibiting the use on board the fishing boats of engines above 15 HP. Despite the fact that the majority of boats have been in service for many years, their state is not critical. Being the property of the fishermen, they are taken well care of by them.

In view of the fact that only 20% of the fishing boats are equipped with engines, it has a great impact on the volume of the catches because the fishermen lose much of their time to get to the fishing grounds and back to their fish collection centre.

Equipping the boats just with engines of 5 to 10 HP should allow to save much time for effective fishing; furthermore the fish caught could be delivered faster to the fish collection centres which again would positively affect its state of freshness.

### Nets

6. In the Lake Nasser the main fishing gear are the trammel nets and the gill nets. These are mainly imported monofilament nets, of good quality, for the purchase of which the fishermen are granted certain facilities by the co-operatives. Other types of fishing gear are used to a small degree like trap nets, hook fishing and draw nets. The latter are not used lately for fear of destroying the reproduction sites of Tilapia which builds its nests in sand in shallow parts of water.

The regulations concerning the protection of Tilapia determine the minimal size of meshes in the nets, which are 50 mm in gill nets and 70 mm in trammel nets (distance between knots).

The deep parts of waters are exploited to a minimum degree and no improvements have been made in this respect.

### 1.3. Fishermen and fishing companies

#### Fishermen

7. In the Lake Nasser the fishing operations are carried out by two groups of fishermen. The first group is composed of those who own the fishing boats and fishing equipment and are organized in 4 fishing co-operatives and a number are employed in one parastatal company. These co-operatives have the exclusive right for catches in the lake, in assigned sectors.

The second group does not own these means of production and cannot therefore become members of the co-operatives. While the number of fishermen of the first group is well known - 2.507 fishermen associated in fishing co-operatives and about 150 in the state company, so the number of fishermen of the second group can only



be estimated to be between 2.000 and 3.000. A few years ago the total number of fishermen was assessed to be over 7.000, at present it fell below 5.000 and continues to be falling in consequence of diminishing income, resulting from low prices for the fish caught. The fishermen of the second group earn about 2 Eg. pounds a day and seek often other better paid jobs. The decrease of income has been observed for a longer time also in case of the first group, the owners of fishing boats and fishing equipment.

The fishermen who do not own the production means and who work on behalf of those of the first group do not usually come from the Aswan region, but from the neighbouring regions of Sohag and Quena. They take seasonal jobs to help out in catches, live without families in primitive housings situated near the fishing grounds. Their low qualifications, lack of experience and knowledge of fishing techniques have negative impact on the volume of catches.

Due to low income from the catches also the owners of fishing boats often quit their job or migrate to the North, to the Nile Delta, wherefrom many of them came in the period of "prosperity". They are replaced by newcomers without experience in the fisheries

8. The co-operatives have so far not organized any training on the fishing techniques; some experiences with regard to application of new nets with larger meshes and of new fishing techniques are made by the Fishery Management Centre, but they have not so far been widely disseminated among the fishermen.

Assuming that 5.000 fishermen are employed in fishing in the lake, with the catch of 16,6 thousand tons in 1986 the average productivity of one fisherman is 3,3 tons.

This productivity can not be considered to be low in relation to other regions of Africa, but taking into consideration the

relatively rich stock of fish in the Lake Nasser the catches could be doubled provided that more effective fishing techniques are used and the qualifications of the fishermen raised.

Fisheries companies

9. The catches in the lake are carried out by four fishing co-operatives and 1 state company, which possess the following manpower and material potential:
- "Aswan Fishermen Co-operative Society" associating 2.080 members who own 1.264 boats and fishing nets. According to estimates the boat owners employ over 1.000 fishermen as hired labour. The Co-operative is owner of 37 carrier boats, it operates in the middle of the lake.
  - "Aswan Sons Fishermen Co-operative Society" associating 302 members who own 382 boats. Assuming that 3 fishermen are working on 1 boat, the number of fishermen employed additionally by the boat owners is about 600. The Co-operative carries out the catches in the northern part of the lake, in a distance of 30 kilometers or so down of Aswan. The Co-operative owns 2 carrier boats.
  - "Nubian Fishery Co-operative" associating 95 members owning 95 fishing boats whose owners employ about 200 fishermen. The Co-operative operates in the southern part of the lake, on the western side.
  - "Integration Fishermen Co-operative" associating 30 members who own 57 boats. It is estimated that its owners employ about 100 fishermen. It operates in the southern part of the lake, on the eastern side.
  - "Misr Aswan for Fishing and Fish Processing Company", a state company owning 125 fishing boats and employing about 250 fishermen. Furthermore, the company owns 40 carrier boats for the transportation of its own catches as well as those of the co-

operatives. This company possesses a fish-processing plant (filleting, production for its own needs and for needs of the transport boats in the whole area of the lake). The company operates in the northern part of the lake near Aswan.

10. Although the operations of the fisheries co-operatives take place in various parts of the lake in assigned sectors, their seats are in Aswan. This is to be explained by the fact that Aswan is in the region of the lake practically the only locality of economic importance. Furthermore, the whole of the fish caught is delivered at the High Dam port and the delivery is received in the presence of a co-operative representative.

A dispensary for fishermen is also situated there. It co-operates with three medical service boats which not only render medical care to the fishermen but which also conduct prophylactic examinations. This kind of assistance is organized in co-operation with the American Society "Care".

11. The incomparably large size of one of the co-operatives, (the "Aswan Fishermen Co-operative Society"), associating over 2.000 members, as well as the distance off the seats of all the co-operatives and from the fishing grounds are responsible for an abnormal situation in the sense that the employed members lose any ties with the board of the co-operative. Such a situation is also an impediment to the management of the co-operatives, to the supervision of their operations, which has, in consequence, a negative impact on the productivity. Taking into consideration the almost three times higher price of fish in the "free market" as compared with the official prices, it may be assumed that a considerable quantity of fish is not delivered to the co-operative "bases" but is sold illegally to organized groups of "tradesmen". The above described situation of absence of ties with the co-operatives facilitates the extension of this form of illegal operations.

12. The reorganization of the co-operatives by admitting open membership for all fishermen, extension function of the co-operatives, transfer of the co-operatives seats to fishing bases established in the operational sectors, may contribute not only to increasing their income but to a great degree to increasing the catches.

2. Ice production and transportation of iced fish

2.1. Ice production

13. The fish caught is carried to places called the "fish collection centre", from whence carrier boats deliver the iced fish at the High Dam port. Only some boats have cool holds but none of them is equipped to produce ice. Tests are made to produce flake ice on floating pontoons with the use of generators and equipment imported from the GDR, but till now they are at the experimental stage.

The whole of ice for the fish-processing and fish-icing needs, is produced by "Misr Aswan for Fishing and Fish Processing Company" with the seat at the High Dam. One plant capable of producing 100 tons of ice per day covers the needs of the fish processing factory. Another ice production plant of the same capacity of 100 tons is situated nearby and produces ice mainly for the needs of the fish carrier boats. The production capacity of the two plants covers, in principle, the actual needs of both the fish-processing plants and the icing of fish, transported and stored.

14. The basic problem, however, is that of transportation of ice to the loading places because of considerable losses due to large distances between the fishing bases and the High Dam port. Large losses occur already at the time of delivery of ice from the plant to the transport boats, since the deliveries take place in open means of transport, further losses arise on the vessels.

Taking into consideration the temperature of air it may be assumed

that from the moment of ice delivery from the plant to its use for fish-icing in fishing bases the losses amount to over 50%.

15. In this situation the only solution should be to put into service another ice-production plant in the southern part of the lake, at Abu Simbel, which would shorten the transportation of ice and ensure more regular deliveries of ice to the fishing bases in this part of the lake. A perfect solution would be to produce flake ice in many other places at the lake close to major fishing bases which should ensure the preservation of fish until the arrival of the transport boats. The decline of the catches in the lake is also caused by shortage of ice in periods of intensive fishing, this being responsible for intervals in the catches for fear of the fish getting spoiled until a transport boat arrives.

2.2. Transportation of fish to the handling and processing base in the High Dam port

16. The whole of the fish caught in the Lake Nasser is delivered to the port at the High Dam by carrier boats of the capacity of 6 to 30 tons, altogether 77 boats operate in the lake. 37 boats belong to the fishery co-operatives, the remaining 40 boats to "Misr Aswan for Fishing and Fish Processing Company". Only one boat has a capacity of 74 tons and merely a few of them possess cool holds. The average age of these boats is over 10 years; the engines are rather worn out and break down frequently, this fact being responsible for lays-off and irregularity in receiving the catch. The catch is received at 41 fish collection centres, scattered on both shores of the lake (19 on western, 22 on eastern side). It takes over 2 days to transport fish from the southern part of the lake (Abu Simbel) to the port at Aswan. The fish is iced in holds with crushed ice (in crusher-mills operated by hand) in a 1 : 1 ratio. In general, the catch arrives at the port in fresh state from those bases which are situated

not farther than half the distance of the lake. The icing of fish from more distant bases during intensive fishing months (March, April, May) is not always sufficient, and cases of spoilage or down-grading to a lower class of freshness have taken place.

17. The transport boats carrying ice to the fish collection centres in the southern part of the lake do not always possess cold storage space and part of the ice melts away. Therefore, after larger catches not enough ice is available to cool the fish in the desirable 1:1 ratio. The introduction of isothermal containers for transportation of ice would solve this problem, before the production of ice at the main fishing bases in the southern and middle part of the lake will be started.
18. In consequence of many years of exploitation of the transport boats their state requires general overhaul of the engines and frequent repairs of the boats themselves. In the intensive catch season their transport capacity is insufficient. Furthermore, as there is no possibility to receive the amount of fish that could be caught by the fishermen, intervals in catches occur.

In connection with construction of the road from Aswan to Abu Simbel the possibility should be examined to transport fish in refrigerated trucks to the processing base at Aswan. That way - before a fish processing plant at Abu Simbel is built - the transport capacity of fish from distant parts of the lake would increase considerably.

19. In this situation a provisional landing-place at Abu Simbel should be built, where catches would be delivered by the fishermen associated in 2 co-operatives, operating in this part of the lake. The fish could be loaded onto refrigerated trucks and transported for further processing at Aswan.

While the transport by boat from Abu Simbel to Aswan takes over 2 days, the transport by refrigerated trucks would take 4-5 hours. By employing car transportation for carrying fish from the southern region of the lake a part of the transport boats, engaged at present on the longest route, would be made available. This would allow increasing the frequency of receiving the catch at other fishing bases, to shorten the waiting time of the fishermen for carrier boats and so increasing the catches themselves.

3. Handlings at landing places and fish preservation

20. The fish caught is delivered by the fishermen to provisional fishing bases, where it is kept until carrier boats arrive. Because of lack of ice at these bases the catch is exposed to spoilage, if the transport boat does not arrive on time. Cases occur that in consequence of major delays the fish gets spoiled and is thrown back into the lake.

The period between the completion of the fishing operation and the delivery of fish into the transport boats and the icing on board could be shortened, provided that all fishing boats are equipped with auxiliary engines. The delivery of fish to the base by rowing-boats prolongs the time of storage without any preservation possibility.

21. A few years ago Japanese experts proposed to install isothermal tanks at the fishing bases, where the fish would be stored in iced water until the arrival of the transport boats. However, the installation of such a type of tanks would be dependent on local production of ice for the needs of the fishing bases. The problem of fish preservation would partly be solved by equipping the fishing boats with insulated plastic boxes which should prolong the freshness of fish until it will be iced on board the transport boats.

In the actual situation when the delivery of fish is concentrated exclusively at the High Dam port, the question of fish preservation is of fundamental importance.

### 3.2. Fish salting

22. Some of the fish species are suitable for salting which takes place at the fishing bases. These are mainly the Alestes (hydrocy-nus) and labeo (Lobbais). This fish is initially salted during the fish operation and after having reached the characteristic flavour is packed in 20 kg cans and delivered to the co-operative or sold in the free market, as there is no official price set on this fish.

A few years ago the salted fish amounted to over 30% of the total catches, at present its share fell to 15% or less.

Fishing of these fish species in shallow waters brings rather small effects and the average size of the salted fish does not exceed 25 cm. Last tests in deeper waters with the application of nets with larger meshes resulted in catches of fish up to 50 cm.

It is to be added that the salting of fish takes place under not very sanitary conditions and the cans used are second-hand cans originally used for packing of oil-product derivatives.

### 3.3. Handling in High Dam port

23. The fish caught by the fishermen is loaded into the transport boats and after icing is delivered at the High Dam port where it is discharged at the pontoon landing places.

The fish is separated from ice, sorted according to species, weighed and examined on freshness by the veterinarian. Then the fish is received in the presence of representatives of the co-operatives and the representative of the consignee.

Almost the total of fish caught and delivered to the port at the High Dam is received by "Misr Aswan for Fishing and Fish



Processing Company". Only insignificant quantities of fish are bought by the "Egyptian Company for Fish Marketing" and sold in fresh state. The fish received at the port is carried in plastic containers to the processing plant belonging to the above said company where it is iced in concrete tanks until its processing for fillets, carcass or is frozen in the whole for further transportation. The "Misr Aswan Fishing and Fish Processing Company" owns 4 tanks for fish icing of the capacity of 25 tons each.

### 3.4. Delivery of fish to market

24. Almost the whole of fish is delivered to the market in frozen state in the form of fillets, carcass or fish frozen in the whole. These operations are carried out at the fish processing plant equipped with machines for deheading, degutting, filleting and skinning, and three contact refrigerators.

Furthermore, the company operates two freezing installations of the capacity of 6 tons per 16 hours at the freezing temperature of  $-30^{\circ}\text{C}$  as well as a cold store of the capacity of 300 tons at the storing temperature of  $-25^{\circ}\text{C}$ .

The above mentioned facilities allow freezing the whole of the processed fish which is delivered to the port at the High Dam as well as part of the fish not processed.

Almost the whole of the fish processed and frozen is delivered to Cairo in refrigerated railway waggons.

From the cold store the frozen fish is delivered in cartons to the refrigerated wagons at the railway station or in insulated boxes (in view of the nearness of the station).

Thanks to the existence of the cold store of a large capacity the deliveries to Cairo are not determined upon fixed dates on which the railway wagons are ready to receive the cargo, although there are no major difficulties in receiving the required number of them.

On the other hand, in the local market only dried and salted fish is sold due to absence of fish preservation facilities, both during the deliveries as well as in the sale shops.

#### 4. Fish processing

25. A large plant, erected a few years ago, by the "Misr Aswan for Fishing and Fish Processing Company", and situated close to the port at the High Dam, has solved the problem of fish processing with regard to almost the whole lake region.

This plant possesses the following equipment and facilities:

- equipment for production of block ice (100 tons/24 hours),
- 4 tanks for fish icing of the total capacity of 100 tons,
- transporter system to deliver the de-iced fish to the sorting plant (according to 4 size groups),
- 4 machines of Japanese manufacture for deheading and degutting,
- 4 machines for filleting (mainly of Tilapia),
- machines for filleting/skinning,
- 3 contact refrigerators (1 ton/3 hours),
- 2 freezing installations (6 tons/16 hours)
- cold store of the capacity of 300 tons (storing temperature  $-25^{\circ}\text{C}$ )
- fish meal plant of the capacity of 6 tons of fish meal daily.

Taking into consideration that the daily deliveries of fish to the above plant amount to 30-40 tons, the plant does not utilize its full production capacity.

26. The plant is orientated mainly for mechanical working (filleting, deheading, degutting) of Tilapia which at present shares in 90% in the actual catches.

There are no stands for hand degutting and filleting of other fish species which are caught in the lake more and more frequently; for the hand filleting speak also other factors like: higher output in relation to mechanical filleting (from 5 to 10%) as well as the opportunity to employ additional workers. Also

the necessity to import filleting machines would have to be taken into consideration.

27. The plant possesses facilities for the production of canned fish as there is a boiler-room producing process steam for the production of fish meal. Other factors, like the existence of facilities for processing of the raw-material which should be supplemented only by facilities for fish portioning, facilities for the preservation and transportation of the canned fish to local as well as to more distant markets, speak also for the establishment of canned fish production plant. There is no need to have refrigerating facilities for the transportation or cold houses for the storage. The canned fish would find ready buyers among numerous tourists visiting this and other regions of Egypt.

#### 4.2. Production of fish meal

The raw-material for the production of fish meal is the offal obtained in the production process of fillets and carcass, of deheading as well as from fish not qualified as suitable for human consumption.

Although the production capacity amounts to 6 tons a day (about 30 tons offal) the actual production is one third of this capacity. This is so because the plant meets temporary difficulties due to break-down of the machines.

The plant has failed to solve the problem of separating oil during the process of fish meal production.

#### 4.3. Utilization of fish meal

29. The fish meal is utilized for enriching fodder for the duck farm, the breeding of which is organized by the above mentioned fish-processing plant.

The ducks are, after slaughtering and dedrawing (by hand process), frozen, packed and stored in the cold house, then delivered by refrigerated railway cars to Cairo.

The breeding farm is so far not in the position to utilize the whole production of fish meal. The ducks bred have too much fat and efforts are made to replace them with another breed (English duck Super M Cherry Valley is being considered). The feathers of the slaughtered ducks have not been utilized hitherto. A new project would envisage an annual production of 500 tons of ducks, for the breeding of which the plant requires:

- 2 hatching facilities
- 1 production line for slaughtering the ducks of a capacity of 300 pcs./1 hour.

#### 4.4. Further utilization of fish offal

30. The skin of the fish, the remainder after skinning the fillets, is not utilized for fish meal production and, similarly as the fish scale, is thrown away as useless waste. This offal could be utilized for the production of glue used in small-scale industry (joiners, leather industry) as well as in tinkering. The production technology of this glue is simple and does not require complicated equipment and could be undertaken at the present fish-processing plant at Aswan. Glue is produced on the basis of such offals in some countries, also in Poland.

#### 5. Other economic activities in the region of Lake Nasser and plans of development of the region

##### 5.1. Background

31. With the construction of High Dam in Aswan which was completed in 1963, the Nubians who had originally inhabited the area to be flooded were moved to locations elsewhere but most (about 30.000) were settled in Kom Ombo, a few kilometres north of Aswan. This population has now increased to 146.000 which has caused employment and food problems. The land holdings, which were already small (2-5 feddans) have become even more fragmented with families at present utilizing land of only 0,5 feddan. The income levels of

most of these Nubians are extremely low averaging only 60 to 75 dollars a month per family. Another group of population of very low income level are the workers employed as fishermen on 2000 fishing boats on the High Dam Lake, most of whom were previously dependent on subsistence agriculture in the Sohag and Qena Governorates. As employment opportunities were not available these people drifted to the High Dam Lake and took up employment as workers on fishing boats. These workers live under extremely difficult conditions in temporary shelters around the lake and returning home only once or twice a year to visit their families. Their income levels are estimated to be only 25 dollars a month on the average.

32. The economic development of the High Dam Lake region is co-ordinated by the High Dam Lake Development Authority in Aswan.

The principal activities include:

- Fisheries development,
- Irrigation and development of agriculture,
- Mining and industrial development based on local raw-materials,
- Settlements and living conditions of population,
- Tourism activities.

The High Dam Lake Authority initiated a five-year plan to develop this region in the framework of the National Development Plan 1987/88 to 1991/92 (which commenced in July 1987).

It is estimated that over this plan period an amount of 149 million dollars will be spent for undertaking various development activities.

## 5.2. Development of agriculture and food industry

33. In the framework of the five-year plan of development of this region approximately 4.500 families will be settled around the lake. It is envisaged that the Nubians will be settled on the upland irrigated areas and the workers engaged in fisheries

activities on the foreshore land. Twelve villages will be set up for the settlers and access roads will be constructed to connect these villages to the main roads.

According to FAO estimates about 500.000 feddans may be brought under cultivation after establishment of irrigation network. For the beginning 11.500 feddans will be handed over to 2.100 Nubian and 200 bedouin families in the upland area and 11.000 feddans along the foreshore will be allocated to 2.200 workers involved in fishery activities. Agriculture will be additional activity of fishermen and their families. Plots of 5 to 7 feddans will be handed to each family and it will take approximately three years for the farmers to reach a satisfactory level of income.

34. In the upland area by utilizing full irrigation (water will be supplied from floating pump stations through flexible pipes supported on pontoons) a number of crops can be grown including fruit trees. The cropping system will also include livestock. The foreshore area will be developed for fodder, livestock and vegetable production. Most agricultural products will be marketed through the cooperative marketing system and some products will be sold directly to merchants. Livestock will be sold to traders, but there are plans to construct a slaughter house in Abu Simbel in addition to the existing one in Aswan.

35. The above plans of development of the region will be executed in cooperation with UN FAO World Food Programme which will participate in the Project for the amount of 11 million US dollars (mainly in form of supply of food for settlers) and the Government of Egypt for 79 million dollars (irrigation, house construction, social infrastructure etc.).

4.500 houses will be constructed within the framework of the Project on a self-help basis by the settlers themselves with some assistance from the local community.

The High Dam Lake Authority has launched some experimental farms in different places around the lake (Khor Kalabsha, Khor El Allagi, Abu Simbel and others) but their further development is subject to introduction of new system of irrigation, owing to low water level in the lake.

### 5.3. Mining industry

36. In the region of Aswan and the Lake Nasser there are mineral resources which contribute to the development of two companies, and the establishment of some others may be envisaged for in the development plan of this area. Close by Aswan there is in operation for the last few years, the Egyptian Company for Refractors, Aswan Factory, producing refractory materials and industrial ceramics. The factory employs 180 persons. The production of bricks, however, was held up because of unsuitable raw-material (marl contents).

Near by the High Dam an up-to-date marble and granite-working plant is under operation. It belongs to "Misr Aswan for Marble and Granite Company". This company exploits marble and granite beds situated over 100 km south of Aswan on the eastern side of the lake. The marble and granite are of a very high quality and after the completion of the road linking the plant with the marble and granite mine, further development of the plant is envisaged. The plant is well equipped with up-to-date marble- and granite-working machines.

37. In the development plans of the region the construction of the cement plant is also envisaged on the basis of local raw materials however this project was postponed.

There are in the region the important beds of kaolinit not exploited till now. Also the problem of the production of building materials on the basis of local raw-materials, mainly stone, the traditional building material in this region, has not been solved.

The decision to construct 4500 houses for the settlers necessitates undertaking studies on the utilization of local building materials and choosing such building technology that could be mastered by unqualified workers; the construction should be completed in a short time and at minimum outlays.

#### 5.4. Development of fishery and fisheries industries

According to the number of studies carried out by FAO there is a potential for increasing the fish catch (after developing of the fishing potential) to 85.000 tons.

Appropriate exploitation of the resources is possible after the establishment of additional "fishery complex" in the southern and middle part of the lake.

The five-year plan mentioned in this report provides for the construction of a fishing port at Abu Simbel as well as of a base for fish-processing like the filleting, freezing, cold storage and ice production for own needs and the needs of the fishing bases in the southern part of the lake.

Bases of similar character are at a later stage envisaged in the middle part (Grot Husein) as well as eastern side of the lake (Khor El-Allagi), the function of which is mainly the storage and freezing of the fish as well as the ice production.

#### 6. Final remarks and recommendations

- 6.1. The natural resources of Lake Nasser are not fully utilized. The actual catch (according to registered deliveries) amounts to 55 kg from 1 ha of water (16,5 thousands tons at the water areas of about 3.000 square kilometers) and could be doubled taking into consideration the rich resources and favourable climatic conditions. In the case of large intensification of catches an examination of the state of resources should be undertaken to assess such an exploitation level that would not throw out of balance the population of basis species.



6.2. For the intensification of the exploitation of the lake a number of actions should be considered, and particularly:

- a) To alter the principles concerning the fisheries co-operatives by introducing open membership to all fishermen irrespective of their owner status, which would increase the productivity and stabilize the fisherman's profession.<sup>x/</sup>
- b) To raise the qualifications of fishermen by organizing appropriate training in the field of fishing techniques and fish biology.
- c) To increase the price of the fish caught and the profit margin of the co-operatives which would allow to increase the earnings of the fishermen and the income of the co-operatives. The official price fixed for the fish delivered is much lower than the free market prices, makes the fisherman's profession unattractive and the low profit margin of the co-operatives does not stimulate their development and even does not allow to reproduce the equipment used.<sup>x)</sup>
- d) To equip all fishing boats with auxiliary engines of 5-10 HP which will consequently shorten the way to the fishing ground and to the base and so increase the time of effective fishing operations.
- e) To extend the range of fishing equipment. Apart from trammel and gill nets used hitherto - fishing hook should be introduced; possibilities of larger use of seine- and draw nets should be examined; the fishing operations in deep waters should be intensified by introducing mechanized drawing and to adopt mechanization for the drawing of hook ropes.

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x) see annex 3

- f) To improve the deliveries of fish from the southern part of the lake to High Dam port by establishing a provisional base at Abu Simbel (fishing landing-place) and by delivery of the fish in refrigerated trucks to the fish-processing plant at Aswan.
  - g) To extend the mobile flake-ice production bases in order to ensure the preservation of the catch during the time of waiting for the transportation by carrier boats at the High Dam port. This would allow to avoid intervals in the fishing operations and to keep the freshness of delivered fish.
  - h) To introduce isothermal tanks in the fishing bases where the iced fish would be stored waiting for the transportation.
- 6.3. In the field of fish preservation and fish processing the following undertakings should be made:
- a) To examine the establishment of canned fish production by Misr Aswan for Fishing and Fish Processing Company at Aswan with the use of the present infrastructure and the possibility of the production of glue from ichthyosis and skin, offals not utilized so far, should be considered.  
It would be advisable to provide for stands for the filleting, degutting and hand deheading of fish, apart from the operations carried out with the use of up-to-date machines.
  - b) To endeavour to undertake in the shortest time possible construction of the port and the fish processing base at Abu Simbel which is foreseen in the plan, including:
    - a landing place for the transport boats to enable discharging of fish as well as a landing place for fishing boats belonging to the local fisheries co-operatives.
    - an ice-production plant for the own needs of the fish-processing base and for the needs of the fish collection centres in the lake.

- a fish-processing plant including storage of fish in ice, treatment of carcass, fillets-freezing of carcass and fillets packing and storage at low temperatures.
- fish-meal production plant and fodder production facility for feeding animals on the basis of fish meal.

- c) Before the implementation of the project of construction of fishing bases and fish-processing factories in the middle of the lake (Garf Hussein and El Allagi) the construction of landing place for fishing boats should be considered as well as ice-production bases for the needs of the transport boats and for preservation of fish, waiting for the transportation.
- d) To accelerate the settling of the fishermen with their families on the foreshore land, granting assistance to them in the construction of houses based on simple technology used already in some developing countries with the participation of UNIDO. The settling of the fishermen and their families would allow family members to help out by performing many labour-intensive operations like for instance: the drawing of fish, replacement and maintenance of the hook materials, fish salting, nets repairs etc. This would enable to devote more time for the fishing operations and would increase the volume of the catch.

6.4. With regard to mineral resources:

- a) To examine the quality of kaolin beds with a view to utilizing them for the production of ceramic china and if possible, for

- the production of cement, as well as for water filtering. <sup>x)</sup>
- b) To develop to a broader scale the production and the utilization of the local building materials (stone, bricks)
  - c) To undertake mineral exploration in the region of High Dam Lake.

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x) After preliminary examination of a small sample of kaolinit stone brought by the experts, it proved that it contained 20-22% of pure kaolin (but very difficult to separate) and more than 70% of quartz.

X-ray examination confirmed small quantity of titanium. The examined mineral has big absorption property and may be used for water filtration, sewage system and mainly for environmental protection.

It may be also used as building material (for facing) and for production of technical and sanitary ceramics.

**LIST OF PERSONS AND INSTITUTIONS MET.**

**High Dam Lake Development Authority - Aswan**

- Mr Hamdy Tolba - Vice-President
- Mr. Mohamed Mahmond El Shahat - Director of Fishery  
Management Centre

**General Authority of Fisheries Development - Aswan**

- Mr. Mohamed El Mele - Director

**Misr Aswan for Fishing and Fish Processing Co - Aswan**

- Mr. Mohamed Harb - General Director
- Mr. Ali Muhtar - Director of Factory

**Egyptian Company for Refractors - Aswan Factory**

**Misr Aswan for Marble and Granit Company - Aswan**

**Aswan Fishermen Co-operative Society - Aswan**

**Aswan Sons Fishermen Co-operative - Aswan**

**Integration Fishermen Co-operative Society - Aswan**

**Nubian Fishery Co-operative - Aswan**

**Investment and Free Zone Authority - Cairo**

- Mr. Mohieddin Elghareeb - Deputy Chairman

**General Authority for Fish Resources Development - Cairo**

- Mr. Mustafa Adam El. Taleb - General Director

**UNDP - Cairo**

- Mr. Luciano Cappelletti, Resident Co-ordinator and Resident  
Representative
- Mr. Farid Y. Oufi, Deputy Representative, United Nations/FAO  
World Food Programme
- Mr. Tharwat Sabry, Senior Programme Officer

# LAKE NASSER

## West

- 1 Khor EL Remsa
- 2 Dahli (west)
- 3 Khor Kelebsha
- 4 Miraw
- 5 ~~Jarf Hussain~~
- 6 ~~Kushkama~~
- 7 EL-Daka
- 8 Kawi
- 9 Seyala
- 10 EL-Siba
- 11 EL-Melhi
- 12 Tomes
- 13 Afa
- 14 Encibe
- 15 Masmas
- 16 Khor Tushka (west)
- 17 Farikadi
- 18 Abu-Simbel (west)
- 19 Bellena

## East

- 20 Khor Manam
- 21 Dahli (east)
- 22 Ambercab
- 23 Khor Rehna
- 24 Khor Gatal
- 25 Khor West Abyed
- 26 Khor Mariya
- 27 Khor EL-Ataq
- 28 EL-Maharaka
- 29 Khor EL-Sabakha
- 30 Khor West EL-Arab
- 31 Khor Singari
- 32 Khor-Keroska
- 33 Abu-Handel
- 34 EL-Dhan
- 35 EL-Darr
- 36 EL-Genina
- 37 Tushka (east)
- 38 Armina
- 39 Abu Simbel (east)
- 40 Khor Or
- 41 Khor Adinda

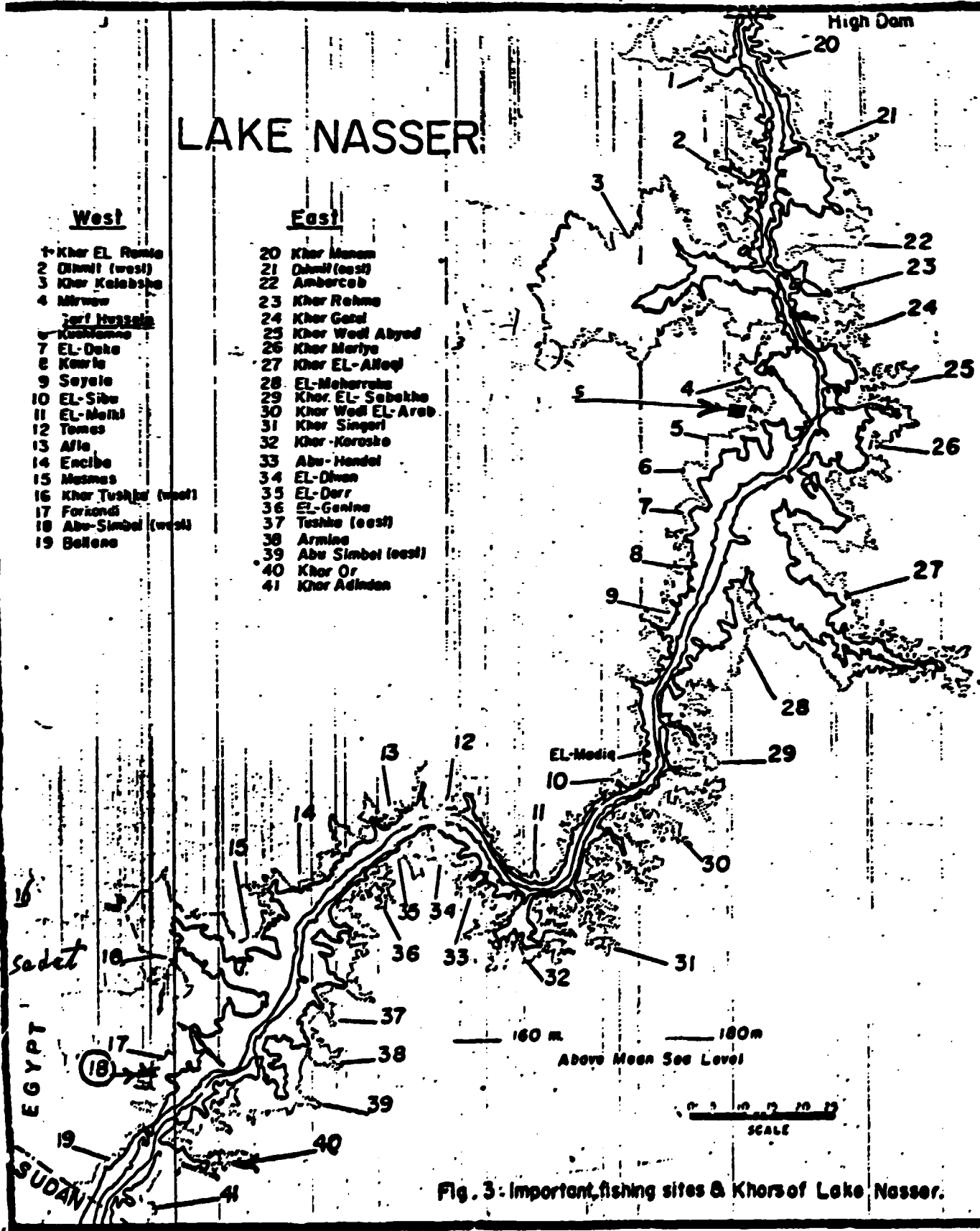


Fig. 3: Important fishing sites & Khors of Lake Nasser.

TERMS OF REFERENCE  
FOR  
THE PRE-FEASIBILITY STUDY FOR  
A FISHERY COMPLEX  
AT ABU SIMBEL, LAKE NASSER, EGYPT

## 1. Background Information

After construction of the High Dam in Aswan had been completed in 1963 the area along the Nile towards the Sudanese border was flooded. The largest artificial lake in the world, known as Lake Nasser, was formed. The total length of the lake at the high water level is approximately 500 kilometres, of which 350 kilometres are in Egypt and the rest in Sudan.

The total area of the lake at a water level of 160 metres above sea is 3074 sq. kilometres, and a water level of 180 metres above sea is 6220 kilometres. During the year there are seasonal changes of water level. However, since 1980 the level of water in the lake has been lowering and now it reaches the level of 160 metres above sea. This was caused by a drought in this part of Africa and by extensive irrigation of the areas surrounding the lake.

After creation of the artificial lake fishing has gradually become the main occupation of the local population. At first the fish catches were rather small but later on, thanks to stocking of the lake and improving of catch techniques and fish transportation, the catches have been quickly increasing.

In the early 80-ies the annual catches exceeded 30,000 tons of fish. Later, however, significant decrease in the catch results has been noted. In 1986 the annual catch dropped down to 16,500 tons, with a number of fishermen also decreased. This was due to

- smaller area of the lake caused by lowering of the water level
- low prices for basic fish species-tilapia, which decreased incomes of fishermen and made them leave their jobs for more profitable ones
- unsuitability of fisheries organisation and infrastructure to changing conditions of the lake

All landed fish is transported by ships /boats/ having capacity of 6-30 tons /only a few of which have cooled storage facilities/ to the port by the High Dam.

For a few years now there has been a fish processing and freezing plant whose theoretical processing capacity is about 100 tons daily.

The plant also produces all ice necessary for icing fish while it is being transported to Cairo.

Attempts to produce ice for storing fish before loading it on boats as well as for complementing ice supply on the boats are in an experimental phase.

There are 41 provisional fish collection centres dispersed in various locations on the lake but they have no ice nor containers for storing fish before it is collected for further transport to the High Dam port.

Transport of fish from southern part of the lake to Aswan takes more than two days and fish often gets spoiled due to insufficient icing, especially after a successful catch.

It is planned to develop the Lake Nasser region by building fishing ports and fish processing plants in the following locations:



- Abu Simbel, small town situated on the southern shore of the lake, where two small fisheries co-operatives have already been operating,
- Garf Hussein - on the western lake - shore, approx 140 km south of Aswan,
- Khor El-Allagi, on the western lake-shore, approx 200 km south of Aswan.

Because of limited financial means it is not possible to start all the above projects at the same time. Abu Simbel will be treated as a priority for the following reasons:

- a/ Transport of fish from the south of the lake to the High Dam port is rather expensive and affects quality of the transported fish due to difficulties in ensuring appropriate transport conditions,
- b/ The existing road from Abu Simbel to Aswan enables quick transport by trucks of fresh and frozen fish, in the first case after the port has been built and later after a fish processing plant has been completed,
- c/ Two fisheries co-operatives exist in this region which have no transportation boats but they have opportunities for development /possibility for settling down of fishermen and possibility of selling fish on the local market/.
- d/ It is possible to set up an integrated agro-industrial complex, utilising gurry for producing fish meal and by using cool storage facilities for storing meat and agricultural products, due to the development of agricultural production in this region.

## 2. Project Information

The fishery complex in Abu Simbel should include the following sections:

- Fishery port, whose main function will be reception of carrier boats with fish and as fishery harbour for fishing boats /co-operatives/ operating in this part of the lake. The port will also be used as a centre for ice and fuel supply for fishing boats from the region,
- Ice production unit necessary for carrier boats, local fish processing, poultry farms and requirements of local population,
- Fish processing plant, whose main functions will include: reception and storage of fresh fish, fish processing /filling, refrigeration of fillets and carcass, packaging of frozen fish, storage in low temperature/,
- Fish meal production unit,
- Warehouse for frozen and fresh fish containers and fish meal,
- Administration buildings,
- General stores for fishermen /food products, fisheries equipment, household goods ect./.

### 3. Scope of Services

3.1 The area of Lake Nasser exploited by the fisheries centre at Abu Simbel.

3.1.1 Determine the area of the lake to be exploited by the Abu Simbel fisheries centre.  
Describe current and forecast data referring to a number of fisheries centres, number of fishing boats and number of fishermen in the region. While establishing forecast data one should take into account a period of intensive exploitation of the lake up to its natural capacity.

3.1.2 Estimate current catch results and fish species structure in the region referred to under 3.1.1. Estimate future catch results and changes planned in the species structure in connection with attempts to introduce new species, such as silver carp, /*Magules caphylus*/ and changes in catch techniques /catch of carnivorous fish and deep water fish/.

3.1.3 Identify a daily fish catch: average and top catch for a season of intensive catch, ie. February-April, and after this season, on the basis of current data and in perspective. Identify frequency of daily peak catch occurrences.

### 3.2 Fishing port

Identify the scope of the port:

3.2.1 Determine necessary number of carrier boats which will be servicing the region referred to under 3.1.1, their cargo capacity and total carrying capacity.

3.2.2 Determine fish transportation routes-average and maximum distance and transportation time.

3.2.3 On the basis of data from 1 and 2 determine an average daily number of boats arriving at Abu Simbel and tonnage of delivered fish. Such an estimate should be prepared for a season of intensive catch /February-April/ and for a period after the season, according to the current catch information and in perspective.

3.2.4 Based on the data from 3.2.3 and taking into account cargo capacity of carrier boats, determine the scope of the port, length of discharging wharf, number of fish unloading stations, length of landing berth, length of bunkering wharf and length of wharf for fishing boats of the local fisheries co-operatives.

### Location and Site of the Port

3.2.5 Collect details concerning water level variations in the lake near Abu Simbel.

3.2.6 Locate the port, considering the following factors:

- site configuration at variable water levels
- possibility of arriving at the port of maximum draught boats at minimum water level
- existing transportation roads at minimum and maximum water level, availability of sufficient area for maneuvering of transport means
- possibility of location of fish processing plant and ancillary facilities in the nearest vicinity of the port
- possibility of power supply,

3.2.7 On the basis of data from 3.2.6 and 3.2.8 consider possibility and purposefulness of building a port based on stable structure which is very unlikely because of variable water level

3.2.8 If it is recommended to build a port based on stable structure and not a pontoon type of port, data should be collected on geological configuration of the location.

### 3.3 Ice Production

3.3.1 On the basis of data referring to average and peak daily unloading of fish and frequency of unloading the following is to be established:-

- daily production of ice for fish icing at the ratio of 1:1, for
  - carrier boats
  - fish processing base
  - local fisheries

While determining production of ice one should take into account results of experience in ice production on boats and pontoons for fishing bases and one should estimate production of ice at Abu Simbel, accordingly.

3.3.2 Collect information on suitability of block ice /produced in Aswan/ and flake ice /produced on vessels/ for fisheries use at Lake Nasser. Choose appropriate type of ice to be produced at Abu Simbel.

### 3.4 Fish Processing Plant

On the basis of data on daily average and peak fish unloading at the port and frequency of peak unloading, determine:

- daily capacity of the plant to receive fresh and salted fish

- daily processing capacity of fish /carcass and fillets/.
  - daily amount of final products /carcass, fillets/ to be frozen and stored in low temperatures
- 3.4.2 On the basis of data from 3.4.1 and data on species and percentage of particular fish, determine a number of de-heading and gutting machines and necessary freezing capacity.
- 3.4.3 Consider purposfulness of using filleting machines or a possibility of manual filleting on appropriate benches. It seems manual filleting will be more advantageous because of the following factors:
- higher output in relation to machine processing by 5 to 8 % depending on the species
  - possibility of additional employment which is significant when labor is cheap
  - no need to import expensive machinery and service
- 3.4.4 Identify daily proportion of gurry in order to estimate capacity of fish meal production unit
- 3.4.5 Determine capacity of deep freeze storage assuming that an average daily despatch of frozen fish products should equal their average daily production with additional reserve capacity
- 3.4.6 Determine area of the fish processing plant including area necessary for:
- receiving and storage of fresh fish in ice
  - de-icing and sorting of fish
  - initial processing, de-heading, gutting
  - filleting
  - freezing, glazing, packing into cartons
  - manouvering area and transportation roads
- 3.4.7 Determine area of the fish meal production unit

### 3.5 Power, water, sewage disposal

- 3.5.1 Identify requirements for power necessary for machine and equipment, lighting, social and administration facilities and air conditioning.  
Collect information on possibility of power supply from existing sources and power generation for the plant.
- 3.5.2 Determine volume of steam necessary for production of fish meal
- 3.5.3 Determine volume of water necessary for production /production of ice, fish processing, boiler house/ and for perso-

nel. Investigate water supply possibilities /pumping from the lake, building a well/ and methods of water treatment.

3.5.4 Identify daily volume of production wastes and other sewage. Describe types of wastes, their treatment and disposal.

### 3.6 Location and Site of Fishery Complex

3.6.1 Select site and identify its area, taking into account vicinity of the fishery port, easy access to water supply and service road

3.6.2 Identify total area of buildings directly connected with production and area of administration building

- ice production and storage unit
- fish processing plant
- deep freeze store
- fish meal production unit
- boiler house
- packing store
- administration and staff building

3.6.3 Give a brief description of buildings, type of structure /steelwork, concrete, stone etc/ which should be used

3.6.4 Prepare plan of building layout in scale 1:500 and describe what geological survey should be made before decision on building is undertaken

### 3.7 Machines and Equipment

3.7.1 Make a list of machines and equipment for the whole fish processing complex, ie for

- ice production
- sorting fish
- de-heading, gutting and filleting of fish
- freezing fish products
- fish meal production
- boiler house /to generate steam for fish meal production/
- internal transport

3.7.2 In order to minimise import purchase of locally produced machinery should be considered while selecting necessary machines. Spare parts should also be ensured.

### 3.8 Personnel Requirements

- 3.8.1 Determine necessary number of direct production personnel and auxiliary personnel describing their qualifications. Identify necessary positions of technical inspection describing professional experience and required educational background
- 3.8.2 Identify personnel training requirements, describing type of training / practical training in Aswan or local, or training abroad/

### 3.9 Legal Considerations

- 3.9.1 Collect valid legal regulations referring to:
- Sanitary conditions concerning fish and fish production, and regulations applying to fish processing units, if any such regulations exist
  - Requirements concerning work safety in production units including food processing plants
  - Conditions referring to power supply and usage of power installation /eg.boilers/-
  - Regulations on sewage disposal
  - Other regulations which may be applicable to building and performance of facilities included in the project.

### 3.10 Plans and Drafts

- 3.10.1 Obtain from local authorities site plans for location of the port and fishery complex. Plan location of particular buildings and prepare layout.
- 3.10.2 Plan location of various categories of equipment in buildings.

## 4. Investment cost estimate

- 4.1 Based on the equipment selection the required investment costs should be estimated. The estimate is to be subdivided into:
- main equipment
  - auxiliary equipment
  - electrical equipment
  - spare parts
  - freight
  - custom duties
  - civil construction
  - erection
  - supervision of erection
  - commissioning
  - production personnel and training costs
  - engineering fees

- working capital
- contingencies

4.2 Figures for local costs and imports should be shown separately, the investment cost of main equipment is to be subdivided into various production departments

#### 5. Operating Cost Estimate

5.1 Based on the personnel, material and power requirements and the investment cost estimate the operating costs should be estimated. These costs should be subdivided into

- local costs and imports
- fixed and variable costs
- costs of personnel, power, material, spare parts and amortization.

5.2 Unit costs of each material input are to be indicated and estimates of these costs are to be substantiated separately. Personnel costs should be itemized and shown separately, the part corresponding to the salary and that corresponding to social benefits and other costs.

#### 6. Financial analysis and economic evaluation

6.1 Based on the normal sales prices applied in Swan Processing Plant and a calculated price of products the yearly cash flow for the lifetime of the project should be tabulated. The simple rate of return and internal rate of return should be calculated. A sensitivity analysis on the feasibility of the Project should also be done. Considering different technical solutions and investment costs and assumed sales amounts and determine the break-even point depending on the price of finished products.

6.2 A detailed analysis of advantages and disadvantages of the Project should be done, mainly from the macro-economic point of view.

The exchange rate, the added value and the import substitution effect of the Project should be determined. An explanation of the Projects effects on employment, technology transfer, spin-off and distribution of income should be prepared.

#### 7. Project implementation

7.1 Guidelines for implementing the Project should be given. A time schedule should be drawn up, listing in detail all the activities required for taking a decision on the realization of the Project and listing the main activities of the projects implementation. Guidelines for the tendering procedure as well as for finance procurement should be given.

**7.2 A cost estimate of any activity brought about by scheduling not covered by previous sections of the study should be calculated.**



**Fisheries Co-operatives in the Lake Nasser Region,  
Current Situation and Proposed Organizational Changes**

**I. Legal Status and Scope of Operation of Fisheries Cooperatives**

1. Most of fish catches at Lake Nasser have been made by fishermen associated in fisheries co-operatives. This situation is prevailing today - over 90% of fishermen collaborate with co-operatives on various principles.

In accordance with a decision of the Egyptian General Organization for Water Resources issued several years ago, only owners of fishing boats and fishing gears could be members of fisheries co-operatives and this status is still in force up till now. .

2. Currently there are four fisheries co-operatives operating at Lake Nasser:
  - Aswan Fishermen Co-operative Society - having 2080 members
  - Aswan Sons Fishermen Co-operative Society - having 302 members
  - Kubian Fishery Co-operative - having 95 members
  - Integration Fishermen Co-operative - having 30 membersApart from the above co-operatives there is a state-owned organization "Misr Aswan for Fishing and Fish Processing Company" co-operating with 250-300 fishermen having 125 fishing boats.

3. There are altogether 2507 fishermen, possessing fishing boats and gears and in this way being eligible for membership in fisheries co-operatives.

Bearing in mind that there are 2-3 and even 4 fishermen working on one boat it is estimated that over 2000 fishermen employed by boat owners are not members of co-operatives.

A number of fishermen employed on a hired seasonal basis has diminished recently due to low wages caused by small catches and by low fish prices.

These fishermen live in very primitive conditions, they are separated from their families for many months. They are supplied with their daily food which forms an advance payment and the rest of the money is paid at the end of the season in the agreed amount.

The most frequent type of profit sharing is distribution of caught fish: 50% of catch is given to the boat owner and the remaining fish is distributed among all crew members and the boat owner.

4. Non-eligibility for membership in the fisheries co-operatives of fishermen not possessing production means is not in accordance with co-operative principles accepted by many countries, including Egypt. This situation is unpropitious for development of collaboration with the co-operative and among fishermen. An enormous fluctuation of fishermen at Lake Nasser and a diminishing number of fishermen is the best proof of it.

Fishermen employed by boat owners as hired hands have not always been attached to their job and they require training in fishing techniques and biology of fish. This training might be arranged by fisheries co-operatives.

5. All fisheries co-operatives are situated in Aswan and not in their fishing sectors which is connected with present supply of fish only to the High Dam port, and with availability of ice, food, fuel and fishing gear.

This situation does not create ties between the co-operative management and its members. These ties are also lost in the co-operative having over 2000 members, with 1500 additional hired hands employed by boat owners. On the other hand two co-operatives, i.e. Nubian Fishery Co-operative and Integration Fishermen Co-operative, operating in the south of the lake, not having their own carrier boats and employing a small number of fishermen are too weak organizations to play a major role in the fishing policies, all the more as they are 300 km distant from a decision making centre in Aswan.

6. There are few functions performed by fisheries co-operatives. The role of the above two small co-operatives is limited to catch and supply of fish to carrier ships and to distribution of profits from fish sales among members.

Two co-operatives have carrier boats: Aswan Fishermen Co-operative Society has 37 boats and Aswan Sons Fishermen Co-operative Society only 2 carrier boats. These co-operatives are responsible for transport of fish to Aswan port /some fish is

carried by "Misr Aswan for Fishing and Fish Processing Company" which has 40 carrier boats/.

Co-operatives render some social services to their members, in terms of health care /in co-operation with the CARE/, food supply or other articles. Due to low commission from fish sales the co-operatives have no sufficient finance for improving catch techniques or fish storage / production of ice or fish storage in fish collection centres/. Payment for fish carriage can hardly cover transportation cost and does not allow for boat repairs and purchase of new boats.

## II. Proposed Organizational and Legal Changes

7. Fisheries co-operatives in accordance with co-operative principles should introduce open membership for all fishermen irrespective of ownership of boats or fishing gear. Fishermen who have been hired by boat owners should become regular members of the co-operative and payment for work should be effected by co-operatives.

Co-operatives should establish rates for equipment used by fishermen, ie. boats and fishing gears, reflecting materials necessary for performance /fuel, spare parts etc/, repairs costs and amortization of the equipment. An adequately established equivalent for equipment used by a fisherman and owned by him is paid to the owner and remaining profits from delivered fish are evenly distributed by the co-operative among fishermen including equipment owner and taking into account qualifications of fishermen.

8. The co-operatives commission for sold fish should be raised, ie. a difference between price paid to fishermen and price for wholesale store or processing plant. In many countries the commission is 20-25% and its rate depends on the function a fisheries co-operative performs. The commission includes, apart from social security for fishermen, costs of training, harbour equipment used by members and administration costs.

Local transportation costs should be incurred by co-operatives but costs of distant fish transportation /in

this case on carrier boats to Aswan port/ should be covered by the buyer according to established rates.

9. Functions of fisheries co-operatives should, if possible, be widened. This should first of all refer to fish preservation from catch to delivery to collection centres for further transportation.

Co-operatives should develop production of ice on floating pontoons or fishing bases, install isothermic containers in bases for fish storage. Co-operatives should also render financial support to fishermen planning to settle down in the lake region. Co-operatives should be included in the government plans of settling down fishermen's families.

10. In order to introduce proposed changes necessary to enlarge a role and scope of operation of fisheries co-operatives, the statute of the co-operatives should be changed to provide for:
- open membership for all fishermen who may be employed by a co-operative
  - widened scope of operation; the statute should determine not only fishing operation but also should precisely identify other activities including possibility of fish processing,
  - rights and obligations of members; principles of employment
  - self-government bodies of the co-operative, its election, scope of activity, participation of co-operative members in management
  - co-operative funds - shares and other, like training and social funds.
11. Efforts should be made to locate the co-operatives in neighbourhoods of their operation area with a possibility of arranging their representations in Aswan.
- As soon as planned fishing bases are established in Abu Simbel, Grot Hussein and Khor El-Flagt, seats of the co-operatives should be transferred to these bases.
12. Division of Aswan Fishermen Co-operative Society, employing over 2000 members, into two or even three co-operatives should be considered, as well as creation of fisheries

co-operatives Federation of co-operatives operating at Lake Nasser with a seat in Aswan. The Federation would represent co-operatives in relation to authorities as regards fish prices, planned investment concerning fisheries development, taxes etc. and would co-ordinate exploitation of the lake by particular co-operatives and other fishing companies, joint projects, transportation, training etc.