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UPDATING FEASIBILITY STUDY:
FISH PRODUCTION AND MARKETING
COOPERATIVE PROJECTS IN THE
KHARTOUM, WHITE NILE, BLUE NILE
AND WADI HALFA REGIONS.

A REPORT TO THE
GOVERNMENT OF THE DEMOCRATIC REPUBLIC OF THE SUDAN

PREPARED BY
E. B. HAMLEY,
U.K. CONSULTANT.

Supported by the Co-operative Development
Fund and Fisheries Committee of the ICA

INTERNATIONAL CO-OPERATIVE ALLIANCE
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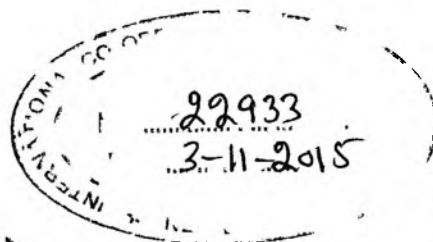
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INTERNATIONAL COOPERATIVE ALLIANCE
FISHERIES COMMITTEE

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PREPARED by
E. B. HAMLEY, CSTJ, FIIM MBIM
General Secretary, Fisheries Organisation Society Ltd., U.K.



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ICA

INTERNATIONAL COOPERATIVE ALLIANCE 11 Upper Grosvenor
London W1X 9PA U.K.



FOREWORD

This report is a result of informal, cordial collaboration between the interested parties and based on co-operative self-help.

The project started with a report "Fish Production and Marketing Co-operative Project" (White Nile/Wadi Halfa/Khartoum), a feasibility study of 125 pp, by Ismail Mahomed Ibrahim (then Director of planning Ministry of Co-operation, Sudan). This was scrutinised by the Agricultural and Fisheries Secretary of the ICA and presented as a summary to the Fisheries Committee Meeting in Copenhagen, 1978. The meeting authorised the Secretary to propose that the Government of Sudan, seek the advice of an expert selected by the Fisheries Committee, to update the feasibility study, subject to the acquisition of funds for such a mission. On the request of the Fisheries Committee, the necessary funds were obtained from the Co-operative Development Fund of the ICA.

The Sudanese Government approved the mission of Mr. Hamley, and he visited Sudan for three weeks in the spring of 1979.

The said feasibility study, and another one which the consultant studied on the spot - "Prefeasibility Study for a co-operative fish production and marketing project in the White Nile Province of the Sudan" by E. T. I. Co. Ltd., Khartoum for UN-ILO, (65 pp) - provided the background material based on published statistics, desk research and analysis of infra-structure needs.

Mr. Hamley's report is essentially an attempt to secure information at grass-root level and the data presented in this report are collected on the spot and updated to get first-hand material on the needs and potential of the project. In this respect Mr. Hamley's contribution is original and crucial; not less important is the collaboration received at all times from the Embassy of the Government of the Democratic Republic of Sudan in London, and then from all concerned Sudanese authorities, especially from Mr. Sayed Md. Ahmed Hassan Ghia, then Permanent Under-Secretary (Ministry of Co-operation, Commerce and Supply), from the local fishermen, UN agencies, and others active in Sudan, and also from the Director of the ICA, Dr. S. K. Saxena, in facilitating this study.

It has been not only this concerted support and the spirit of co-operation that enabled Mr. Hamley to finish this report, but above all, his zeal and stamina in going to the most remote places and bringing out the reality of the needs and potential of the fishermen in this area.

The International Co-operative Alliance thanks all involved in this modest but very useful project for small scale fishermen for their collaboration.

Subject to the approval of this report by the Sudanese authorities, and their permission, this project will be presented to international agencies with a request for its financing.

B Zlataric
Chief of Agriculture and Fisheries
INTERNATIONAL CO-OPERATIVE ALLIANCE

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Note - The Sudanese pound (SE) has been used throughout this paper. SE.1.00 = approx. £0.65 sterling.

This Report is based on observations and material collected in official consultations, together with the results of direct conversations with practical people in the fisheries, in the course of an intensive study visit to the Sudan between 17th March and 8th April, 1979.

Briefing talks were held in London with representatives of the Sudan Government and officers of the appropriate international bodies concerned, as well as consultations with the fisheries experts of UN-FAO and COPAC at their Rome headquarters on 16th March, 1979, en route to Khartoum.

The trip followed a formal approach by the Ministry of Co-operatives of the Government of the Democratic Republic of the Sudan and approval in principle of the request for assistance by the Fisheries Committee of the ICA at its meeting in Copenhagen in September, 1978.

The study was financed by the ICA Co-operative Development Fund in respect of the consultancy itself and all external costs. The Sudan central authorities provided local back-up facilities and interpretation; in particular their help is gratefully acknowledged in the provision of transportation, as it would otherwise have been impossible to travel extensively for first-hand review of the practical situations at remote fishing stations within the limited time available for the updating study.

For convenience of reference in assessing donor etc., priorities, separate sections deal individually with regional areas suggested from earlier studies as offering the most promising potential for aided co-operative socio-economic development. This presentation is favoured as the problems in each fishery differ by reason of location, population, accessibility and resources available to the fishermen.

Resources and General Statistics

Only limited catch, boat and fishermen's statistics have been available for the inland fishery waters of Sudan and detailed records of first-hand markets turnover and exports, etc., are similarly inadequate. However the reports of UN-FAO fisheries biologists (notably F. Henderson, 1975) and senior officers of the Sudan Ministry of Agriculture and Natural Resources have provided scientific assessment of stocks and yield forecasts to confirm the acceptability of increased effort availability. As exploitation is likely to rise sharply with co-operatives formed to encourage fisheries development, the updating of scientific studies is to be strongly recommended to ensure that future yields are not diminished by too much effort in certain fisheries. However, on the basis of present findings, ample resources exist in the areas inspected to justify all reasonable levels of production for the immediate future.

In the course of this study, most of the official Departmental figures covering the year 1976/7 were made available for the first time. They are now reproduced at Appendix 1. Red Sea marine fish landings have been included for information and comparison with

inland river-lake production. Data collected from some distant centres cannot be verified and should therefore be treated with caution; all other estimated catch figures appear to be reasonable except where otherwise indicated.

* * *

2.

TERMS OF REFERENCE

- 2.1 By agreement with the parties concerned, the original terms of reference were slightly modified and extended to take into account results of two recent prefeasibility survey-studies for the Sudan Government by Md. Ismail Ibrahim of the Ministry of Co-operatives and by an independent consultancy, Messrs. Engineering and Transport International Company, Ltd., (ETI) under a special service agreement with United Nations (UN) on behalf of International Labour Organisation (ILO) representing the Joint Committee for the Promotion of Aid to Co-operatives (COPAC). The first survey took place in 1977, and the second was concluded in February, 1979.
- 2.2 As earlier studies dealt in some depth with the historical background of working the fisheries concerned, some of this material is now excluded from repetition in this Report to permit concentration on updated study objectives as follows:
- 2.3 "Updating and supplying an independent feasibility and advisory assessment to strengthen and develop fisheries production and marketing on co-operative principles in the Sudan White Nile - Wadi Halfa - Khartoum (Blue Nile) regional areas, with particular objectives in rehabilitating Wadi Halfa and improving the socio-economic status of fishermen generally. Measures to improve fish storage and transport, etc., would also be envisaged under the Plan."
- 2.4 COPAC Consultation in Khartoum

By coincidence, this three-week study linked up with the 17-nation "Consultation Meeting on Co-operative Development in the Sudan" under COPAC auspices in Khartoum from 26th-31st March 1979. In the Fish Production and Marketing Session (SUD/CP/13), senior representatives of the Government discussed the development of Sudan co-operatives with the prefeasibility consultants (ETI) and delegates from ILO, FAO, COPAC and ICA. In discussion it was generally agreed that most of the co-operatives in fishing had made some encouraging progress since their recent inception and merited consideration of donor aid support in helping to achieve much-needed social and economic stability for fishing communities with high dependence on local resources.

* * *

- 3.1 The Democratic Republic of the Sudan has a total area of 2.5 million square kilometres; it is the largest country in Africa and the Arab world. The population is estimated at 16.4 million. With a real national per capita income of only S£ 110, the country ranks amongst the 25 countries in most need of assistance in the World Development programmes. The infra-structure is relatively weak and continuing communication and transport problems create a special concern for fish producers. Fuel shortages generally, and rising costs, exacerbate the situation in agriculture and fisheries too.
- 3.2 The annual fish consumption level of 1.8 kg. per head, (which is low) is maintained only by importation of some 18,000 tonnes of (mostly canned) fish, although some official Sudanese estimates indicate that the present annual production rate of 23,000 tonnes (Appendix 1) is capable of expansion to 60,000 tonnes from the Nile fisheries alone. This estimate appears somewhat over-optimistic since little recent work has been done to ascertain the biological effect sustained effort at such levels would have on breeding stocks and general conservation policy. In any event the present traditional fishing methods are highly labour intensive and self-regulating for many conservation purposes. Nevertheless, inland rivers total 6,400 km. in length and reservoir fisheries an area of 3,000 km² so the whole fishery is about 20,000 square kilometres, with virtually exclusive fishing rights along 700 kilometres of Red Sea coastline. The Sudanese artisanal co-operative fisheries must therefore, have capability for considerable production uplift, given the input of capital aid assistance in the right quarters, with a measure of advisory help to promote best use of the investment especially in the early stages.
- 3.3 Fisheries, generally, offer a higher-than-average return over a longer period, usually, than agriculture, since the capital investment for, say, an outboard engine or purpose-built vessel for fishing is immediately capable of earning and increasing production, and given good maintenance can have a useful working life of up to at least 10 years for engines and 15 years for hulls of conventional design. The Sudan fisheries would be likely to be no exception once initial difficulties have been surmounted and co-operative effort starts to pay real returns for the fishing members.

3.4 Fish Exports

These comprise only a minor part of the economy (one per cent). Although no details were available, a useful export trade in wet-salted fish is reported to exist mainly in the Southern provinces for overland deliveries to bordering States (the South was not included in this study). It is understood that similar efforts are now actively being made to resume a former trade in processed fish for the Arab Republic of Egypt.

If this trade can be promoted, preferably at Trade Mission levels, it could improve Sudan's balance of payments position

slightly. It might afford a much-needed outlet for supplies from the Niba/Halfa fishery at present inhibited in market development by the costly necessity of extended transportation of fish as far as Khartoum, or other distant places en route.

3.5 Contacts

The study featured consultation and collaboration with widely varied interests, and evidence collected from numerous bodies and individuals. The list of participants gratefully acknowledged for their help at Appendix 2 is not complete as names were sometimes unobtainable; they are nonetheless sincerely thanked.

3.6 Species Utilised

For reference purposes, a full list of species generally used commercially in Sudan inland waters is given at Appendix 3. A few exotic varieties are known to exist in addition, but are not included here as they have little effect on commercial marketing.

The better utilisation of some species now less popularly demanded by the consumer is worth investigation.

* * *

- 4.1 Informal discussions with experts at the COPAC Consultation confirmed field research identification of many of the current practical problems and although these varied in points of detail, at the fishermen's level time and time again their representatives put forward the same themes to fall under several broad classifications. These are taken into account more fully in recommendation from each fishing area but may be summarised as:
- 4.2 (A) PRODUCTION
- Catch levels too low to maintain optimum profitability margins.
 - Inputs too costly, especially nets and twines.
 - Localised trouble with Nile hyacinth and other pollutions.
 - Lack of motorised capacity.
 - High spoilage loss.
- (B) MARKETING
- First-hand collection arrangements unreliable: Grading needed.
 - Perennial need of better quality control and ice provision.
 - Price structure disincentives to the primary producer.
 - Concerns over "middleman" roles.
- (C) TRANSPORT & DISTRIBUTION
- Reduction of delivery delays.
 - Inadequate storage in transit.
 - Adoption of modern techniques and containerisation.
- (D) PROCESSING
- Recognition of needed development of primary processing.
 - Salt deliveries and increasing costs; disappointment over absence of central co-operative buying facilities.
- (E) EXPORTING
- Improvement of outlets.
 - Cheaper containerisation desired.
 - See paragraph 3.4 - Trade Promotion.

- (F) STRUCTURES - Improvement of Co-operative Structure generally to discourage defections to private buyers. More capital investment at primary levels. Credit availability.
- (G) TRAINING - Training Services at fishing stations sought.

* * *

- 5.1 The study covered fisheries in four quite separate provincial areas. The terms of reference sought to establish a preferential scheme to improve the economy of the fishing community at Wadi Halfa, but several factors are now influencing the position there which may not have been taken into full account previously. The presence of a (second) working agreement with the Chinese concerning development of the Lake Nuba fishery and the establishment of certain processing, ice plant and storage facilities have been coupled with big new self-help irrigation, and a water boring joint project under the International Voluntary Service (IVS) and others which might, if successful, provide alternative employments and ease pressure on the fishery as the labour intensive main contribution to the local economy in extremely 'hostile' environmental conditions.
- 5.2 It was argued that although differing in detailed character, all the areas examined had in fact a common denominator in claiming support to help overcome problems inhibiting the expansion of co-operative fisheries (paragraph 4.1 above). If financial constraints eventually limit the support to only some of the projects envisaged, the Ministry of Co-operation, Commerce and Supply should be invited to recommend preferred objectives. This is essential to ensure that too little aid in various forms is not spread so thinly that longer-term beneficial effects are reduced.
- 5.3 The areas now assessed are shown below in "provisional" order with some relevant facts briefly outlined for information:
- (A) White Nile - A fishery of importance covering a land area of 12,000 hectares, locally claimed to produce 13,000 tonnes p.a., supporting the greatest number of fishermen in any one area. (See Appendix 2: 2.1.9).
- (B) Blue Nile - Flood-vulnerable areas justify co-operative action to stabilise the livelihoods and economic activity of local communities; small units fishing in the Roseires Reservoirs - Sunnar area are showing initiatives in experimenting in fish preservation methods which should be encouraged at relatively little cost.
- (C) Nile - Khartoum - Atbara River, etc.
Marketing problems. Closer proximity of fisheries to population centres indicate that co-operative developments in transport, review of distribution systems and retail outlets could give benefits to producers and consumers alike.

(D) Northern Province - Wadi Halfa - Nuba, etc.

(See note 5.1 above). Increased exploitation opportunities noted. Marketing and transport, distribution difficulties properly solved by concerted local effort with aid support, would yield significant economic results.

Summarised analysis of regional areas:

5.4 WHITE NILE PROVINCE

- 5.4.1 Approximately 1760 fishermen (but ETI local study claims 2,600 including part-timers), 390 boats and 206 sharougs. The 17 fishing stations extend southwards below Khartoum from approx 15°15' Latitude to 13°50' Latitude - about 200 kilometres. The actual distance is much greater than this by reason of the river configuration. The Provincial Governor is centrally based at Dueim; he and his advisers provided details of the Communities linked with the industry and stressed their social and economic importance.
- 5.4.2 The well-established fishery at the Jebel Aulia - Nile Dam - Site is productively operated by up to 500 subsistence scale seine net fishermen, mostly making and maintaining their own nets which are preferred, though expensive (See Appendix 5), of the "dag tihig" and "dag fog" type, with a few long lines and smaller hand nets used as well. The West Bank Dam approach area is used as a fish collection and first-hand sales point.
- 5.4.3 Other fishing stations and/or collection centres inspected or "noted" in this area include - EL GETEINA, HUREIDANA, WADI EL ZAKI, GAMMALAB DUBASI, SHABASHA, EL DUEIM, KAWA, ABU SHATEEN, EL MALLAHA (Training Centre - See separate reference), HARDANA, KOSTI, REBEK, EL HUDEIB and EL JEBELEIN. (Note collection points or markets are underlined).
- 5.4.4 The projected 1979 population of the Province (Dept. of Statistics, 1973 Census Source) is 1.3 million, (Kosti 65,400 and El Dueim 26,250 and Rabak 18,4000, are the chief towns).
- 5.4.5 Seven primary fishing co-operatives, claiming a total of over 1,000 members were formed in 1978 at Wadi El Zaki, Arkuz, El Mangarah, Hashaba, Dubasi, Abu Shateen and El Kunuz. Some are not yet actively operating and unless greater member-involvement responsibility is engendered, certain official sources doubt their capacity ever to become truly viable: we fully agree.
- 5.4.6 The federal body for the Co-operatives is the White Nile Fishermen's Union (WNFU), providing under its Constitution formation financing via donor and loan

institutions. Prefeasibility (Ibrahim and ETI) studies suggest better use of the recently formed White Nile Fish Production and Marketing Corporation, which has only secondary fisherman producer representation limited to the WFNU nominees. Both the Union and Corporation seem too remote from involvement in the primary production problems and could benefit from a closer scrutiny of their constitution and working objectives. Certainly a "second-tier" body is essentially needed to initiate and organise better management control, equipment of collection centres with cold storage facilities, and organisation of transport to ensure regular collection.

- 5.4.7 An Agreed national grading standard system in the form of a simplest workable numerical scale, should be fully implemented, and the idea of stationing a responsible fish purchase clerk at each collection centre to record and pay out cash on checked weight settlements (with receipts for monies paid) for fish, is to be commended. The "bonus" system of fish through-puts throughout (paid at the end of the season) is to be commended. It provides a positive incentive and a step towards improved marketing control and management. Even on the small scale of present Sudan local through-put, this principle, (adapted from now well established UK Share fishing co-operative methods) would assist stabilisation of the producer position and instil confidence in place of the regrettable scepticism about Unions and Corporations amongst the fishermen, largely because the Boards are relatively new and unproven in functional and management ability and they have not been able to "project themselves" as being in the primary producers' best interests.

Unfortunately too, the Government itself appears to give no financial support to fishermen's co-operatives formation in the White Nile, or indeed anywhere, although, in fairness, as much technical advice as feasibly possible is made available through a hard-working team of field fishery officers, though back-up resources are lacking. Registration of co-operatives is accepted at a concessionary fee of S£ 5.00 per company.

- 5.4.8 Brief reference must be made to the activities of an experimental Fisheries Dept. Government-sponsored fishermen's training (temporary tented) Camp at El Mallaha (meaning the "salty" place) in the White Nile. About 20 practical fishermen work for 4 months as a team on 3 boats, catching Kharwa Kas species mainly and wet salting 5 x 50 kilo barrels for sale each week. They are paid a wage and the production proceeds go to official sources locally. The training is supposed to be at "Instructor level" to enable these "good" fishing types to give instruction to fellow fishermen on completion of their course, but no syllabus was produced and the "programme" was largely informal. The scheme has been going for 3

years. It should now be closely reviewed but the idea is basically sound if standards could be raised and visiting instructors employed to introduce more formalised practical instruction; it could then be further extended to other suitable centres.

- 5.4.9 One serious impediment to improved fishing in the Mallaha area is typical of a similar potential menace to other fisheries. The bank of the river is increasingly congested by Water-bushes (locally MAAHUA) which first spread rapidly, break off and regenerate elsewhere. In other places, notably near Rebek, the "Nile hyacinth" is actually encouraged in its habitat growth to "choke" itself by spray treatment with a substance of plant hormone known as "K24", but the total control effect appears to be negligible and the plant continues to spread, despite bans on its transference by man. Further scientific study of this problem, with suitable remedial action, appears to be necessary. This may not be a major issue in the total review of the fisheries but it is considered essential by the fishermen that all the commercial fisheries be maintained at maximum potential for production efficiency; their view is supported by this study findings.
- 5.4.10 In prefeasibility (ETI) reports the White Nile production figures for all species each day are listed as having risen from a mean average (assessed by means of highest and lowest efforts) of 8.5 tonnes in 1976/77 to 17.50 tonnes in 1977/78. The assessment asserts a more realistic figure to be 37 tonnes per day, based on limited field investigations (which this updating survey did not undertake), and claims that official catch collection data is limited to three centres only (Jebel Aulia, El Duiem and Kosti). Unchecked catches, dried and salted, for export to consumption centres in Southern provinces and neighbouring countries such as Zaire are said to be not included in the lower levels of quoted statistics. All figures should be treated with caution in the circumstances, but clearly the potential for increased production remains valid as shown below.
- 5.4.11 From visits to many of the centres in this Province, fishermen's leaders and community heads independently represented similar views on capacity based on local experience. They claimed (it would seem with fair justification) that complex and comparatively expensive aid schemes for infra-structural improvements, nationally or regionally, would be difficult to relate to the urgent needs of serious economic difficulties of sheer subsistence survival, especially in remoter fishing communities; that speedy alleviation might be forthcoming by soundly evaluated and well supervised help to properly constituted co-operatives - incidentally thus encouraging new formations.

5.4.12 Examples of forms of such aid meriting costing analysis if they are accepted by donor agencies in conjunction with the Sudan Government, might usefully include, in outline:

- (i) Aid in material form of small outboard motorisation for suitable larger craft: the time now spent in rowing to the fishery would be reduced to permit longer periods of actual catching on each trip.
- (ii) "On site" technical training; instruction in the use and maintenance of craft and gear and fish preservation techniques. (Almost every "session" of this study could have led to an "instructional class" such was the keenness of fishermen to acquire knowledge - EBH).
- (iii) More practical assistance and advice at site in setting up efficient local co-operative structures and selection and training of reliable management. Seconded co-operative officers for short terms?
- (iv) More aided support for the provision of working inputs - twine and netting materials costing several times normal prices of gear secured in open markets.
- (v) Aid for improvements in more 'selective' catching and maintaining first-hand fish quality control. Better marketing structures through co-operative fish producer enterprise, thereby reducing the problems now frequently experienced through lack of true competitive elements at initial sale levels: too many "middlemen" and entrepreneurial interventions. Producers' own transport and cold storage facilities require priority consideration.
- (vi) Where salt preserving (dry or wet) is employed, bulk purchase schemes through a central special buying co-operative are sought to reduce cost, eliminate supply delays, etc.

5.4.13 The Case of Abu Shateen Village, White Nile Region

Note: To ascertain more precisely the extent of dependency on the White Nile fishery it was particularly observed in the typical large village of Abu Shateen, Near Kawa that approximately 1,500 inhabitants appeared to have no possibility of alternative employment resources, the terrain and location precluding almost all forms of agricultural cultivation. 20 boats, manually operated each with 4-man crews, produce excellent quality food fish for local use and market supplies in varying quantities to provide the source of income of the village. More than half these 80 fishermen assembled at dawn to meet the researchers and answer questions.

They advised that the co-operative formed one year previously to provide a transport lorry (Khartoum over 250 kilometres away) had "run into difficulties"; the former private regular buyer now rarely visited the village and marketing of catches was becoming unreliable. Nets and supplies were virtually unobtainable through normal channels and a S£ 100- S£ 120 net could be purchased through what is termed "black" market sources at about S£ 5 200 each. The middleman's agent used to bring sugar etc. to exchange in kind of fish, he now rarely does so.

The co-operative's members needed improved boats and several more of them; they claimed they had the capability to effect repairs if motorised vessels were obtained and would be willing to repay capital loans through a co-operative on a regulated basis. The price received for their first class fish sold to agents (middlemen) was 37 piastres per kilo; its authorised central market price was 90 piastres but outside the regular market S£ 1.20 per kilo was being paid. This illustration underlined the recommendations made by previous researchers as currently and confirmed the desirability of strengthening co-operatives to provide maximum self-help and aid, fundamentally, at the producer level. This typical co-operative might well merit its selection for a pilot project after detailed examination of costing feasibility under one or more headings of paragraph 5.4.12 above.

5.5 BLUE NILE PROVINCE (Roseires, Damazin, Sennar, etc.)

- 5.5.1 The fisheries of the Blue Nile Province lie South-east of Khartoum near the Eastern border of the Sudan adjacent to Ethiopia, approximately 34° Longitude and 12° Latitude. These fisheries were covered in a one-day visit by the Consultant (on 28th March), the main air journey being undertaken in a Piper Commanche Air Taxi flying at approx. 7,500 ft. Following the course of the Blue Nile this also provided later a "bonus" in viewing the main reservoir fishery and Dam at El Reseries before landing and inspecting the site. The Reseries reservoir has an estimated output of 1,500 tonnes of fish whilst the Sunnar reservoir has 1,100 tonnes, according to ETI pre-feasibility figures. The Roseires was created over a tree'd area in 1963 and occasionally the fishermen still encounter obstruction in netting where trees have broken loose.

The Blue Nile province as known today, was administratively set up in 1974 on division of the Gezira Province with Damazin as the provincial capital, the population of the area being some 798,000. Amongst 73 fishing stations either temporarily or permanently set up on both banks of the Blue Nile there a few are important fishing centres notably at Suki, Sennar, Singga, Abu Zagholi, and the fishing camp village of Regeba some 28 km from Damazin which was inspected.

The area gives employment of an estimated 1,100 men using 450 sharougs; there are no tarror type craft and few larger boats. There are at present no co-operatives; one of the difficulties of establishing them lies in the seasonal influx of fishermen alongside the indigenous groups; a number of itinerant or semi-itinerant Nigerian fishermen work these fisheries from time to time. In the Herif area for example, 150 fishermen work a seasonal catching and processing industry only between May and September as they have little transport, no storage facilities and food supplies become difficult. Often as the rains come their grass huts are washed away and they retreat to work from higher ground or move on elsewhere.

- 5.5.3 One complaint constantly voiced by the fishermen in this area concerned problems of obtaining salt at reasonable prices. The issue, as elsewhere, pointed to the expediency of co-operative bulk purchasing arrangements and resale facilities for fishermen members.

The two methods of local processing used both require the use of salt, which costs SE 2.50 per 100 kilo bag in normal fine weather rising steeply to SE 58.00 in the Autumn. "Dry" salting fish (Samek Kaijak) involves a 5-hour brine soaking and sun-drying for 7 days on ropes; "Wet" salting (Samek Mojafat) uses tins for packing after an initial salt pickling. The dried fish is baled for dispatch to distant markets.

- 5.5.4 At Regeba the fishermen have shown considerable interest in trying different methods to improve marketability and seriously enquired about setting up a smoking kilm experimentally. The three principal species landed are Egil (Class I), Bulti and Bayad (Class II), Himela is the smaller popular variety also caught. Gill netting (nets cost up to SE 300 here for 25 metres x 2 metres size) is popular.

- 5.5.5 Marketing and Taxation problems were highlighted and the weakness of transportation affecting cost structures indicate recommended action to immediately change at least one apparently highly anomalous situation. Supplies of fish are sent to Khartoum, sometimes by air, but this is becoming positively expensive now, and to Gadarif; a local throughput for the market at Demazin is also provided. River bank fresh fish prices to the producer are currently 25 piastres (Class I) and 15 piastres (Class II) - Salted fish makes 35 piastres down to 20 piastres according to Class (all per kilo). The cost of road transport is an added overhead essential averaging 7½ piastres per kilo. A 5-ton lorry may carry 3 tons of fish to 2 tons of ice, in ratio, and 13-15 piastres of ongoing icing and packaging costs may be included in the retail price of about 90 piastres per kilo.

Because of the lack of regular Provincial taxation Collection to maintain essential services, the Provincial Government administration decided to impose

a local levy of 7½ piastres per kilo on all fish (the bulk being transported out to big population centres) passing out of the Province from September, 1978, with a "maximum" of £ 100 per 3-ton vehicle! Air-freighted fish (about 3 tonnes per month) attracts a 5 piastre per kilo tax surcharge. It is pointed out that essential protein food for poorer people highly dependent on regular and cheap supplies should preferably not be subject to additional costs of this nature which might put fish prices beyond their reach. The additional risk of creating law breaking activities by operators attempting to "smuggle" fish consignments over the Provincial border at unchecked points is also mentioned.

- 5.5.6 Consideration of most of the feasibility criteria applying to other fishing areas is similarly advocated for the Blue Nile fisheries. In special regard to the economic and social hardships created by vulnerability to flooding etc., attention should be given to the salt supply situation, the setting up of co-operatives in local fisheries, finding some alternative method of raising local taxation to eliminate the border fish levy, and aid towards some encouragement for experimental alternative preserving processes at the producer level, by the installation of smoking equipment for a limited scale pilot project.

5.6 NILE PROVINCE - KHARTOUM/R. ATBARA

- 5.6.1 In this area the capital of Khartoum and the railway centre of Atbara provide the major centres of consumer population in a Province roughly stretching north to south about 500 kilometres situated between 32° and 34° Longitude. The local operational fisheries are not extensive and of course have good access, relatively, to markets.

Apart from concentration on Central Khartoum fish Marketing, Pricing and Grading Structures in the principal wholesale and co-operative retail outlets, and a smaller wholesale fish market visited at Atbara, opportunity was taken to examine the work done at experimental fish farms near the national Training Headquarters at Shagara, also visited briefly at the end of the study.

5.6.2 Fish Farming Developments

Under the direction of Mr. T. T. George, a 3-year project started at the fish farm centre in July, 1977, with aid from the IDRC of Canada. Five special areas of study are linked seriously with attempts to find commercial viability and potential. The possibility (to be scientifically assessed first of course) of commercial fish farming was noted from study of certain areas of the Nile and Atbara rivers near their confluence, where flow-patterns normally conducive to sedentary species culture in "pockets" off the

mainstream were observed. The Shagara centre work should therefore be carefully monitored as successful outcome could be channelled to future possible co-operative development on realisation of growing under control commercially marketable quantities of fish, oysters or other shellfish. Tilapia, labea niloticus, barbasbynni, cyprinus carpis and other family idella species, (the latter being exotics for brook stocks) are currently being raised, using oil cake feed, rice and bran nutrients. Water supplies are continuously drawn directly from the adjacent river Nile and pumped to cover 32 hectares of ponds.

An interesting oyster culture plan is developing too in attempts to raise 'mother of pearl' shell quality and growth rates for commercial exploitation. In close working conjunction is the Fisheries Research Centre of the Agriculture Research Corporation, under the direction of Professor Hamid Osman Burhan; no follow-up was made here as this work appeared to have no direct co-operative relevance at least as far as the present feasibility study is concerned.

5.6.3 Fisheries Training Centre

Inspection of the Training Centre itself at Shagara, kindly accompanied by the Director of the Fisheries Department, Dr. Youssif Ishaig, revealed a fairly impressive record in training fishery officers and others in medium and short-term courses. The establishment might, however, in your consultant's view, be possibly used to greater capacity. One recommended additional facility which could be developed is the introduction of suitable intensive courses for those engaged (or earmarked to be employed in the future) in co-operative fisheries formation operation and management. With premises fully furnished and support services already available, and the Centre's noted close proximity to Khartoum, a pilot course as an experiment, suitably aided with external field study and lecture support from the ILO-UN-FAO pool of co-operative experts, could be a worthwhile trial venture. The local provincial fisheries now starting co-operatives desperately need improved, expert technical and management leadership in their formative stages. This is a matter of some urgency. The specialised use of the fisheries institute, as distinct from the normal co-operative training centres used normally for training consumer industry workers etc., has obvious advantages in accessibility to textbooks, etc. and teaching resources appropriate to the subject.

5.6.4 Atbara by reason of its central situation in the Sudan and proximity to the railhead, coupled with accessibility to three good fishing areas on the River Nile and River Atbara, is important. The fisheries are at KARABA (2 to 3 hours from Berber), ATBARA-NILE and in the MOGURAN river area; in the latter two

areas fishing is only possible during six months of the year, giving ancillary employment to Sudan Railway workers.

- 5.6.5 Karaba is typical and provides interesting detailed data supplied by the Inspector of Co-operatives for further examination. Approximately 40 boats each carry about 5 crewmen to fish most varieties full-time; the fishermen represent about one-fifth of the population, around 1,000. There is no co-operative, and catches have been transported 3 times each week by lorry to Atbara (4 hours), through a single private merchant; now 11 fish producers have amalgamated to launch their own lorry service. Two or three "middlemen" are said to control Atbara Market and it is claimed they can "control" the lorry operations by threatening to advise the Health Department of irregularities.
- 5.6.6 On average the local fishermen receive 20p per kilo for fish retailing at 80p per kilo. Market conditions are primitive and the fish section is remote from the fully enclosed area. Those fishermen excluded from the main market unload lorries directly outside the area to deal with their business from the baskets placed on the ground.
- 5.6.7 At Atbara the wholesale fish market conditions are quite similar to Kosti in the South (3 markets) and other areas, where small enclosed spaces, where provided, are congested with dealers and their staffs, sometimes insanitarily operated as gutting takes place amongst sorting and rebagging of fish and waste accumulates in a restricted area.
- 5.6.8 Whilst dealing with Nile province towns market conditions generally, Khartoum Fish Market is, by contrast, relatively well-organised with buyers outside the buildings "changing" fish several times, it is said, before the final transactions in smaller quantities ensure its removal from the Market.

All market areas require updating with provision of at least the minimal facilities for clean handling of fish, including, in at least one centre, replacements for badly hacked and filthy tree stump preparation blocks, etc.

- 5.6.9 From Atbara, north, through considerable desert areas adjacent to the Nile, five fishing stations operate, of which little has been previously known to researchers. Apart from KARABA (mentioned above); 30 kilometres on NADI has 4 boats with 4/5 crewmen; 15 kilometres further the station known as (?) SHAREIK is manned by about 20 "corn/fish crofters" possibly in strict limitation by reason of its island river situation. Next comes ABU HASHIM 25 kilometres on, with no motor or rail facilities, but 3/4 boats sell all catches locally. About 70 kilometres northwards ABU HAMED fishery provides in a lot of tiny islands

According to another recent official report (Md. El Tahir Ali & Dr. Asim Mougrahby) to the Sudan Fisheries Research Council (June, 1978) production targets for the Nuba Lake can be more realistically set at an average of 3 to 4 tonnes per working day, based on 270 days each year of operational fishing by ten boats each crewed by five fishermen. 50 per cent of all catches by weight comprise the Bulti (tilapia) species, whilst a further 15 per cent is made up of Nile perch (lates) giant specimens of which are exceptionally found at + 80 kg. each. During a fishing trip undertaken as part of the present practical investigation, this consultant noted several large fish in the 40 kg. category, routinely captured in seine nets on the Western side of the reservoir. A problem was also observed with a few fish seen to be dead on hauling in the "set" nets after a period of up to 10 hours exposure. Disease and water pollution being ruled out, it is suggested, confirmed by quite extensive damage and tangling indications, that such fish might be trapped early on in the catching and die in entanglement through struggling to free themselves. Consideration might therefore be given to the trial use of alternative net materials and webbing patterns to find some solution to this unnecessary wastage.

Overall, it would be beneficial to all operators if an early and clear understanding could be announced in regard to the resource availability and directed production position; also the management and servicing facilities required. At the present time it must be admitted that the large number of boats provided, training undertaken and marketing and distribution arrangements generally do not appear to be properly inter-related to the present and immediate foreseeable situation.

5.7.3 Management etc.

The former Nile Fishing Company no longer operates, its place being taken by the Lake Nuba Fishing Corporation which, since 1978, has the control of 10 boats (x 3 crew on each) the fishermen being paid wages of S£ 25 per month basically, with an incentive bonus after a monthly target of 6 tonnes per boat landings have been obtained. There appears to be some dissatisfaction amongst the fishermen who feel incentives, if granted, should be more realistic; this may account for present low production to some extent. Those fishermen working from tented bankside camps such as at Margaswa (visited) on the Westside live in primitive conditions for long periods absent from their families. Co-operatively operated enterprises could probably ensure that members "shared" such arduous station duty periods, on a rota system for example.

The wider management and regulation situation of this fishery appears to have changed markedly since earlier reports were made and future input applications for

donor and national aid should take into consideration that the full implementation (or indeed in parts any implementation) of considerable investment support under the Chinese/Sudanese Governmental agreement on technical and financial loan help is still taking effect. (Practically no information was available as to the amount and arrangements for this financing, nor did the consultancy have any opportunity to see the Chinese-sponsored facilities or discuss plans with their representatives).

However, from Sudan official sources it was understood that the Chinese-constructed new buildings near the Wadi Halfa port area have a throughput for fish capacity of 5 tonnes per day, or about 1,500 tonnes per year; consisting of a chilling plant, deepfreezing units, gutting and preparation facilities, these must be considerably under-utilised at present on present information. Similarly, at Atbara under the same 1977 Chinese/Sudanese scheme, a well-constructed large freezer-storage building had been completed but was lying totally unused at the time of the visit, the keys said to be held by the authorities at Wadi Halfa. There must, of course, be good reasons for this non-operative situation but it is difficult to make a sound case for additional assistance until this structural project for assistance to the industry is fully functional. It is understood that after installation of a 6/7 tonne refrigeration unit at the Atbara premises, the Fisheries Division of the Ministry of Agriculture and Natural Resources might act in management on behalf of producers; if this is so, liaison with the Ministry of Co-operatives and other sections is strongly recommended.

About 80 Chinese technical personnel are still in long-term residence at Wadi Halfa, as advisers etc. The principal Chinese-contributed elements at Wadi Halfa comprise some 36 fishing craft with full equipment, the larger boats mostly powered by Model 20A 20 h.p. engines with auxiliary oil pumps of CS20 type; 30 Seagull-type outboards are used - they are all reliable in operation but the local fishermen have yet to find the larger boats fully adaptable to their type of operational fishery. Six vessels are currently used for training purposes; 14 other fishing craft are individually owned and make use of the Wadi Halfa facilities.

The extension of training to net-making and repairing and general fishing technique improvement was requested by some of the practical fishermen.

5.7.4 Transport and Distribution

One of the major problems of the area lies in distribution to central and other user markets. Whilst the railway network is doing everything possible to keep services in operation, it is far from reliable and a 24-hour journey may necessitate 35 hours on track.

However, the transport position for bulk shipment of fish appears to have improved a little with the allocation of 4 refrigerated 30 tonne wagons understood to be formerly used for fruit shipment ex Port Sudan now allocated regularly as two vans each way Khartoum/Halfa. The Ministry of Communications was reported to have directed this change within the previous three months to enable at least 9 tonnes of fish to be handled each week. In the 30 tonne truck only about 8 tonnes of maximum capacity can be provided for fish. The cost of transporting one load to the capital is approximately S£ 120. This problem has hitherto centred on having to transport ice for preservation of consignments northwards before the return journey south, obviously both expensive and wasteful. If ice-making can be quickly developed on or near shipment sites a rapid improvement in quality and capacity to meet demand is anticipated; it is recommended that priority be given to this aspect.

Khartoum & London
March-August 1979

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6. CONCLUSIONS AND SUMMARY OF OBSERVATIONS
AND RECOMMENDATIONS

6.1 Introduction

(The reference figures shown against the principal points mentioned in Sections 6.2.1 and 6.2.2 are linked with those in the main report). The list amplifies a number of project possibilities open to individual selection or combination with others to provide maximum objective national and donor aid support for the river and reservoir fishing communities most in need of assistance. In an immediate way technical and economic assistance could have practical effect, at the same time providing an accurate assesment of longer term potential. This is strongly recommended in the form of pilot projects of approximately 12-18 months duration, geared, wherever practicable, to the implementation of co-operatives formation in servicing structures to assist the earliest possible achievement of a high degree of self-supporting status. This policy also bears in mind the importance of upgrading socio-economic conditions and operational capacities at the vital primary producer levels, which appear to have been hitherto somewhat under-emphasised. In view of this the recommendations are not necessarily in order of preferred priority and flexibility is envisaged in their selection for adoption.

Section 6.3 briefly summarises the overall financial implications from the UN-ILO prefeasibility (1978/9) findings, mainly related to the White Nile - Khartoum situation. This provides at least a fairly recent general basis from which more detailed costings can be derived to ascertain current and projected external currency requirements for provision by accepting donor agencies. If the present slow progress in fishing co-operatives formation can be advanced, with technical and financial external assistance, positive profitability is indicated as achievable with fuller stabilisation, given good production resources and local sound management, in the five to seven-year term; this reflects a cautious but reasonable financial approach in the difficult infra-structure conditions, especially in the remoter situated regional fisheries

6.2 Recommendations

(Ref: 1.6). Updating and new statistical and biological resource assessment is urgently needed in most of the major inland fisheries subjected to the present studies. Rapid expansion of catch effort and its effect in potential demand on the biomass with simultaneous depletion of mature, breeding stocks must indicate close monitoring is necessary, with advance remedial action prepared if early warning signs of stock deterioration become apparent.

(Ref: 3.2). Notwithstanding recommendations in (Ref: 1.6) it is confirmed from present limited available scientific assessments, also visual observance of species size and quality of fish currently produced, that provided increased effort is maintained to proportionate manpower and gear capacity, virtually all the fisheries concerned do have capacity for increased effort.

(Ref: 3.4). It is recommended that aid encouragement be given at least at National levels to the promotion of valuable export markets through negotiation, trade missions and similar channels. Some direct advisory and practical assistance on exports intelligence for individual co-operatives and trading sources would be beneficial and productive. Known demand channels neglected or abandoned completely (mainly by reason of irregularity in quantity and delivery of supplies) should be re-negotiated with longer-term contracts at realistic higher prices to the fishermen, thus providing better incentives to allocate some outputs in salted or dried form which is popular with importers of Sudanese fish in neighbouring states.

(Ref: 3.6). Most species available are fully utilised as food fish from the river and reservoir production, but concentration of consumer demand still centres on Grade I fish. Means therefore must be found to improve the balance of graded production and market structures by encouraging sales of less-used species mainly in Grades II/III. Benefits would thus accrue to producers and consumers alike since fishermen would have opportunities to market fish often now rejected by middlemen and buyers whilst the poorer consumers could have access to good, fresh condition, but smaller-sized, fish supplying their protein food sources at cheaper prices than they now have to pay.

(Ref: 5.2). The Central Ministry of Co-operation might usefully consider publication of a definitive document giving guidance on policies for the fishing areas to be designated for development of fishing co-operatives in production, marketing, processing transport and services. National agencies and Departments engaged in Town etc., developments would then have positive indications of deployment strategy for long-term movement of fishermen and improvement of the infra-structural services to meet the requirements.

(Ref: 5.6.4). Following from Ref. 5.2, some restructuring of the Constitutional basis of the WNFU and WNFPP & M Corporation appears desirable in order to give greater representational voice to the interest of primary fish producers. At present some co-operative fishermen are "suspicious" of the motivation and objectives of the Corporations; by strengthening Board links most of these fears can probably be eliminated through better information and liaison.

(Ref: 5.4.7). The Grading system which has been evolved for fish size and species categorisation needs critical examination to establish, if nationally possible, a

"quality" criteria; the system must not be too complicated. A simple quality payment "bonus" could also be used (as in European fisheries grading for IA species) to encourage more grading, care in handling, selection and sorting on shore.

(Ref: 5.4.8). An experimental training plan for Managers and Leaders for co-operatives in formative stages merits favourable further urgent consideration. The fisheries Training Centre at Shagara, Near Khartoum is ideally situated.

(Ref: 5.4.9). The continuing menace to commercial river fishing from the water-bush growth, Nile Hyacinth, and general pollution problems needs constant and careful review. Increasingly, large areas were found at risk of rapidly becoming unproductive, particularly in the White Nile/Kosti region. Air-sprayed selective Hormone "24D" treatment is reported by the fishermen to be insufficiently effective to control the problem as they consider necessary: few alternative remedial treatments appear to be available however.

(Ref: 5.4.12). The fishing community's strong advocacy of local aid assistance (i) to (vi) is noted and supported; this suggested aid policy was re-iterated at several co-operative fishing stations. (Whether operating in co-operatives now or not, most fishermen understood their implications, advantages, and disadvantages too).

(Ref: 5.5.3). Early implementation of suggestions for an aided central buying and distributive co-operative for the purchase of bulk salt supplies from the Red Sea area is recommended. The user fishing areas particularly vulnerable to inflated salt costs lie in the Blue Nile/Roseires but the White Nile and Northern areas could benefit considerably from bulk purchasing and organised distribution: empty outward bound vehicles collecting bulk fish could be chartered for transport of salt to the fishing villages in some cases.

(Ref: 5.5.4). The adoption of ("Torry" type) fish smoking Kilns as an experimental small project at Regeaba (Roseires), and elsewhere, could, if supported by fishermen concerned, prove useful. Fuel (i.e. wood shavings, etc.) for the smoking process might be a difficult supply problem to be overcome, initially.

(Ref: 5.5.5). Local taxations imposed on fish and transport, supplies, etc., must be examined at national and provincial levels and in the interests of co-operatives promotion, these disadvantages and disincentives should be eliminated if at all possible.

(Refs: 5.6.7 and 5.6.8). The improvement of physical conditions in almost all markets could at relatively little capital cost raise standards in fish handling and encourage a respect for the products handled. The main upgrading recommendations for attention include:-

(Ref: 5.6.9). It is recommended that consideration be given to the alternative provision of double-cased containerisation units; possibly using the "Cardice" or other carbon-dioxide system if practicable and supply obtainable. This would be useful for smaller consignments of the higher graded fish and specialised market demands.

(Ref: 5.6.10). Outboard engine provision, with instructional operation and maintenance back-up in on-site training, is recommended.

(Ref: 5.7.2). The trial use of alternative nets and seine meshes should be undertaken with suitable operational aid.

(Ref: 5.7.2). The resource production policy for Lake Nuba should be closely reviewed and regularised in the interests of co-ordination and to avoid losing the goodwill of fishing operators.

(Ref: 5.7.3). Attention should be given to the introduction of co-operation for the social and economic conditions and welfare of fishermen operating in tented Nuba Lake fishing camps. Some aided support in the provision of better accommodation would give more encouragement to improved production.

(Ref: 5.7.3). In the agency management of the Atbara/Wadi Halfa facilities close consultation between the Fisheries and Co-operative divisions in Government Departments could prove beneficial to the fishing industry.

(Ref: 5.7.4). The early introduction of better ice-supply sources now in construction is strongly advocated; prices of ice to the producers should be kept at economic levels especially at the early stages, if necessary through aided subsidisation.

6.2.2 Additional General Observations:

"Middlemen": Almost universally condemned from official sources, Co-op Unions and producers, as being generally unreliable in purchasing and irregularity in collection of supplies with low prices paid to fishermen, general obstruction to trade promotion, etc. it is difficult to recommend appropriate formal steps at this stage to secure the elimination of such alleged malpractices. They undoubtedly do occur although probably not always wholly on the scale implied. No one was able to suggest positive alternatives to those set out in the pre-feasibility study which advocated devolving exclusively marketing responsibilities to the respective Corporations. The fishing co-operatives, where active, do not yet have the strength or expertise to themselves provide for the substitution of middlemen by producer

or processor participation in distribution from first-hand sales points. Aid for the promotion of a pilot marketing project could probably best be directed towards KOSTI and possibly ATBARA.

6.2.3 Fish Farming

(Ref: 5.6.3) refers to a reasonably successful fish farming experimental project continuing at the Shawaga (Nile) Government ponds. Pressure is being exerted in some quarters (an outline plan for a farm was produced by local officials at Duiem, White Nile, for example) for assistance in promoting commercial production, with a view to bringing farmed fish varieties to commercial markets; eventually introducing co-operative elements in production and/or marketing, if quantities proved sufficient, for viability.

Investigation of several potentially good waters for aquaculture produced modestly promising signs (subject to scientific confirmation and advice) in slower-flowing waters farming pond-like areas near the confluence of the Rivers Nile and Atbara. Experienced fishery officers of the District helpfully explained details of certain experiments by some more progressive local fishermen who had created special net enclosures for the purpose of ongrowing fish for marketing, presumably at times when normal supplies were depressed and their stocks could meet demand and command better prices. Unfortunately, no substantive evidence of success was available and despite the initiatives, such minor schemes do not appear to qualify for aid as advocated to the consultant.

(Incidentally, it is of interest to note here the continuing traditional practice whereby local fishermen tie fish together threading twine through the dorsal fin of each fish to permit free swimming, under control, until removed for transport to market. Survival rates vary according to the condition of the catch and water area used, but three to four-day retention is common by this method and overall spoilage risks appreciably reduced; marketable quality appears to be unaffected.)

6.3 Financial Projection (Based principally on ETI ltd. pre-feasibility study, 1979).

Based on a typical fish production and marketing project (White Nile Province) for approx. 20 fishing stations (including 7 collection centres) covering approx. 2,500 full and part-time fishermen, manning 620 boats and sharougs. Income revenue is assessed on average throughput at 8,400 kg. fish (all species, mixed) /annum at 30 piastres/kg., less 20 per cent spoilage.

Labour requirement estimate, overall (excluding all fishermen) approx. 80 at annual salary + S£ 83,000.

Loan and interest commitment - 7-year term repayment.

Boat costs - Capital S£ 300: depreciation and repairs at 20 per cent each, and interest 7 per cent.

A. SUMMARY OF FIXED COSTS ESTIMATES

| | <u>S£ (Equiv)</u> |
|---|-------------------|
| 1. Based on 200 fishing boats (but similar sum could apply to outboard engines, etc.) | 60,000 |
| 2. Fishing gear: 800 assorted seine nets, 500 gill nets and 200 long lines | 258,000 |
| 3. Collection centre offices, supply stores | 8,590 |
| 4. Covered market areas and equipment | 99,400 |
| 5. 600 insulated boxes | 6,000 |
| 6. Ice plant/cold store | 93,400 |
| 7. Administration offices | 8,850 |
| 8. Vehicles and trucks: (2 landrovers, 4 45 tons- lorries) | 86,710 |
| 9. Boat building - repairs- maintenance workshop | 55,380 |
| 10. Wages and salaries | 93,820 |
| 11. Furnishing | 5,000 |
| 10% contingency allowed | <u>77,520</u> |
| SUB TOTAL (c.f.). | <u>852,670</u> |

| | <u>S£ (Equiv)</u> |
|---|---------------------|
| A. Summary of Fixed Costs estimates (b. f.) | 852,670 |
| B. <u>WORKING CAPITAL ESTIMATE</u> | |
| 1. Fuel for 3 months (subject to adjustment) | 2,000 |
| 2. Packing materials (3 months supply) | 24,750 |
| 3. Purchase of 2,250 tons of fish .. | 1,012,500 |
| 4. Utilities & Ice, Manufacturing requirements for 3 months | 1,500 |
| 5. Unskilled labour wages for 3 months | 1,500 |
| 10% Contingency allowed | <u>104,230</u> |
| SUB TOTAL | <u>1,146,480</u> |
| Total Capital Cost | <u>S£ 1,999,150</u> |

Notes

1. The total capital cost of this project would therefore be + equivalent of S£ 1,999,160, say S£ 2,000,000. No allowance is made for inflationary revision since February, 1979 and all figures are estimated on current prices, allowing sterling for external currency commitment portion.
2. Returns on the total investment under this type of capital commitment have been assessed at 14 per cent compared with the Sudan Bank lending rate of 8 per cent. This is relatively high but indicates viability of the project, and on analysis at 31.6 per cent of production capacity the project (if drawn on one region only) would break even. If cash flow discounting were applied interest returns may be lowered.
3. Source Acknowledgement is made to E. T. I. Co. Ltd., Khartoum for details from which this summary is drawn.

EBH/AMC

STATISTICS 1976/77

1. GENERAL (current in 1979).
 - 1.1 Fees Registration costs S£ 1.00 for a fishing boat and 25 piastres for a sharoug.
 - 1.2 Licences are S£ 1.00 and 25 piastres per annum payable to the local Fishery Officer. (Many fishermen are alleged to hide their vessels in their houses to evade payment).
2. FISHERMEN AND VESSELS EMPLOYED

| <u>Province or District</u> | <u>Approx. fishermen</u> | <u>Boats</u> | <u>Sharougs</u> |
|---|------------------------------|---------------------------|----------------------------|
| BLUE NILE PROVINCE (Sennar/Roseires) | 787 | 34 | 565 |
| EL-GEZERI PROVINCE (North of Sennar to Khartoum) | 171 | 64 | 38 |
| KASSALA PROVINCE (To Arbard) | 91 | 19 | - |
| RED SEA (Sea Fishing) | 810 | 270 | - |
| NORTHERN PROVINCE Lake Nuba | 58 | 24 | - |
| Rest of Province (Estimated) | 58 | 24 | - |
| ATBARA DISTRICT | 148 | 74 | - |
| NILE PROVINCE (Remainder) | 30 | 10 | - |
| KHARTOUM PROVINCE (North of Jebel Aulia Dam) | 473 | 363 | - |
| WHITE NILE PROVINCE (all) | 1760 | 390 | 206 |
| SOUTHERN REGION (6 Provinces) Malakal etc. (Estimates only) | <u>2000</u> <u>6386</u> | <u>250</u> <u>1522</u> | <u>1000</u> <u>1809</u> |

(Note: In certain areas fishermen and/or craft operate seasonally only and the number of fishermen employed is therefore not necessarily divisible by vessel numbers to establish crew sizes).

Source: Fisheries Department (Statistics) Ministry of Agriculture & National Resources. (July 1st 1976 to 30th June 1977, period).

STATISTICS 1976/77 (June)

3. CATCHES AND PROCESSING

3.1 Figures relate to all species in metric tonnes per annum.
Source: Markets returns.

| <u>Province/District/Area</u> | <u>"Private"</u> | <u>Quantity</u> | (Total 4028 tonnes) |
|-------------------------------|------------------|------------------------|---------------------|
| | | <u>"Fishing Corp."</u> | <u>"Public"</u> |
| HALFA (LAKE NUBA) | 43 | 191 | 130 |
| ATBARA | 198 | - | - |
| KHARTOUM | 2342 | - | - |
| KOSTI (3 markets) | 404 | - | - |
| (WHITE NILE) | 104 | - | - |
| | 96 | - | - |
| MEDANI-GEZIRA | | | |
| (BLUE NILE) | 184 | - | - |
| SENNAR DAM (Suki) | 128 | - | - |
| 3.3 PORT SUDAN-RED SEA | 208 tonnes | | |

4.1 "SUN-DRIED/SALTED" FISH - Total 1400 tonnes -

| | |
|--------------------|--|
| 500 tonnes | S. Blue Nile (350 Mallawa 150 Regaeba) |
| 300 " | White Nile (Sofkosti to Renk) |
| 300 " | S. White Nile (Renk to Border) |
| 300 " | Other S. Areas incl. Roseires and S. Sennar (Flood Season) |
| <u>1400</u> tonnes | (Estimated equivalence to 4,200 tonnes "fresh" supplies). |

4.2 "WET-SALTED" FISH - Packed in tins (17 to 20 kilo) - Total approx. 400 tonnes national production as,

| | | | |
|-------------|--------------------------------|---|------------|
| 3000 tins | White Nile | } | 200 tonnes |
| 5500 " | Jebel Aulia Dam | | |
| 1500 " | Blue Nile | | |
| | Northern Sudan | } | 200 tonnes |
| 10,000 tins | (inc. Sennar, Roseires Kosti). | | |

4.3 "FRESH" FISH - As in 3.2 and 3.3 above 4028 tonnes plus -

+ 1000 tonnes (estimated) remainder of BLUE NILE -
GADARIF (from Atbara River)

300 tonnes JEBEL AULIA DAM (local)

50 tonnes DUEM VILLAGES

450 tonnes WHITE NILE villages (El Kawa area)

750 tonnes Estimated for "unregistered" catches
Khartoum to Wadi Halfa

2550 tonnes

+ 90 tonnes Port Sudan local landings only

+ 300 tonnes Remainder of Red Sea catches
2940 tonnes

4.4 About 12,00 tonnes are estimated as the annual yield of all
Southern Provinces production.

4.5 Conclusions: The Department assesses total tonnage of the national
production of Sudan as -

| | | |
|------------|---------------|--------|
| | 4,200 | (4(1)) |
| | 4,028 | (3.2) |
| | 2,940 | (4(3)) |
| | <u>12,000</u> | (4(4)) |
| 1976-1977= | <u>23,168</u> | tonnes |

FAO Fishery Statistics showed 20,000 tonnes produced in 1967 and
21,500 tonnes in 1968. A fairly constant average catch level
therefore appears to have been maintained for at least ten years.

* * *

CONTACTS USED IN STUDY

Embassy of the Democratic Republic of the Sudan, London:

SHERFI OMER ABU EL HASSAN, Economic Counsellor.

Ministry of Agriculture and Natural Resources, Khartoum:

Dr. YOUSSEF ISHAK MEDANI, Director of Fisheries Division.
Mr. THOMAS T. GEORGE - Head of Fisheries Research Centre.
MOHD. ALI FADL - Nuba Reservoir Fisheries Officer i/c.
M.O.H. EL DARDIRY - Statistics Officer, Fisheries Division.
Md. S. EL AHMADI - Fisheries Experimental Station, Shagarwa.

Ministry of Co-operation, Commerce and Supply, Khartoum:

His Excellency Dr. MOHD HASHIM AWAD, Minister.
MOHD ABDEL GAMMA AMBIA, Permanent Under-Secretary (1/4/79).
SAYED MD. AHMED HASSAN GHIA, Permanent Under-Secretary (31/3/79)
(now General Director of the Development Bank).
M. BORAIE MOHAMMED, Deputy Under-Secretary and Registrar of
Co-operatives.
ISMAIL MOHAMMED IBRAHIM, Director of Finance and Administration
(Principal Co-ordinator & Interpreter for the Study)
M. ALI ELK HALIFA BARAKAT, Director of Public Relations.
M. BASHIRI OMER KISHA, Public Relations Officer.
M. A. BOURAEE, Director, Field Work and Follow-up Department.
ADLI EL SADIG, Director of Co-operation - Operational Fisheries.
SADIG HIMADA, Fishery Officer, White Nile Province.
AWAD HASSAN EL SHEIK, Deputy Fishery Officer, Blue Nile Province.

Department for the Development of Wadi Halfa, Khartoum:

M. AHMED ABASS, Director.

Survey Department Government of Sudan, Khartoum:

ISMAT AHMED INBRAHIM, Assistant Director (Registration).

National Co-operative Union:

M. BENJAMIN MAJAK DAU - President.
M. OSMAN ELAWAD SAEED - Deputy Secretary-General and Council Member.

Regional Union of Co-operatives of Sudan:

M. EL NOUR MOHAMED FADIL, Chairman.

Overseas Development Administration; UK:

Mr. FRED HOWARTH, Adviser on Co-operatives for the Middle East, Jordan. (Met in Khartoum).

Ministry of Agriculture, Fisheries and Food:

Dr. ERIC EDWARDS, MAFF Laboratory, Burnham-on-Sea.

Commerical and Industrial Contacts (Khartoum):

SHARAF ELDIN MOHD. ALAGIB, General Manager Sharif Engineering Co. Ltd.
AHMED D. SHIBEIKA and ABDEL GHAFAR ALI, Fish Marketing Co.
AWAD A. GABBANI, Intercontinental Trading and Engineering Co.
ABDEL EL RAHIM GASIM EL SEED, Local representative of Sudan Commerical Bank.

Specific Field Contacts:

MOHAMED HASSAN MOHAMED, Acting Commissioner, Halfa.
YOUNIS MOHAMED ABDEL MAGID, Inspector of Co-operatives, Nuba.
AHMED MOHOMED BEIRAM, Chairman of Wadi Halfa Peoples' Council.
MAHOMED DAOUD, Leader of Fishermen's Group, Halfa, Secretary El Gamalab' (White Nile) Fisheries Co-operative.
ACHMED MONOFALY, Nile Province Inspector of Co-operatives.
The Governors, Deputy Governors or Assistants of all other Provinces and Districts visited.

Fishermen's leaders and Community officials in all fishing centres surveyed.

International Organisations

World Council of Credit Union (WOCCU), Washington, USA:

Mr. PAUL HERBERT, Executive Assistant, Managing Director, Rome and Khartoum.

Agricultural Co-operative Development International, USA:

Mr. B. HARVEY, Executive Vice-President, Khartoum.

International Co-operative Housing Development Association, (ICHDA):

Miss SARA WAKEHAM, Senior Housing Adviser, London. (Met in Khartoum - re African Fishing Communities Housing).

International Co-operative Alliance, London:

Mr. BRANKO ZLATARIC, Chief of Agriculture and Fisheries (Principal
organiser of the Study Arrangements).
Mr. J. HANNS OLLMAN, Chief of Press and Public Relations.
Mrs. MARGARET BLINDELL, Assistant to Chief of Press and Public
Relations.
Mr. GRAHAM J. ALDER, Development Officer.
Miss ANITA M. CARCONE, Secretary to Chief of Agriculture and
Fisheries.

* * *

SPECIES AVAILABLE IN NILE AND NUBA FISHERIES

| <u>National Grading</u> | <u>Scientific name</u> | <u>Anglicised name</u> | <u>Arabic name</u> |
|-------------------------|---|--------------------------------------|---------------------|
| 1 | <u>Lates calcarifer</u> (fam. <u>Latidae</u>) | NILE OR GIANT PERCH | IJLE |
| 1 | <u>Bagrus-Ictaluridae</u> | FORSKALS OR FRESHWATER CATFISH | BAYAD or KABARUS |
| * | <u>Malapterurus</u> | AFRICAN ELECTRIC CATFISH | BARDA |
| 2A | <u>Tilapia nilotica</u> | BULTI OR PERCH | BOLTI or BULTI |
| 2B | <u>Haploch. romis</u> | LESSER PERCH | BULTI |
| 2A/B | <u>Labeo- Cyprinidae</u> | NILE CARP | DEBES |
| 2A/B | <u>Barbus</u> | BARBEL | BINNY |
| 3 | <u>Mormynus</u> | ELEPHANT-SNOOT | KHASHM ELBANAT |
| 2 | <u>Distichodus</u> | ROUGHCAST FISH | KRAISH |
| * | <u>Citrarinus</u> | MOONFISH | BITKUYA |
| 3 | <u>Clarias</u> | EEL CAT FISH | QUARMUT |
| 3 | <u>Synodontidae fam.</u> | SHIELDHEAD or LIZARD FISH | QARQUOR |
| 3 | <u>Hydroeyon</u> | TIGER-FISH | KASS |
| 3 | <u>Alestes</u> | PEBBLY FISH | KAWARA or HIMELA |
| 2 | <u>Etropins</u> | FATTY-FINNE BUTTERFISH | SHILBAYA ARABI |
| * | <u>Protopterus</u> | AFRICAN RINGFISH | UMM QURUO |
| * | <u>Tetraodontidae</u> <u>fam.</u> | STRIPED PUFFER or occ. GLOBEFISH | TAMBAIRA |

*According to local sources not generally used commercially.

Sources: Local.

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SPECIAL REFERENCE TO PROCESSING AND
MARKETING. G. Christensen, Report
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 - 1.3 THE FISHERIES OF THE RESERVOIRS OF CENTRAL
SUDAN. Dr. H. F. Henderson, 19 pages,
Report. FAO Cairo, 1975
 - 1.4 FISH PRODUCTION AND MARKETING CO-OPERATIVE
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fishermen in African fisheries. CIFA Occasional
Paper No. 1. 19 pages. 1974
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3. Other Technical Pamphlets

3.1 EQUIPMENT AND METHODS FOR IMPROVED SMOKE DRYING
OF FISH IN TROPICS - Ref: F11P/T104.

3.2 SMALL SCALE ICE-PLANTS FOR FISHERY INDUSTRIES -
Ref: F11M/T131.

3.3 THE PRODUCTION OF DRIED FISH.

(All the above available from UN-FAO Headquarters, Rome).

3.4 TORRY ADVISORY NOTES (Selected).

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No. 9 - Smoked White Fish - Recommended Practice for
Producers.

No. 11 - Handling Inshore Fish by J. J. Waterman.

No. 21 - Which Kind of Ice is Best? by J. J. Waterman.

No. 28 - Cold Storage of Frozen Fish.

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No. 50 - Some Notes on Fish Handling & Processing by
J. Horne.

(All the above available from Torry Research Station,
PO Box 31, Aberdeen, AB9 8DG, Scotland, UK).

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BOATS, NETS AND GEAR IN COMMON USE IN SUDAN
INLAND WATER FISHERIES

1. Introduction

Much of the equipment is of traditional hand-made construction using locally available materials; boats are, by present-day standards, too small to provide an economic turnover for most fishermen operating above subsistence level catching. Despite the disadvantages of poor quality boats and construction the fishing folk often demonstrate considerable expertise in boat handling and have good catching ability relative to the sizes of craft and equipment used.

Types of Craft

- 2.1 Traditional boats: Made of "Sunt" or "Haraz" wood, usually between 5.22 metres and 6.38 metres in length. Crewed by 4 to 6 men. Useful life 5 to 6 years, often still used for much longer periods. Built at three traditional workshops at Gulli and Abba Island at a cost of approx S£ 225 to S£ 275 each.
- 2.2 Sharoug: Very small, roughly-shaped dugouts made from local woods; between 5.2 and 5.8 metres in length. Operated frequently by a form of pedal-type propulsion, it may be single or dual-handled. The useful life is restricted as the wood eventually becomes water saturated. Cost between S£ 100 and S£ 150 each. Quite heavy for handling.
- 2.3 Tarror: So-called from the name of the water-reed used in its home-made, simple, construction by tying together tight bundles of this grass-like material. Used mostly by poorer fishermen unable to purchase either a small boat or sharoug. Powered by oars or paddles only. Quite manoeuvrable, light for handling.

Nets

- 3.1 Formerly of cotton twine or thread most manufactured nets are now of nylon or polypropylene material. Normally the fishermen purchase material of appropriate gauge. It is noticeable that a wide range of mesh sizes and gauge thicknesses are used, even by the same fishermen.
- 3.2 Seining-type nets (Karara) are known as "Dag tihit" and "Dag fog" locally. The "Dag tihit" is 180 metres x 1 to 3 metres with top floats and sinkers; the mesh is squared at 12.5 centimetres. Used for close bank operations and flat sandy bottomed waters. The "Dag fog" is larger at 270 metres x 2.5 metres in depth with a 15 to 17.5 centimetre square mesh. Fed out on floated head ropes with sinkers on the bottom rope, it is operated by paired boats in a circular setting, joining up to take in the fish.

Long Lines etc. (Sareema or Sarina)

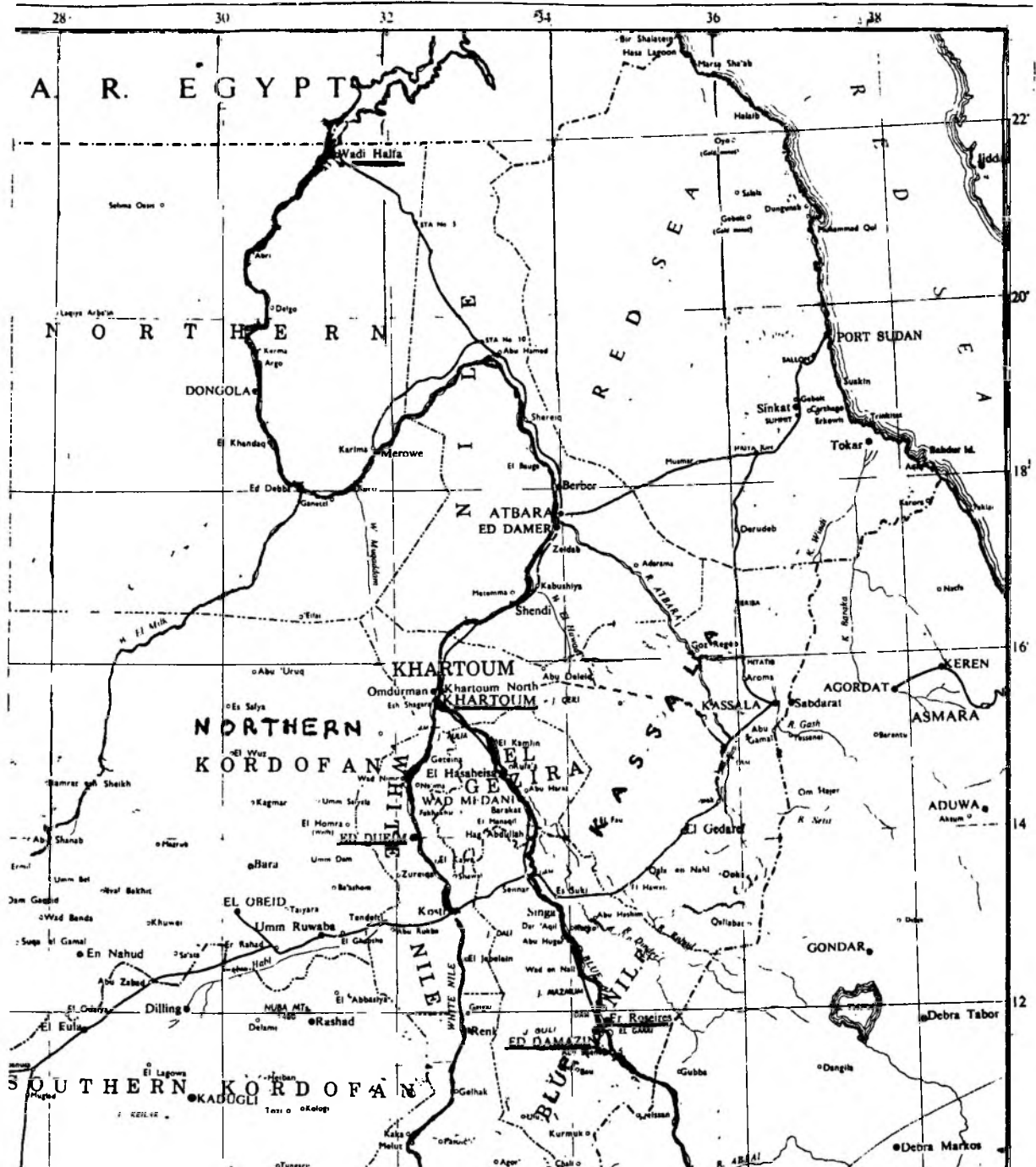
- 4.1 The main line is 90 metres with floats bearing branch "wings" of 1 to 2 metres length with sinkers and hooks at the ends baited with worm or tilapia. One end of the long line is fixed to the bank, the other is weighted to mid-stream and usually left all day before collection of the catch. Each fishing unit might employ several long lines.
- 4.2 In other parts of the Sudan an alternative version is the "Jagou"; a line with up to 500 baited hooks placed in any appropriate direction in shallow water; inspected every 24 hours; most types of fish may be taken by line methods.

Baskets (Sharaks)

5. Traps or baskets constructed of palm leaves (Zaaf); placed in shallows adjacent to gaps, or passes, created in sand or mud dams to allow fish entry to the basket traps.

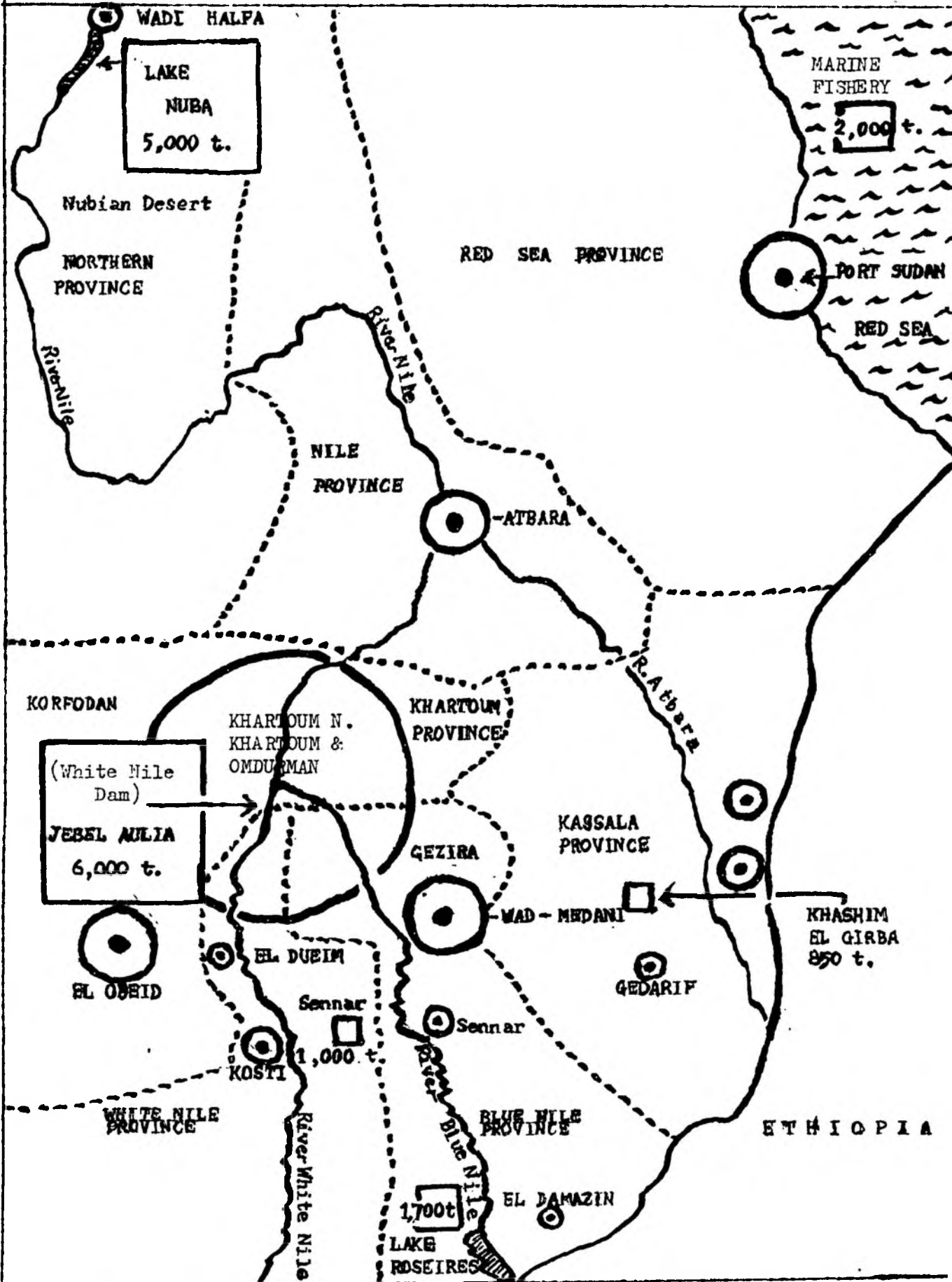
* * *

SUDAN



Scale: 1:8,000,000.

SUDAN POTENTIAL FISHERY
RESOURCES & PRINCIPAL
USER DESTINY



KEY: Map area to general scale - 1 : 5,000,000
 --- = Approximate Province borders
 ○ = Approx. ratio population □ = Estimated resource potential
 (0.5cm.sq. - 1,000 t.)

Source: Adapted from assessment: F. Henderson FAO-UN. 1975 "Fisheries of Reservoirs of Central Sudan."

AVERAGE RETAIL PRICES OF FISHBased on 1978 Returns from Selected Centres

| Town or Centre | Grade of Fish | | | |
|---------------------|---------------|-----|-----|-----|
| | I | IIA | IIB | III |
| WADI HÁLFA | 90 | 50 | 40 | 25 |
| ATBARA | 70 | 50 | 40 | 25 |
| KHARTOUM: | | | | |
| "OPEN" MARKET PRICE | 125 | 75 | 50 | 30 |
| WNFDMC "OFFICIAL" | | | | |
| PRICE | 90 | 60 | 50 | 25 |
| MEDANI | 80 | 70 | 50 | 30 |
| KOSTI | 60 | 45 | 35 | 20 |
| EL DUEIM | 40 | 30 | 25 | 20 |
| SENNAR | 60 | 40 | 30 | 20 |

- Notes:
- (a) Prices quoted are piastres per kilo.
 - (b) Fuel and inflation rises generally indicate allowance required for a probable overall increase of between 10 and 20 per cent on the above figures since original compilation.
 - (c) Prices at stations and townships distant from the main centres listed above vary considerably, some by as much as \pm 20 per cent, depending on location, transport facilities, demand and supply situations.
 - (d) WNFPMC = White Nile Fish Production and Marketing Corporation.

Source: (Updated) from ETI Co. Ltd., UN-ILO, Prefeasibility Study, February, 1979.

INTERNATIONAL CO-OPERATIVE ALLIANCE

The International Co-operative Alliance (ICA) is a worldwide organisation of co-operatives of all types, founded on 19th August 1895 in London. It is the only body entirely and exclusively dedicated to the promotion of Co-operation in all parts of the world, with a membership of over 346 million in 63 countries, more than half from developing countries and farming areas.

Through the Alliance its members, without distinction of colour or creed, are linked with their fellow co-operators throughout the world in the pursuit of co-operative aims, and the aspirations of co-operators for a better social order and world peace are voiced by the ICA in the Council of Nations and the Agencies of the United Nations. As a Non-Governmental Organisation, the ICA has Consultative Status Category 'A' with the United Nations.

Besides the governing bodies, Congress, the Central and Executive Committees, there are various auxiliary committees which serve various types of co-operatives such as agricultural, fisheries, consumer, banking, production-artisanal, etc.

FISHERIES COMMITTEE

Objectives

Fishermen's co-operative organisations, members of the International Co-operative Alliance, have formed this Auxiliary Committee with the aim of promoting in every country fishermen's co-operatives and good understanding and economic agreement between fishermen's co-operatives and other co-operative organisations; in the international sphere to promote economic relations between the fishermen's co-operatives of different countries and between them and other co-operative organisations.

The Committee also prepares and issues to its constituent organisations reports, documentation and advice.

Activities

Recent activities of this Committee have included the Fisheries Co-operative Management Seminar for the South-East Asian Region, held in Tokyo; the strengthening of collaboration with FAO; the participation of Zengyoren (Japan) in the 7th Meeting of the Working Group for Co-operative Fisheries for South-East Asia; and the Chairman's visits to Latin America and Canada, where the possibility of organising a seminar in Canada for co-operative fishermen from Latin America was discussed. A second fresh-water aquaculture seminar would be held in June, 1980, in Hungary.

Membership

Present members of the Committee are fishermen's co-operative organisations from Canada, Hungary, Iceland, Malaysia, France, Ghana, Indonesia, Italy, Japan, Korea, Poland, Sri Lanka, Turkey, United Kingdom. The Chairman is Mr. J. Saito from the Japanese National Federation of Fisheries Co-operative Associations (Zengyoren).