RESEARCH FOR THE MANAGEMENT
OF THE FISHERIES ON LAKE TANGANYIKA

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TOWARDS A REGIONAL INFORMATION BASE FOR LAKE TANGANYIKA RESEARCH

by

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PREFACE

The Research for the Management of the Fisheries on Lake Tanganyika project (Tanganyika Research) became fully operational in January 1992. It is executed by the Food and Agriculture organization of the United Nations (FAO) and funded by the Finnish International Development Agency (FINNIDA).

This project aims at the determination of the biological basis for fish production on Lake Tanganyika, in order to permit the formulation of a coherent lake-wide fisheries management policy for the four riparian States (Burundi, Tanzania, Zaïre and Zambia).

Particular attention will be also given to the reinforcement of the skills and physical facilities of the fisheries research units in all four beneficiary countries as well as to the buildup of effective coordination mechanisms to ensure full collaboration between the Governments concerned.

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GCP/RAF/271/FIN PUBLICATIONS

Publications of the project are issued in two series:

A series of technical documents **(GCP/RAF/271 /FIN-TD)** related to meetings, missions and research organized by the project.

A series of working papers **(GCP/RAF/271/FIN-WP)** related to more specific field and thematic investigations conducted in the framework of the project.

For both series, reference is further made to the document number **(01)**, and the language in which the document is issued: English **(En)** or French **(Fr).**

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EXECUTIVE SUMMARY

1. A review is presented of mission work carried out during September-December 1991 for Project GCP/RAF/271/FIN, Research for the Management of the Fisheries on Lake Tanganyika (Tanganyika Research). All four riparian states were visited in the following order: Burundi, Zaïre, Zambia, and Tanzania.

2. The main objectives of the mission were to conduct an inventory of data sets and other relevant documents held at fisheries research/administrative stations around the Lake and to begin the task of assembling this material for use in the Project research programme.

3. A sizeable body of photocopied or duplicate-copy material was secured from lakeside stations and other sources for deposit at the Documentation Centre to be located at Project Headquarters in Bujumbura. These are listed in Annexes to this report, along with further inventories of other records available at the various stations -Bujumbura (Burundi), Uvira (Zaïre), Mpulungu (Zambia), and Kigoma (Tanzania).

4. In general it was found that archive and data storage requirements are poorly caterred for at stations around the Lake, and that major upgrading is needed. The Project should consider providing for both physical improvements to storage facilities and the technical assistance required for their reorganisation and effective management.

5. A need was also identified for the restoration of copies of important reports and documents covering past research projects to stations that originally hosted the work. Records have been lost or misplaced or have otherwise disappeared. others have been damaged through improper storage. Backup copies of relevant items can probably be obtained from FAO Fisheries Library holdings in many cases.

6. A further need was identified to secure backup copies of original data sets and field notes now lying at some stations, as other copies may not be available elsewhere.

7. Several other regional and national agencies/projects are now or are soon to be involved in activities related to Tanganyika Research Project concerns. Efforts should be pursued to develop collaborative ties with them for the purpose of research coordination and information exchange, and possible cooperation in developing and maintaining a regional documentation facility.

8. Current fisheries statistics collection and reporting activities for Lake Tanganyika are of widely varying standards. Only for Burundi and Zambia can existing systems be described as in any way adequate. It is

suggested that elements of both of these systems be used for the development of a standardised approach for the entire Lake. The present Burundi system in particular could serve as a model for a harmonised system. Measures would have to be taken however to overcome those operational bottlenecks common to the other countries but not posing such serious problems in the Burundi context.

9. The development of standardised statistical collection and reporting procedures is an immediate task to be addressed by the Project, and in this respect thorough consultations need to be held with relevant fisheries administrators and researchers in order to devise a draft plan for approval and adoption at the Statistical Coordination and Standardization Workshop to be convened later in 1992.

10. The central and southern zones of the Zaïre shoreline and the southern (Rukwa Region) part of the Tanzanian shoreline remain little known in terms of the fisheries they host. This is a serious information gap and the Project should promote frame, catch assessment, and socioeconomic survey work along the lines of what has already been carried out for other sectors of the Lake by the Fisheries Statistics and Information Project (BDI/90/002) and the IFIP Project (RAF/87/099). Tanganyika Research should also consider providing assistance to facilitate efforts now in progress at Mpulungu and Bujumbura to build computer data bases out of historical catch/effort and length/frequency records.

1. INTRODUCTION

1.1 Background

Planning and mobilization activities for Project GCP/RAF/271/FIN, Research for the Management of the Fisheries on Lake Tanganyika (Tanganyika Research), have been carried out over the course of several years (Dunn and Hyytinen, 1987; Mikkola and Lindqvist, 1989; Lindqvist and Mikkola, 1989; Pieroni, 1991). By September 1991 most of the Agreement formalities between FAO and the governments of the four riparian states (Burundi, Tanzania, Zaïre, and Zambia) had been completed, allowing Project field mission activity to get underway.

The Project Document provides a brief description of GCP/RAF/271/FIN in the following terms:

> The project aims at the determination, through implementation of a modern scientific research programme, of the biological basis for fish production on Lake Tanganyika, in order to permit the formulation of a coherent lake-wide fisheries management policy for maximizing the sustainable exploitation of the important but fluctuating pelagic fish stocks, so as to supply high-protein food for the human populations of the four riparian States.
>
> This initial five-year research programme also involves particular attention to the reinforcement of the skills and physical facilities of the fisheries research units in all four beneficiary countries, as well as the build-up of effective coordination mechanisms to ensure full collaboration between the Governments concerned in their much longer-term research and management programmes regarding the shared resources of Lake Tanganyika, particularly the fish stocks, but also conservation of their unique aquatic environment.

As an initial project activity a mission was organised to begin the task of assembling basic data collected over the years at various national fisheries research stations around the lake. As was pointed out in the mission brief,

> In order to gain an understanding of the relationships among the environment, fishes and fisheries the project will require an historical perspective as well as current field investigations. Over the years data valuable for the project's activities have been collected at lake-side laboratories, but no effort has been made to integrate and interpret the data in a holistic way. Thus, the main objective of this consultancy is to provide the raw data required to develop the historical perspective and to better plan for the current studies by identifying gaps in the historical data [record].

1.2 Mission Terms of Reference

The specific Terms of Reference for the mission were spelled out as follows:

(a) Generally, to inventory biological, fishery statistical, economic and limnological data held at various laboratories, fishing companies and fisheries administrations around the lake and elsewhere;

(b) Compile a list of the data important for the project's future activities in fisheries biology, stock assessment, limnology and statistics;

(c) Copy the essential data and carry it to the project's headquarters in Bujumbura;

(d) Decide on which data should be entered on a data base and estimate the costs for doing so; and

(e) Write a brief technical report on findings including recommendations for future data storage and retrieval at each fishery station.

1.3 Itinerary and Work Programme Revisions

Whilst most of the tasks set out in the mission TORs were accomplished, circumstances made it impossible to complete the entire programme as planned. For one thing, certain types of information readily available in one country were not easy to obtain in another. This posed difficulties for any attempt to construct country-by-country information inventories according to a standard set of categories. Also, for that material which was available, it was not always possible to obtain duplicates of data sets and other documents at some stations due to the lack of photocopying facilities. Photocopies were made or spare copies obtained whenever possible, but otherwise a listing down of relevant items had to suffice.

Far more serious were the difficulties of obtaining information directly for the Zaïrean sector of Lake Tanganyika. A preliminary visit was made to Zaïre in early September 1991 (see Annex I), when plans were made with the Director of the Centre de Recherche en Sciences Naturelles/Uvira (CRSN/Uvira) to visit Kalemie and other stations in Zaïre during the first half of November (upon the return of the Director from a trip abroad). But events of military and civil unrest which erupted towards the end of September blocked any further fieldwork in the country. Even a return trip to Uvira from nearby Bujumbura was specifically ruled out by FAO officials. An alternative plan of meeting the CRSN/Uvira Director in Bujumbura was thwarted by the sudden outbreak of civil disturbances in Burundi during late November. These latter were fortunately of short duration, but did cause some additional interruption of mission work.

Following further communication with FAO-Rome and meetings with the Tanganyika Research Project Coordinator and Project Scientific Coordinator, the Consultant was requested to look after a few other matters in addition to those stipulated in the TORS. These included: (a) making contact with members of the Biodiversity Project Formulation Mission during their visit to Burundi; and (b) investigating the possibilities for research vessel refitting work to be carried out in local Kigoma boatyards.

1.4 Report Contents and Organisation

In what follows, the situation at each of the major national fisheries research/administrative establishments is briefly reviewed with respect to (a) existing archival records and facilities; (b) statistics capabilities; and (c) additional research/development activities and sources of information of potential relevance to the Tanganyika Research Project. The final section of the main report contains a summary of mission findings and recommendations.

Lists of specific documents and data sets secured in the course of the mission for deposit at the Tanganyika Research Documentation Centre[1], and of other documents and data sets which were noted but could not be readily obtained, are provided in Annexes II through V. The Bibliography of Fisheries and Limnology for Lake Tanganyika (FAO, 1982), contains some 700 references to published and unpublished literature, and further reviews of relevant studies, articles, and reports have been prepared by Dunn and Hyytinen (1987) and by Lindqvist and Mikkola (1989). The bibliographical record for the lake is therefore quite well known, and the references cited in this report are intended only for the purposes of acknowledgement or as supplements to update the existing record. With regard to the latter purpose, it might be appropriate first to note that a major volume entitled Lake Tanganyika and Its Life (Coulter, ed., 1991) has only just appeared.

[1]the name adopted in this report for what will be the Project's main reference facility/library/archives at Bujumbura Headquarters.

2. COUNTRY REVIEWS[2]

2.1 Burundi

2.1.1 Archival records

The FAO has been associated with several fisheries projects in the Burundi sector of Lake Tanganyika in the past. These have focussed on general survey and development (BDI/70/508: 1970-73), resources investigations (BDI/73/020: 1974-76), and development of the artisanal sector (BDI/73/007: 1974-76; UTF/BDI/018/BDI: 1976-81). Although a substantial number of reports and articles resulted from these earlier projects (FAO 1982), a great deal of the original data sets stored at the Département des Eaux, Pêches, et Pisciculture (DEPP) have been destroyed or misplaced over the intervening years. The only records that now exist in any comprehensive form are those pertaining to industrial fleet catches. The Burundi industrial fishery started in the early 1950s, though it is probable that reliable catch data are available only from the early 1970s. The staff of the FAO/UNDP Project BDI/90/002, 'Fisheries Statistics and Information', are now recovering these old records and mounting them on computer data bases. Ultimately it should be possible to reconstruct a statistical picture of the industrial fisheries using data on daily catches by boat, fishing area, and species. The reprocessing exercise will allow for corrections of errors made in the original compilation of much of these data. An incorrect raising factor was used for some years, and there are simple arithmetical mistakes to set right as well. In general there is a need to standardise the way in which the data have been handled in the past. (Bellemans, pers.comm., 1991).

A similar exercise is being mounted to recover and reprocess length/frequency data collected for the industrial fishery from 1973 to present. These data cover the major commercial species of *Stolothrissa, Limnothrissa,* and *Luciolates* (both juveniles and adults). At present all the length/frequency data going back to 1983 have been captured on computer data bases.

Records pertaining to the artisanal and traditional fisheries unfortunately seem to be irretrievable, at least on the local scene. Virtually all raw production data collected before September 1990 are reported to have been lost. old data forms have been reused in the field in many cases, because there were no new forms available for statistics collection. old and/or reused forms have also been thrown away rather than being kept in store. This is particularly disappointing for researchers and planners since the real growth of the Burundi fisheries within the last two decades or so has been in the artisanal sector. A complete reversal has

[2]Presented in the order countries were first visited during the mission. occurred from the situation which prevailed earlier on. Indeed, the industrial fishery is of comparatively little consequence, accounting for less than 10% of the total catch landed thus far in 1991 (Bellemans, pers.comm., 1991).

If backup copies of early records, data sets, and reports on the fisheries of the Burundi portion of Lake Tanganyika can be located at the FAO Fisheries Library in Rome or in other old project files, an immediate effort should be made within the context of the Tanganyika Research Project to have them reproduced and sent to the Project Documentation Centre in Bujumbura. Efforts should also be directed towards the rehabilitation of information/document storage and retrieval facilities at the DEPP office as well.

2.1.2 Current statistical collection procedures

Major improvement of the statistical collection and reporting system for the Burundi Lake Tanganyika fisheries is now underway within the framework of Project BDI/90/002, mentioned above. Significant progress has already been made to update the information base, particularly in regard to the artisanal sector (Bellemans 1991).

Catch data for the now limited industrial fishery of Burundi continue to be supplied through enumeration activities at the Bujumbura Central Market. Although the 17 still active purse seiners may land their catches at any one of eight sites (see map, Annex II.A.1), all fish must be shipped to the Bujumbura market for recording and sale. Data collection is thus a very straightforward exercise involving the completion and submission of a daily form (Annex II.B.1).

The current catch/effort data collection system for the artisanal and traditional fisheries of the Burundi waters of Lake Tanganyika is based on the approach devised by FAO personnel in the early 1970s. This consists of a two stage stratified sampling system and the application of appropriate time and space raising factors. Recent frame survey exercises carried out by BDI/90/002 Project staff have enabled these factors to be properly 'calibrated.' The frame surveys consist of straight censuses of fishing factors for the 42 shoreline villages, conducted over a three day period. Two surveys are supposed to be held per year, one in June and the other in December. A specimen of the recording form used in the surveys is shown in Annex II.B.2.

The lakeshore is divided into a total of three strata, and recorders are stationed at 15 beaches. The collection system is a static rather than a dynamic one, with recorders permanently in residence at their assigned posts instead of making rounds between different sites. At the end of each lunar month a vehicle is sent out from DEPP Headquarters to collect the completed data forms (see Annex I IB. 3-5 for specimens) . The data are tabulated and processed to yield daily and monthly estimates of catch per sample village, and monthly estimates of catch per stratum and per administrative province.

A modification to the system put into effect from July 1991 involves a more detailed specification of industrial and artisanal catch composition. Previously fish were simply categorised as 'ndagala' (i.e. *Stolothrissa, Limnothrissa*, and

juvenile *Luciolates),* 'mukeke' (i.e. *Luciolates),* and 'sangala' (i.e. all *Lates).* Now there are further enumeration categories for 'kahuzo' (juvenile *Stolothrissa)* and 'nyamu-nyamu' (juvenile *Luciolates).* The new arrangement will thus register periods of abundance of very small fish, which was not possible before.

After compilation and processing, the catch data by quantity and value for the artisanal and industrial fisheries are reported in the format shown in Annex II.B.6.

In terms of current length/frequency data collection, sampling from the industrial boats continues as before. But as the purse seine fishery has dwindled to a comparatively insignificant level, it was decided to institute a sampling scheme for the artisanal fishery from October 1991. The approach is the same as that used in the industrial fishery, i.e. two three-day sampling periods per lunar month. Sampling exercises are carried out at three main villages -- Kanyosha, Rumonge, and Muguruka, each representing one of the strata.

2.1.3 Other information, related projects/research activity

(a) BDI/90/002 Project Documents

A number of valuable documents containing extensive information on historical and contemporary trends and characteristics of the Lake Tanganyika fisheries of Burundi have been prepared through the Fisheries Statistics and Information Project, and these are available at the Project offices located in the DEPP building, in the same compound where the FAO/FINNIDA Project will have its headquarters. A complete list of the documents which have been prepared to date is given in Annex II.C..1.

(b) IFIP Project

The FAO/UNDP Regional Project RAF/87/099, 'Inland Fisheries Planning, Development, and Management in Eastern/Central/Southern Africa' (IFIP) has been operating from offices in the DEPP compound since 1989. The Project has assembled what is probably the most comprehensive collection of contemporary fisheries publications anywhere in the region, many related to Lake Tanganyika. IFIP scientists have themselves produced numerous technical documents and working papers that report on the outcome of missions, field studies, regional and national symposia, and workshops on the biological and socioeconomic aspects of major fisheries and their bearing on management issues. All of these documents are available at IFIP Headquarters. Those that deal with Lake Tanganyika in particular are cited as appropriate in the course of this report. The IFIP library should prove an important resource for scientists working in the context of the Tanganyika Research Project. The Project might consider the idea of offering to combine forces with IFIP and operate it on a joint basis, as a regional fisheries reference centre. Tanganyika Research's contribution to the effort could possibly be in the form of further acquisitions to the collection,

physical improvements to storage facilities, provision of professional librarian assistance, and so on.

(c) Other FAO Work, Related Documents

Additional documents collected in the course of the present mission and placed on file for the Tanganyika Research Project derive from the early 1970s research project BDI/73/020, the Symposium on River and Floodplain Fisheries held in Bujumbura in 1977, and various other sources. These are listed in Annex II.D.1 (pre-1980 vintage articles) and Annex II.D.2 (recent articles).

(d) SIL Symposium and Biodiversity Conference

Also acquired for the Project Documentation Centre were the papers relating to the Lake Tanganyika which appeared in the Proceedings of the Societas Internationalis Limnologiae (SIL) Symposium on 'Fisheries of the African Great Lakes' , held in Bujumbura in late 1989 (listed in Annex II. E. 1), and the complete proceedings of the 'First International Conference on the Conservation and Biodiversity of Lake Tanganyika', convened in March 1991 at the University of Burundi (listed in Annex II.E.2).

(e) Belgium/CEPGL Project and EEC Fisheries Development Project

A Belgium/CEPGL (Communauté Economique des Pays des Grands Lacs) applied hydrobiology project has been in preparation for some years, as noted by Mikkola and Lindqvist (1989). According to available information it should be starting up in early 1992. The project is to focus on Lakes Tanganyika and Kivu and the Bugasera Complex. It is understood that primary attention will be focussed on the inshore species communities of Lake Tanganyika rather than the pelagic stocks. As Belgium/CEPGL intends to establish a full laboratory and documentary/data base facilities, Tanganyika Research scientists should seek to establish collaborative links with this project.

Mikkola and Lindqvist (1989) also make reference to an EEC project on fishing technology, input provision and training that has been in the pipeline for quite some time and is now in the preparatory phase. The mission has no updated information on the status of this project.

(f) German-funded Water Project -- Bujumbura

Watershed and water quality issues will obviously be important concerns of Tanganyika Research Project work. In this connection contact should be made with the engineers and other technical personnel involved with a German-funded scheme to improve Bujumbura's water supply and waste treatment systems, now said to be underway.

(g) Biodiversity Pipeline Project

A meeting was arranged during the mission with members of a group formulating plans for the pipeline project 'Pollution

Control and Other Measures to Protect Biodiversity in Lake Tanganyika'. The proposed project is being organised in the context of the Global Environmental Facility (GEF), with participation in different funding, implementing, and advisory capacities by the World Bank, UNDP, and UNEP. An ambitious six year programme of research, monitoring, and conservation action is being planned. As summarised in the Biodiversity Project Brief, the objective

> ... is to demonstrate an effective regional approach to prevent the loss through human activities of the natural biodiversity of Lake Tanganyika's international waters, with a view to ensure the survival of this and other freshwater lake ecosystems.
>
> In order to accomplish this the project will quantify the biodiversity of Lake Tanganyika and the threats from pollution to the conservation of this diversity and, based on this information, implement demonstration activities to ensure that pollution is minimized and that biodiversity is conserved on a permanent basis. The project will demonstrate and act upon the direct linkage between pollution monitoring/control and the conservation of biodiversity at Lake Tanganyika.
>
> The success of pollution monitoring and biodiversity maintenance initiatives are predicated on the establishment of a sustainable programme of Lake conservation. Therefore, a focus of the project will be to establish training programmes and provide institutional support to enhance local capabilities in water pollution monitoring and control, and to promote greater self-reliance in aquatic conservation biology capabilities.

Clearly the Tanganyika Research and Biodiversity projects share extensive common research interests. This point was emphasised during the meeting with members of the Biodiversity group in November 1991. Possibilities for collaboration and cooperation were reviewed in terms of sharing certain operating facilities and designating research topics/areas for specialised concentration by one or the other project teams, thus avoiding unnecessary duplication of effort. A memorandum detailing the content of discussions was prepared (Reynolds - Hanek, 15.11.91) and left on file, along with a copy of the Biodiversity Project Brief and a description of the GEF programme. As the Biodiversity Project is still in the formulation stage, it will presumably be at least a year or two before field activities commence, providing that funding commitments are finalised and no delays are encountered with other preparations.

2.2 Zaïre

2.2.1 Archival records

It appeared from the short visit made to CRSN/Uvira that the library and archival records of the institute were being looked

after on a very basic caretaker level only. Books, documents, journals, and miscellaneous articles and old data files are shelved in a fairly neat manner, but little or nothing is being done to keep the collection secure from damage by dust, moisture, and insects, or to develop it through new acquisitions and the provision of efficient information retrieval procedures. Like the rest of the Uvira institute, the library has suffered from inadequate upkeep. This is understandable in the context of CRSN's chronic shortage of funds and the country's ongoing political and economic crisis. CRSN/Uvira staff are listed in Annex III.A.l.

2.2.2 Current statistical collection procedures

All recent observations in the literature pertaining to the fishery of the Zaïre sector of Lake Tanganyika point out the difficulty of building an adequate picture of the situation given the extremely imprecise and unreliable nature of available official data. There appears to be no effective, standardised system of catch and effort statistics collection covering the entire coastline. In principle the fisheries administration operates in the field through a staff of fish guards, heads of sectors, and zone supervisors (Maes *et al.* 1991). In practice administrative Organisation and capabilities are exceedingly weak.

The northern (Uvira and Fizi) zones of the Lake have received relatively more attention in terms of statistical and survey work over recent years in comparison with the southerly zones of Kalemie and Moba. This is as a result of certain project initiatives in the area, to be noted below.

Within the last decade there has been a dramatic shift in effort by both artisanal and industrial operators from the northern shoreline further to the south, with Kalemie becoming the main fishing base. It is understood that some 15 purse seiners work out of the Kalemie area at the present time. These include the two units run by the CELZE (Communauté Evangélique Lutherienne du Zaïre-Est) Fishing Project mentioned by Mikkola and Lindqvist (1989). Local fisheries officials reportedly try to monitor the catches of the industrial fleet and provide returns to the Directeur de Pêche, Ministère de 1'Environnment, Conservation de la Nature et du Tourisme (ECNT) on a monthly basis. An example of one such monthly report for May 1991 is shown in Annex III.B.1 It is not known however if this activity is systematic or merely sporadic. Whatever the case, it is likely that all monitoring of fishing operations and indeed the operations themselves have been severely disrupted by recent events in the country.

2.2.3 Other information, related projects/research activity

(a) CRSN/Japan Universities Collaborative Research.

Most research work at CRSN/Uvira over the last decade or so has been carried out under the auspices of the collaborative CRSN/japan universities Ecological and Limnological Study

Project on Lake Tanganyika and Its Adjacent Regions, funded by the Japan International Cooperation Agency and the Japan Ministry of Education, Science, and Culture. The research programme has covered a wide range of topics, with specific studies tending to be short-term and highly focussed in nature. Although the primary emphasis has been on basic ecological, limnological, and fish biological research, some effort has been made also to monitor artisanal catches through a sampling programme in the Uvira sector of the lake, and to conduct fish marketing studies as well.

Research results have been reported in a series of project publications, seven volumes of which have appeared to date. They have been reported in other monographs, symposia papers, and journal articles as well. The project has in fact generated a very substantial literature in one form or another, an accomplishment that may not be fully appreciated as yet in fisheries research and development circles. This may be due in part to the limited circulation of the Ecological and Limnological Study on Lake Tanganyika and Its Adjacent Regions series, and in part to the fact that articles have appeared in a wide variety of other flora, many of them written in Japanese. The extent of the literature base can be seen by reference to Annex III.C.1 , which reproduces the list of 'Papers, Reports, and Articles Already Published or In Press' authored by project members, as it appeared in Volume VII (March 1991) of the Project's publication series.

As noted earlier by Mikkola and Lindqvist (1989), the CRSN/Japan Project is of long-term duration and opportunities should be explored for developing co-operative relations with it.

(b) CRSN/IFIP Survey Work.

In January 1991 the IFIP Project in conjunction with CRSN/Uvira personnel undertook a census of artisanal and traditional fishing units along the northern part of the Zaïre shoreline, extending about 250km from the border with Burundi to the area around Kazimia (see map, Annex III.C.2). The exercise was carried out in order to compile an inventory of basic characteristics of the fisheries, to obtain precise figures on fishing unit numbers in order to facilitate comparison with previous censuses and develop some appreciation of changes in the fisheries, and to lay the groundwork for further socioeconomic survey work planned for later in 1991. Results of the census exercise have been published in the IFIP Project Working Paper series (Maes *et al.,* 1991).

The fuller socioeconomic survey covering the same stretch of coastline was mounted in May 1991, through a collaborative effort involving IFIP (researcher, assistant, vehicle, funds), CRSN (interviewers), and SOCOFIDE (Société de Coopérative de Fize pour le Développement -- boat, captain, assistant, interviewer) . The objectives of the survey were to:

- assess the socioeconomic structure of the fishery in the area under study;
- gain insight into the performance of the fishing units; and
- develop benchmark data for assessment of the evolution in the fishery.

It was decided to fix the sample size at 10% of the total number of units in the northern part of the lake as determined by the January 1991 census. This resulted in a sample of 250 units. The sampling strategy was based on a multi-stage stratified random selection approach. The same three geographical strata defined for analytical purposes in the census exercise were used for the socioeconomic survey, viz:-

- north of Burton Bay up to the Burundi border (10% sample 130 units);
- Burton Bay (35 units); and
- outer (eastern) side of Burton Bay peninsula south to Kazima (85 units).

Shoreline villages were next classified into four groupings according to the number of fishing units they contained (<10; 10 - 24; 25 - 39; and ≥40).

Following a random selection of two villages of each class per stratum, sample size per village was fixed according to the total number of units in the village related to the sample size of the stratum.

Interviews of individual unit proprietors were then carried out using a questionnaire that probed for details of personal history, fishing activity, gear and equipment used, catch disposal, operational problems, and so on. Analysis of the data collected is now underway. Results are to presented in a further IFIP publication, provisionally entitled 'Caracteristiques socioéconomique de la pêche zaïroise au Lac Tanganyika' (Leendertse, pers.comm. 1991).

2.3 Zambia

2.3.1 Archival records

The library at the Zambia Department of Fisheries (DOF)Headquarters in Chilanga has been fairly well maintained with respect to the physical storage of books and documents, the filing and information retrieval systems, and the securing of new acquisitions. Improvements are definitely needed in all these areas, but it can certainly be said that the DOF has managed to retain the basic core of a good archival facility despite the budgetary problems that have plagued its operations in recent years due to the economic reversals suffered by the country as a whole. In no small measure the condition of the library and the general professional commitment of DOF officers to maintaining a strong research orientation is a legacy of the earlier days of the Central Fisheries Research Institute. Much of the Institute's research programme was documented in the five volumes of the Fisheries Research Bulletin of Zambia that appeared between 1963 and 1971. A complete bibliography of work related to the fisheries of Zambia recently has been produced and is available at the DOF Library (DOF-Zambia, 1990; Mubamba, pers.comm., 1991).

Research activity related to the Zambian sector of Lake Tanganyika has been conducted mainly from Mpulungu, where the DOF opened a Fisheries Research Station in 1959. A number of the earlier studies done for the southern part of the lake have been noted in reports by Pearce (1985a, 1985b). An inventory of all work for which data sets or other records that still exist at Mpulungu station is provided in Annex IV.A.l. The archival storage facilities at the station are limited and in need of upgrading and expansion. In some cases, as remarked in the inventory, original sample collections, data sets and field notes are thought to be the only or almost the only records of their kind still available anywhere. In a few instances written or typed work dating back many years is becoming faded and worn to the point of illegibility, and pages are sometimes missing altogether. It was impossible during the time of the mission visit to arrange for extensive photocopying work, as facilities simply were not available. An early attempt ought to be made by Tanganyika Research Project personnel, therefore, to sort through the Mpulungu papers again and produce backup copies where needed.

Industrial fishing started up in the Mpulungu area in 1962 and the number of active companies and their associated units has fluctuated widely over the years. At the present time there are ten companies operating 17 fishing units. Historically the industrial operations are much better documented than those of the artisanal fishery. Daily catch records for the company units go right back to the beginning of operations almost 30 years ago. within the last few years a major effort has been mounted to capture this information on computer data base files (Pearce, pers.comm., 1991; see Annex IV.A.2).

Computer data bases are also being built up from length/frequency field measurements collected for both the industrial and artisanal fisheries. Length/frequency sampling exercises have been carried out in the Mpulungu area since 1961, and data have been mounted on computer back to 1980, when the current data entry forms and twice-per-month sampling exercise for each commercial boat went into effect (Annex IV.A.3). A serious bottleneck to all the data base development has been the lack of any desktop computer unit at Mpulungu, meaning that all entry work must be carried to Lusaka and Chilanga.

A total of four basic gillnet surveys have been executed in Zambian waters since the Mpulungu DOF station was established (Pearce, 1985a; pers.comm., 1991). A three-year exercise was carried out in the 1960s by Coulter (1966, 1970a, 1970b) and another in the 1970s by Kendall (1974). Pearce conducted a further major survey between 1979 to 1983 (Pearce, 1985a), and a more limited exercise was completed in 1990 (Phiri, pers. comm., 1991). The two most recent surveys made use of the standard data collection form shown in Annex IV.A.4-5. All these recent data have been mounted on computer files in Chilanga.

Catch assessment surveys (CASS) have been carried out for the Zambian national fisheries since 1973. Prior to that time another statistical monitoring system was used which relied on resident recorders working at designated landings. For Lake Tanganyika there were five permanent fish scouts posted at different sites around the Zambia shoreline. Fisheries statistics compiled under the old system were published annually from 1966 to 1973 by the Central Statistics Office. The transition between the old system and the CAS approach was not immediate. The first few years of CAS work were basically pilot efforts, and it was not until 1977 that the first results regarded as reliable were produced for Lake Tanganyika. Data for all previous surveys back to 1977 are being entered for computer processing. A list of sample results now on file at Tanganyika Research Project Headquarters is provided in Annex IV.A.6. The current CAS sampling programme is described in more detail below.

2.3.2 Current statistical collection procedures

Catch statistics continue to be collected for all industrial units operating in the Mpulungu area on a daily basis. The same applies for the one industrial operation based close to Nsumbu to the north, at Cape Kachese. Each unit files a return using the form shown in Annex IV.B.1. detailing the results of every trip. The form has also been completed on a daily basis by a few selected artisanal fishers in the Mpulungu area since 1985, though the information produced must be regarded as indicative rather than truly representative.

The DOF relies on its CAS exercises to generate a comprehensive picture of catch levels, trends, and other characteristics of the artisanal fishery. over the past few years these have been scheduled to take place thrice annually. Previously CAS rounds

were scheduled on a quarterly basis, but this system proved too expensive in operation. Even under the reduced programme, however, it is difficult to execute each and every round because of financial constraints. In the Nsumbu area, for example, no CAS rounds at all have been completed for 1991.

In principle, the CAS programme for Lake Tanganyika runs as follows. The shoreline is divided into four strata (see map, Annex IV.B.2). Three of these strata are handled by field teams operating from Mpulungu, and one from Nsumbu. A frame survey is supposed to be part of each CAS round. This covers every fishing village, and records details of number of fishers, number and type of boats, and number, type, and gear complement of fishing economic units (FEUs), made up of the fisher owner/operator, the boat (if applicable), and the gear. The frame survey forms (see Annex IV.B.3-4), when completed and tabulated, can thus provide a complete census of gear and number and type of fishers and units.

For the actual catch assessment work, each stratum is divided into three minor strata based on village size, and within each minor stratrum three villages are randomly selected for sampling. The sampling procedure lasts for three days. On Day one, each fisher is interviewed and details are recorded as to type of boat and whether the individual went fishing for the last three days. On Days One, Two, and Three, a list is also compiled of who actually went out fishing. From each day's list a sample is drawn of six fishers (if ≤10, then everybody), who are interviewed separately. Details are elicited on gear and effort used that day, boat and crew composition, and catch by species, number, and weight. Specimen copies of the data entry forms employed in the CAS exercises are provided in Annex IV.B.5-6.

With reference to marketing data, recorders are stationed on a daily basis (or according to the frequency of traffic) at the major road shipment points in Mpulungu and Nsumba. Every trader in fresh or dried fish leaving on a bus or lorry is interviewed and details obtained on the type of fish, weight, value, destination, mode of shipment, and transit time for his/her consignment. These details are entered on daily forms and the information is later summarised on monthly forms (Annex IV.B.7-10).

Annual summaries of catch, effort, and marketing data for Zambia as a whole and by each major fishery are now compiled by the DOF Statistics Section. A list of contents of the latest compilation (July 1991) is provided in Annex IV.B.11 , and a copy of the entire report has been placed in the Tanganyika Research Project Documentation Centre.

Specimen data recording sheets used for current length/frequency surveys are shown in Annex IV.B.12-15. The first sheet is the standard DOF L/F form used since 1963. The next three sheets have been in use since 1980, and provide the format for the twice monthly L/F surveys carried out since that time for every commercial boat operating out of Mpulungu and Nsumba. The same forms are also used for a thrice-monthly survey of one artisanal

unit, and a twice-weekly survey on one artisanal beach carried out in the Mpulungu area since 1985.

DOF Mpulungu also monitors ornamental fish production and has done so for every month since 1983. Currently there are two companies involved in this export trade to European markets, one based in Mpulungu and the other located on the eastern shore of Hore Bay towards Tanzania. The companies are required to file the record form shown as a specimen in Annex IV.B.16.

The Zambian waters of Lake Tanganyika reportedly support a fairly active sports angling fishery, at least in comparison to the other national sectors. At least three lakeside tourist lodges offer angling as an attraction and major fishing competitions are held on an annual basis. A number of Mpulungu residents also regularly engage in recreational fishing. Large predators constitute the main targets of these anglers. The DOF might therefore find it useful to maintain records for the sports fishery, perhaps tied in with licensing procedures, or at least encourage the practice on a private basis. The idea should be considered by the fisheries authorities of the other riparian states as well.

2.3.3 Other information, related projects/research activity

(a) DOF/Japan Universities Collaborative Research

Collaborative work has been carried out between DOF personnel and visiting Japanese researchers under the same Ecological and Limnological Study Project that has been operating at CRSN/Uvira. A number of reports on findings have been produced. References are listed in Annex III.C.l.

(b) Limnological and Meteorological Data

Lake Tanganyika water levels have been regularly recorded at Mpulungu harbour twice daily (with some gaps) since 1957, and these readings can be obtained through the Department of Water Affairs. Levels have also been recorded over the same period at Nsumbu. Discharge records for both the Lufubu and Lunzua Rivers exist but are intermittent in character. The DOF office in Mpulungu has data files on the Lunzua for the periods of 1955 (one year), 1959-65, and 1969-70, and on the Lufubu for the period of 1957-1965.

Simple limnological and meteorological data were collected by DOF personnel at four stations around the Mpulungu area during 1982-1984. They include morning and evening readings for surface and bottom temperatures, Secchi disk, water colour, zooplankton abundance, cloud cover, and wind speed and direction. The Fisheries Office has recorded daily air temperature and rainfall since 1982 (with some gaps) along with surface water temperature (50m offshore) and Secchi disk readings. Since 1988 daily Min/Max air temperatures and relative humidity have been recorded.

The Met Department of the Ministry of Power, Transport, and Communications maintains a station at Mbala Town, on top of the Lake's fringing escarpment and some 40 km distant from Mpulungu. It is understood that this is one of the oldest met stations in the country. Whether the long time series of basic readings it has presumably generated is of any use to lake-focussed research will have to determined.

(c) Checklist of Zambian Fish

The Manager of Blignault Exports, one of the ornamental fish exporting concerns referred to earlier, has over the last few years been assembling a mollusc collection and also compiling a checklist of fishes found in the Zambian waters of Lake Tanganyika (Bills, pers.comm., 1991). He will be using the checklist in conjunction with his ongoing MSc. work at Rhodes University, RSA. Tanganyika Research Project scientists will no doubt wish to refer to this list when it has been completed.

(d) Planned DOF/IFIP Socio-Economic Survey

The IFIP Project in collaboration with DOF personnel is presently organising a socioeconomic survey of the artisanal fishery of the Zambian sector of the Lake, along the lines of the other exercises that have been conducted for Zaïre (Section 2.2.3 above) and Tanzania (Section 2.4.3 below). The survey should be completed by early 1992 (Hoekstra, pers.comm., 1991).

(e) Maps

The Map Office in Lusaka has a number of bathymetric, topographical, and other maps in stock that could be of potential use to Tanganyika Research Project research activity. Several of these sheets were acquired and placed at the Bujumbura Headquarters (list, Annex IV.C.1).

(f) NORAD/SADCC Project

Plans have been in the pipeline for some years for a NORAD-sponsored, SADCC-coordinated regional stock assessment project project for the Tanzanian and Zambian sectors of Lake Tanganyika. Details of the proposed project have been noted by Mikkola and Lindqvist (1989). During the mission the impression was gathered that these plans have now been shelved, at least for the time being. Further details could not be obtained.

2.4 Tanzania

2.4.1 Archival records

The TAFIRI Centre at Kigoma was developed under the FAO/UNDP Lake Tanganyika Fisheries Research and Development Project, URT/71/012, which ran from 1972 to 1978. Most of TAFIRI-Kigoma's present physical and research facilities -- laboratories, offices, demonstration processing plant, workshops, staff houses, miscellaneous equipment, and research vessel -- are legacies of this project. So too are a large number of f iles, research reports, and original data sets kept in the main of f ice and laboratory. Unfortunately the condition of some of these latter is not very good. Adequate storage facilities are lacking, and both old and new records have been damaged by dust, insects, rodents, and moisture -- sometimes all four together.

Indeed the overall condition of the TAFIRI-Kigoma complex and facilities has deteriorated quite severely over the years, owing to an almost complete absence of funds to carry out basic maintenance work. For the same reason, new acquisitions of equipment, reference material, and necessary supplies and services have not been possible, a circumstance that has seriously compromised the Centre's research capabilities.

During the mission visit substantial archival material was salvaged for transfer to the Bujumbura Tanganyika Research Project Headquarters. This mostly comprised extra copies of URT/71/012 Working Papers and miscellaneous reports. A list of what was recovered is provided in Annex V.A.1-3. Numerous files containing original data records from the old URT/71/012 Project were also found in the laboratory block, stored in trunks and on various shelves. This discovery came late in the mission visit and there was simply no time to sort and examine the files thoroughly. Also, their sheer bulk ruled out the possibility of obtaining photocopies. The only option was to compile a complete list of their contents (see Annex V.A.4). Once Tanganyika Research Project activity commences in Kigoma, an early task to address will be a review of all these files in order to decide on their value in terms of present research purposes and whether back-up copies should be made.

2.4.2 Current statistical collection procedures Statistical coverage of fishing and fish marketing activity along the Tanzania sector of Lake Tanganyika is generally poor, despite various initiatives taken to improve the situation in the past. Several factors account for this disappointing state of affairs, not least of which are the extremely difficult communications links between widely scattered landing sites up and down the 600+ km of shoreline, inadequate motivation and supervision of field staff, and a confused system of administrative accountability.

There is certainly no question about how the statistical collection and reporting system is supposed to work. Procedures are clearly laid down and plenty of forms exist to facilitate data entry and compilation at all levels. Efforts have also

been in progress since 1989 through the FAO Tanzanian Fisheries Statistics Project, URT/87/016, to streamline the analysis and reporting of national data through staff training and the installation of computer facilities at Division of Fisheries Headquarters in Dar es Salaam.

In principle catch statistics are collected by beach recorders stationed at all major landings along the Lake Tanganyika shore. That length of shoreline lying within Kigoma Region contains over 50 landing sites (map, Annex V.B.1). According to Regional Fisheries officials, 11 of the major sites are covered by 27 resident recorders, each of whom operates with a 'Form 21A' -- the 'Daily Fish Landings Work Book' . The recorders are supposed to use the work book to note down for each sampled fishing unit details of boat type ('lift net' , 'scoop net' , 'beach seine' , etc.), gear size and numbers (for gillnets), crew size, and species caught by weight and value. Procedures are for the contents of the work books to be transcribed to 'Form 21B' -- the 'Daily Record of Fish Landed', and turned over to District Fisheries Offices at the end of each fishing period (lunar cycle). District Office staff should summarise the data and enter them on 'Form 24', for transmission to DOF Headquarters, where they are eventually aggregated on an annual sheet ('Form 30'). Other forms exist for recording marketing, catch-per-unit-effort data, and so on (specimen copies of all collection forms are shown in Annex B.2-11). Despite the clear 'theory' of the monitoring and reporting system, however, it is virtually impossible to operate under present conditions.

It is known that whereas many landings occur at night or in the early hours of morning, recorders tend not to be on duty at these times. Enumerations are also missed or overlooked because field staff posts are vacant. For example, marketing activity in Kigoma Town is not recorded at all at present due to lack of enough staff. Working conditions everywhere make it difficult to perform necessary tasks. Staff are not availed of sufficient transport facilities and/or allowances to enable them to travel between dispersed landing sites. They also lack essential tools like heavy-duty scales. Data quality cannot be checked because there is virtually no supervision from the District and Regional levels. Most critically, though, the incentives of adequate and timely remuneration are lacking. Both District-level and field level fisheries staff are paid by and are answerable to the District Councils and their District Executive officers. Monthly salaries for these staff are not really sufficient to meet even basic costs of living anyway. But when they are delayed for weeks or more, the adverse effect on morale and work performance can be readily imagined.

The fundamental structural problem of fisheries administration in Tanzania -- its fragmented character – also explains in part why the statistical monitoring procedures are not working very well. Since the District Councils ultimately fall under the Office of the Prime Minister and its Administrative Board (the 'Tume Taa'), and the Division of Fisheries comes under the Ministry of Natural Resources and Tourism, there is no single

chain of command or administrative hierarchy which unites Fisheries personnel at the Regional level and below.

Whereas catch returns and associated data generated from routine enumeration at landing sites and markets are open to considerable question as to their accuracy and reliability, the DOF with the assistance of the FAO Statistics Project URT/87/016 has in recent years been able to track developments in the sector through an Annual Fishing Survey. This exercise is basically a census conducted for each landing, during which numbers of fishers, boats, and gear and equipment are enumerated, as indicated by the specimen forms shown in Annex V.B.12-13. The Fishing Survey of the Lake Tanganyika coast was carried out for 1990 and the data are now being processed in Dar-es-Salaam by the DOF Statistics Office. The 1991 Survey has not yet been carried out. Survey results are used in interpreting trends and to help establish corrected estimates of catch levels and other parameters monitored through the routine landing site enumerations. Annual statistical reports are produced by the Fisheries Division on this basis. The last such report available is for 1989, and a copy of this was obtained for FAO/FINNIDA Project files (Annex V.B.14).

One other dimension of current statistical data collection for the Tanzanian sector of Lake Tanganyika is that of ornamental fish capture and export. ornamental fish producers (Aqua Products in Kigoma is the only company officially operating in the Tanzanian sector) are required to pay a small royalty on all live fish exported to the DOF, and to file a return on species and quantities exported, and export destinations.

2.4.3 Other information, related projects/research activity

(a) TAFIRI Researchers' Meeting at Mwanza Centre, Feb. 1988
Researchers from all of the TAFIRI Centres convened for aworkshop in February 1988, and during this session scientific papers on various national fisheries were presented. Copies of those papers relating to Lake Tanganyika were secured for Project records. The titles are listed in Annex V.C.l.

(b) Japan Universities Research

Members of the Ecological and Limnological Study Project have carried out limited investigations along portions of the eastern shore of the Lake in the past, and have provided reports of their findings (see Annex III.C.1). No further Project work in the Tanzanian sector seems to have been undertaken recently and it is not known if any is planned for the future.

(c) IFIP Survey of Artisanal Fishery in Kigoma Region

In February 1991 the IFIP Project in conjunction with the FAO Integrated Technical Assistance and Credit for Artisanal Fisheries Project (GCP/URT/066/NET)[3] executed a socioeconomic baseline survey of the artisanal fishery in Kigoma Region. The survey was a forerunner to the one conducted a few months later for the northern Zaïre coastline, reviewed in section 2.2.3 above. The same objectives were involved -- viz., basic characterisation of the fishery's socioeconomic structure and the performance of fishing units, and the provision of benchmark data for future assessment of changes. In the case of Kigoma the sampling frame was already available in the form of census data on fishing operators collected through the 1989 Annual Fishing Survey conducted by the URT/87/016 Project. It was decided to sample 5% or 384 of the total 7672 fishers counted for the region. The coast was initially divided into three strata (map, Annex V.B.1), as follows:

- Kigoma area (inclusive) north to the Burundi border;
- from Kigoma area south to around the Lubalisi River; and
- the remote southern sector of Kigoma Region bordering on Rukwa Region.

All fishing villages were then classified according to size into four groups -- viz., those containing <100, 100-250, 250- 400, and 400+ fishers respectively. Random selection was next carried out to pick four villages in each stratum, one for each of the population classes. The final size of the sample for each village was determined on the basis of the proportion of total fishers in the village to the total number of fishers in the village's stratum. Survey results were analysed at IFIP Headquarters and have been fully reported in a Technical Document (Leendertse and Horemans 1991).

The completion of socioeconomic surveys for Kigoma Region and the northernmost shoreline of Zaïre have filled a major gap in the information base on Lake Tanganyika. But a great deal of further basic census and survey work remains to be done for vast stretches of the Lake, notably along the central and southern coast of Zaïre, and the Rukwa Region coast of Tanzania.

(d) Meteorological data and the Water Quality Lab -- Kigoma

Met data for the regions adjoining Lake Tanganyika are available at the head offices of the Directorate of Meteorology in Dar-es-Salaam. Records were reviewed during the course of the mission and the Directorate kindly agreed to supply copies of several data sets and documents for use by the Tanganyika Research Project (see Annex V.C.2 for list). These include computer printouts of rainfall measurements at various Lake stations for the period 1908 - 1989, a specimen copy of the Data Report Form used by the national Met Service stations, and printouts of all monthly met data from Kigoma Station for the last five years (1986-1990).

[3]The future status of the GCP/URT/066/NET Project is not clear. In light of highly positive appraisals it is being considered for extension but no definite steps have yet been taken. Field activities were closed down in May 1991.

In Kigoma a visit was also made to the Water Quality Laboratory to see its facilities and obtain a briefing on technical work being carried out. The Lab was established as part of the NORAD-sponsored Kigoma Water Master Plan Project in the early 1980s for the purpose of providing planners and engineers with basic analytical data needed for the design and construction of water supply systems. The Lab is still operational and capable of carrying out basic analyses of water samples (pH, colour, conductivity, bacteria counts, etc.). Its technicians have a standing task of collecting bi-weekly samples for quality monitoring purposes from the area around Kigoma's water supply intake, though it is claimed that transport problems make this difficult to carry out on a regular basis. A copy of the Lab's Analytical Report Data Form was secured for the Tanganyika Research Project reference files.

(e) The Kigoma Region Water Master Plan

The NORAD Kigoma Water Master Plan Project produced an impressive amount of documentation on a number of topics relating to water supply planning and development in the region. The complete Plan is presented in an eleven volume set and probably represents the most comprehensive single information base available for any region bordering Lake Tanganyika ... except Rukwa Region, for which NORAD has sponsored a similar plan (see Annex V.C.3 for details).

The Kigoma Plan is structured by volumes and subjects as follows:

Vol.1 - Executive Summary.
Vol.2 - Water Development Atlas.
Vol.3 - Water Supply Planning, Kigoma District.
Vol.4 - Water Supply Planning, Kasulu District.
Vol.5 - Water Supply Planning, Kibondo District.
Vol.6 - Water Development in Kigoma Region.
Vol.7 - Hydrology.
Vol.8 - Hydrogeology.
Vol.9 - Water Quality.
Vol.10 - Water Management and Utilisation.
Vol.11 - Water Laboratory Operation.

The volume on Hydrology was updated in 1989. Through the kind assistance of NORAD and Department of Water Hydrology Section officials in Kigoma it was possible to obtain complete copies of this update and Volumes 1, 7, and 9 of the Plan for Tanganyika Research Project use. Copies of selected maps from the Water Development Atlas (Vol. 2) were also obtained, along with a sample extract from Vol.3. This latter is a 'Village Information Form' or fact sheet covering various basic features of one local community. Similar forms exist for each village in the Region.

3. SUMMARY OF FINDINGS AND MAIN RECOMMENDATIONS

This report has reviewed the status of information availability and management at fisheries research and administrative stations in each of the countries riparian to

Lake Tanganyika -- Burundi, Zaïre, Zambia and Tanzania. All countries were visited during a mission carried out for the Tanganyika Research Project between early September - early December 1991 (Annex I). However, mission investigations had to be curtailed to a considerable extent because of political disturbances taking place in the region.

Wherever possible, duplicates of past and present data sets, documents, reports and other records of potential value to the Project's scientific programme were obtained for the Tanganyika Research Documentation Centre. Lists of all records reviewed at various stations, including those obtained for the Project, are provided in separate Annexes for each country (Annexes II - V).

3.1 Care and Development of Research Station Archives

Archival record upkeep at all the lakeside stations visited is not of a very high standard, owing principally to lack of necessary funds and trained personnel. Tanganyika Research should try to provide upgraded information storage and retrieval facilities as part of the rehabilitation work planned for these stations. Filing cabinets and adequate shelfspace are required at all sites. If possible, shelves should be fitted with sliding glass panel or standard glass-paned doors to protect contents from dust, rodents, etc. All the archival collections need to be properly catalogued and organised as well. This could be supervised by a trained professional librarian posted in rotation on temporary assignment to each of the lakeside stations.

For stations where materials have gone missing (most apparent in the case of the Burundi DEPP offices), contact should be made with the FAO Fisheries Library and relevant Fisheries Department personnel in an effort to arrange for backup/replacement copies to be supplied.

There are original copies of data sets, field notes and the Like being held at Mpulungu and Kigoma for which photocopies Could not be obtained at the time of the mission visits. Steps should be taken to secure backup copies for storage at Project Headquarters.

3.2 Project Documentation Centre

It is suggested that Tanganyika Research consider collaborating with IFIP (RAF/87/099) in developing a Regional Fisheries Documentation Centre. IFIP already has built up a significant collection of literature, including many publications related to Lake Tanganyika. The Project's contribution to a joint effort could take the form of physical facility improvements, new acquisitions, and the provision of a trained librarian to operate the Centre.

3.3 Linkages with other Agencies/Projects

Tanganyika Research should also endeavour to develop linkages with various other agencies and projects involved with

activities related to fisheries and watershed area research, conservation, management and exploitation. Considerable scope exists for general information sharing, documentation facility development, and research programme coordination. Relevant agencies and projects include the following: the Lake Tanganyika Biodiversity Project (in pipeline -- regional); the Belgium/CEPGL Project (regional -- Burundi, Rwanda, and Zaïre); the Japan Universities Ecological and Limnological Study Project (Zaïre, Zambia); water development projects (Bujumbura, Burundi; Kigoma and Rukwa Regions, Tanzania); and commercial fishing companies and ornamental fish exporters (all countries).

3.4 Fisheries Statistics

Only for Burundi and Zambia can it be said that adequate catch/effort and marketing data collection is being carried out at the present time. In Tanzania procedures for routine statistics collection are clearly laid down and field staff are posted at major landing sites up and down the shoreline. But the system functions poorly and unreliably in practice. Field staff are not given sufficient supervision and backstopping, there are difficulties with communication and transport, and problems exist with administrative Organisation. From what could be learned through limited observation and indirect sources, the monitoring and reporting situation in Zaïre is even more seriously fraught with problems.

In Zambia DOF staff are maintaining the statistical system quite well, considering the very considerable constraints of budget, equipment and supply shortages under which they operate. These latter have affected the implementation of Catch Assessment Survey rounds in particular.

Through the assistance of the FAO/UNDP Fisheries Statistics and Information Project (BDI/90/002), Burundi now has an upgraded collection and reporting system that can be taken as a model for the other riparian countries. Possibly with the inclusion of elements from the Zambian and other systems, in a scheme that would need to be elaborated, it could be promoted by the Tanganyika Research Project as a basis for standardising statistical systems right around the Lake.

Certain allowances would obviously have to be made to accomodate the special circumstances found in the other countries. It must be remembered that Burundi has an easily accessible shoreline served by an excellent road. Thus the problems of communication and transport that plague fisheries research and administrative work in the other sectors of the Lake are here of comparatively minor significance. In the other countries too the headquarters of national fisheries authorities are located many hundreds of kilometres away from the Lake, making communication between regional and central offices extremely problematical. In such contexts the compilation and analysis of statistics, and information management and administration in general, become anything but straightforward.

The elaboration of any global (lakewide) approach would thus have to anticipate the bottlenecks and obstacles that

fisheries personnel routinely encounter in virtually all parts of the Lake save that of Burundi. Distances are long, landing sites remote and often inaccessible by road, and staff insufficiently supervised and supported due to lack of funds. For sustainability in the long term routine enumeration work will have to designed in such a way as to minimise costs and maximise quality -- the usual paradoxical proposition! But, for example, necessary frame survey work covering the respective national waters could possibly be carried out on a once-per-year basis, rather than trying to mount two or even three exercises annually. All available resources could then be brought to bear to ensure that the one survey produces results of the highest possible reliability.

The standardisation of data entry forms should not prove unduly difficult. Whilst there are variations from country to country, an essential core of target information on catch/effort and marketing characteristics is shared in all cases.

One area that is not provided for in present monitoring systems and that may warrant more attention is the sports fishery. In Zambia sports angling especially for large predator fish is fairly popular and it is pursued to some extent in Tanzania and Burundi as well. All the national fisheries authorities should perhaps be encouraged to institute some form of monitoring of sport catches as it could potentially yield useful and interesting information.

It is suggested that further mission work be undertaken as soon as possible to evaluate more closely the special circumstances that obtain in each country and to hold detailed consultations with relevant fisheries researchers and administrators. on this basis and using the newly upgraded Burundi system as a principal model, elaborating and adjusting it where necessary by abstracting elements from the Zambian and other systems, a draft global approach to statistical collection and reporting could be prepared in time for the Workshop on Statistical Coordination and Standardization planned for mid- or late 1992.

3.5 Other Measures to Improve the Tanganyika Research Information Base

Tanganyika Research should encourage efforts now underway at Mpulungu and Bujumbura to build computer data bases out of historical catch/effort and length/freguency records. Substantial work has already been done at both stations, but support for data entry assistants would ensure its timely completion. Costs involved should be fairly minimal. Bearing in mind that the Project may wish to support further data base building from the old records at Kigoma mentioned earlier in the report, and allowing for possible data sets pertaining to the Zaïre sector for which there was no chance to carry out an inventory, it is recommended that the Project set up a contingency 'dbase budget' for such work. The uncertain extent of requirements makes it difficult to make an exact estimate of

cost, but a figure in the range of 3000-4000 USD is provisionally suggested.

The central and southern zones of the Zaïre shoreline and the southern (Rukwa Region) part of the Tanzanian shoreline remain little known in terms of the fisheries they host. This is a serious information gap and it needs to be filled through the kind of frame, catch assessment, and socioeconomic survey exercises already carried out for other sectors of the Lake by the Fisheries Statistics and Information Project (BDI/90/002) and the IFIP Project (RAF/87/099). The possibility of collaborative effort to see this work completed should be considered.

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ANNEX I -- ITINERARY AND CONTACTS

A. MISSION ITINERARY

DATES	LOCATION/ACTIVITY
07.09.91	Arrival Bujumbura, Burundi.
08-20.09.91	Meetings and consultations with FAO officials, Finnish Ambassador, Finnish Consul, Burundi Government officials, and IFIP Project personnel. Arrange field programme and visa formalities. Assemble and review reference material at IFIP offices. Preparations also for additional IFIP mission work in Zambia (Lake Mweru).
17.09.91	Visit to Centre de Recherches en Sciences Naturelles (CRSN), Uvira, Zaïre for consultations with Director and members of scientific staff. Note:Further visits to Zaïre (Uvira, Kalemie) planned for later on were cancelled due to the outbreak of civil disturbances from late Sept.1991.
20.09.91	Depart Bujumbura, Arrive Nairobi, Kenya.
21.09.91	Depart Nairobi, Arrive Lusaka, Zambia.
22.09-28.09.91	Meetings and consultations with FAO, UNDP, and Zambian Government officials in Lusaka and Department of Fisheries (DOF) HQ in Chilanga; assemble and review reference material for both L. Mweru (IFIP mission) and L. Tanganyika (GCP/RAF/271/FIN); arrange visa formalites.
24.09.91	Travel to Siavonga (L.Kariba) to meet Ag. Director, DOF (attending conference on L. Kariba).
29.09-06.10.91	Fieldwork in Luapula River/Lake Mweru region for IFIP mission.
07-12.10.91	Return to Lusaka; further archival review work and consultations at Dept.of Fisheries HQ Chilanga. Follow-up work on IFIP L. Mweru mission.

	Preparations for fieldwork in Mpulungu, L.Tanganyika.
13.10.91	Depart Lusaka enroute to Mpulungu by road. Overnight in Mpika.
14.10.91	Visit Kasama and Mbala to try to arrange for use of Lima Bank boat in Mpulungu. Courtesy calls on Fisheries Dept. officers in Kasama and Mbala. Arrival Mpulungu.
15.10.91	Meetings and consultations at DOF Mpulungu. Visit fishing companies. Night visit to beach seiners camp to observe light fishing and interview operators.
16.10.91	North to Nsamba area by boat. Overnight in Nsamba.
17.10.91	Visit DOF office Nsamba, Cape Kachese Fishing Co., Ndole Bay, Chisanze Beach, Kasaba Bay Lodge and Crocodile Farm. Return by night to Mpulungu; observe industrial purse seine operations en route.
18.10.91	Further consultations and review of archives at DOF office, Mpulungu.
	Depart Mpulungu by lake steamer en route to Bujumbura.
20.10.91	Half-day lay-over in Kigoma. Inform TAFIRI and other contacts there about plans for visit around end of month.
21.10.91	Arrival Bujumbura harbour.
21-26.10.91	Compilation of Zambia material. Completion of report for IFIP L. Mweru part of mission.
25.10.91	Arrival of G.Hanek, GCP/RAF/271/FIN Project Coordinator, for preliminary consultations on Project.
27.10.91	Depart Bujumbura, Arrive Dar es Salaam, Tanzania, in company with Hanek.
28-31.10.91	Meetings and consultations with FAO officials, senior Division of Fisheries, TAFIRI, and Directorate of Meteorology personnel,and 0.Lindqvist, Scientific Coordinator, GCP/RAF/271/FIN.

01.11.91	Depart Dar es Salaam, Arrive Kigoma. Meetings with TAFIRI and NORAD personnel, and G.Bowman, Project Manager, GCP/URT/066/NET.
02.11.91	Tour of TAFIRI Kigoma Centre and other Division of Fisheries facilities.
03.11.91	Interview with Directors of Aqua Products.
04-05.11.91	Meetings and consultations with Regional- and District-level Government officials.
06-10.11.91	Consultations and review of archival materials at TAFIRI, Regional and District Fisheries offices, Water Laboratory and Hydrology Section, Dept. of Water. Discussions with Marine Dept. (Tanzania Railways Corp.) and AMI port officials about repair work on ECHO (FAO 81), the TAFIRI research vessel.
10.11.91	Depart Kigoma by road, Arrive Bujumbura.
11-30.11.91	Preparation of mission memoranda. Meetings and consolations with Burundi-based FAO Fisheries personnel. Miscellaneous consultations and errands related to Project preparations.
14.11.91	Meeting with project formulation mission for "Pollution Control and Other Measures to Protect Biodiversity in Lake Tanganyika."
16.11.91	Meeting with CRSN/Uvira Director in Bujumbura.
22.11-01 .12.91	Return visit of Project Coordinator Hanek to continue with Project preparation work in Bujumbura.

23-30.11.91	Interruptions to office work due to civil disturbances in Bujumbura.
01-06.12.91	Final compilation of mission field notes, cataloguing of data records and documents collected. Drafting of mission report.

07.12.91 Depart Bujumbura.

B. PERSONS MET/CONTACTED

NAME	DESIGNATION
BURUNDI (BUJUMBURA)	
Dr. George Hanek	Project Coordinator GCP/RAF/271/FIN.
Mr. Kari Karanko	Ambassador of Finland (Tanzania, Burundi).
Mr. Daniel Parisse	Consul of Finland, Burundi.
Mr. Michael Falavigna	Ag. UNDP Rep., Burundi.
Mr. Joachim Laubouet	Programme Officer, FAO Burundi.
Mr. Silvestre Bambara	Directeur A.I. et Counciller au Département des Eaux, Pêches, et Pisciculture (DEPP), Burundi.
Dr. Dominique Gréboval	Coordinator, IFIP RAF/87/099.
Mr. Benoir Horemans	Fisheries Economist, IFIP.
Mr. George Ssentongo	Biologist, IFIP.
Ms. Monique Maes	APO Biologist, IFIP.
Mr. Piero Mannini	APO Biologist, IFIP.
Mr. Dampha Nfamara	UNV Fisheries Scientist, IFIP.
Mr. Mark Hoeskstra	APO Socio-Economist, IFIP.
Mr. Kees Leendertse	APO Economist, IFIP.
Mr. Mark Bellemans	CTA, BDI/90/002.
Mr. Jean-Pierre Marquet	CTA, BDI/89/019.

L. Tanganyika Biodiversity Project Formulation Mission:

Ms. Virginia Ravndal	GEF Technical Programme Coordinator, Regional Bureau for Africa, UNDP New York.
Dr. Andrew S. Cohen	Associate Professor, Dept. of Geosciences, Univ. of Arizona.
Dr. George Coulter	Consultant Biologist.
Mr. W. Franklin G. Cardy	Environment Management Specialist, The World Bank, Washington D.C.
Mr. Jan Aug. Myhrstad	Water Quality Consultant.

ZAIRE (UVIRA)

Mr. Kwetuenda Menga Kuluki	Directeur de Station, CRSN/Uvira
Mr. Mulimbwa N'sibula	Biologiste, CRSN/Uvira.
Dr. Gashagaza Masta Mukwaya	Biologiste, CRSN/Uvira (Chef du Dept. d'Hydrobiologie).
Mr. Nshombo Muderhwa	Biologiste, CRSN/Uvira.
Mr. Tshibangu Kalala	Chimiste, CRSN/Uvira.
Dr. Mwanza Ndunda	CRSN/Lwiro (Chef du Dept. de Biologie).
Dr. Kunio Shirakihara	Associate Professor, Faculty of Fisheries, Nagasaki University, Japan.
Mr. Akihisa Hattori	Ecologist, Graduate Student, Osaka City Univ., Japan.

ZAMBIA

(LUSAKA)

Mr. F.G. Livingstone	FAOR, Zambia.
Mr. M. Borsotti	Deputy Res. Rep., UNDP, Zambia.
Dr. M.A. Ngwenya	Senior Regional Programme Officer, Eastern and Southern Africa, UNDP, Lusaka.
Mr. L.P. Sooli	National Programme Officer, UNDP, Lusaka.
Mr. M. Smulders	Food Security Programme Mission, FAO, Rome.
Mr. M.H. Gunawardena	Senior Fishery Officer, FAO/World Bank Cooperative Prog., Investment Centre, FAO, Rome.
Mr. T.Y.F. Bitanihirwe	Financial Analyst, FAO/World Bank Cooperative Prog., Investment Centre, FAO, Rome.
Mr. A. Ranganathan	Sn. Financial Analyst, Agricultural Operations Division, Southern Africa Dept., The World Bank, Washington D.C.
Mr. L. Lulemba	Sn. Projects Officer (Fisheries),Lima Bank Ltd.
Ms. I. Toro	Second Secretary (Development Cooperation), Embassy of Finland.

(DOF HQ - CHILANGA)

Mr. H.G. Mudenda	Ag. Director,Dept. of Fisheries, Zambia.
Dr. Raphael Mubamba	Ag. Chief Fisheries Research Officer.
Mr. Justin Lupikisha	Officer-in-Charge of Statistics.
Mr. B.C. Moonga	Senior Executive Officer.
Mr. Martin Pearce	Fisheries Research Officer/ ODA (SIAVONGA)
Mr. P. Cheembo	Fisheries Development Officer. (KASAMA)

Mr. L.M. Mwape	Fisheries Research officer, Nsama (L. Mweru Wantipa).
Mr. H.C. Kabunda	Project Manager, Fish Culture Development Project, Northern Province.
Ms. Bakwiza Mvula	Asst. Manager, Lima Bank. (MBALA)
Mr. C. Ndonna	Regiona1 Fisheries Development Officer, Northern Province.
Mr. W. Sinyinza	Project Officer, Lima Bank Ltd.
(MPULUNGU/NSUMBU)	
Mr. Douglas Kabakwe	Fisheries Development Officer, DOF Mpulungu.
Mr. Harris Phiri	Fisheries Research officer, DOF Mpulungu.
Mr. Demitrius Tzelepis	Managing Director, St. Georges Fisheries, Mpulungu.
Mr. Mbita Kabalika	Managing Director, Sabraa Fisheries, Mpulungu.
Mr. Dominique Chileshe	General Manager, SOPELAC, Mpulungu.
Mr. Chris Blignault	Managing Director, Samaki Fishing Enterprise Ltd., Mpulungu.
Mr. Roger Bills	Manager, Tropical Exports (Samaki Fishing Enterprise Ltd.), Mpulungu.

Mr. Mathews Banda	Fisheries Assistant, Ag. OIC, DOF Nsumbu.
Mr. Oscar Mantari	Fish Scout (Statistics), DOF sumbu.
Mr. P. Kasengele	Fish Scout (Research), DOF Nsumbu.
Mr. Bob Taylor	Manager, Cape Kachese Fisheries (Circuit Safaris).
Ms. Mary Becker	Ag. Manager, Ndole Bay Lodge (Circuit Safaris).
Mr. Brian Sutton	Manager, Kasaba Bay Lodge (Circuit Safaris).
Mr. Dinesh Buddhia	Managing Director, Nkupe Lodge, Mpulungu.

+ Local Community Leaders, Fisherfolk, and Traders.

TANZANIA

(DAR-ES-SALAAM)

Mr. R.W. Fuller	FAOR, Tanzania.
Mr. Jim Yonazi	Asst. Programme Officer.
Dr. O.V. Lindqvist	Scientific Coordinator, GCP/RAF/271/FIN.
Mr. W.A.M. Sichone	Director of Fisheries, Division of Fisheries, Min. of Natural Resources and Tourism.
Mr. T.W. Maembe	Chief Fisheries Officer.
Mr. B.S.M. Moreni	Fisheries Officer, Planning.
Mr. P.O. Bwathondi	Director, TAFIRI.
Mr. M.K.L. Mlay	Centre Director, TAFIRI Kyela (L. Nyasa/Malawi).
Mr. C.K. Rumisha	Fisheries Biologist.
Dr. M.S. Mhita	Senior Meteorologist, Directorate of Meteorology, Min. of Communication and Transport.
Mr. Michael M. Kavishe	Chief of Research, Planning

	and Training Divison, Directorate of Meteorology, Min. of Communication and Transport.
Mr. Peter A. Msafiri	Principal Meteorologist, Directorate of Meteorology, Min. of Communication and Transport.
Mr. Emmanuel Mpeta	Meteorologist, Directorate of Meteorology, Min. of Communication and Transport.
(KIGOMA)	
Mr. Garth Bowman	Project Manager GCP/URT/066/NET.
Mr. K.I. Katonda	Centre Director, TAFIRI Kigoma.
Mr. Anthony Kalangari	Research Officer, TAFIRI Kigoma.
Mr. Jan Eklund	Asst. District Water Engineer, NORAD Rural Water Supply Programme.
Mr. Lief Larsen	Marine Engineer Advisor (DANIDA), Marine Dept., Kigoma Harbour, Tanzania Railways Corporation.
Mr. J.D. Vaitha	Director, Aqua Products Ltd.; Sunset Tours; Aqua Lodge.
Mr. K.D. Vaitha	Director, Aqua Products Ltd.; Sunset Tours; Aqua Lodge.
Mr. Wilhelm Reimertz	Senior Telecommunications Engineer, DE-Consult, Tabora Office, Tanzania Railway Corporation
Mr. Z.J. Abuya	Regional Planning Officer,(Ag. Regional Development Officer).
Mr. F.T. Matalist	Regional Land Development officer.
Mr. James Lukona	Regional Fisheries Officer.
Mr. S.W. Juma	Regional Natural Resources Officer.
Mr. Y.J. Rwakanadi	Fisheries 0fficer (Statistics), Kigoma Region.
Mr. R.S. Cherehani	Assistant Fisheries Office (Licensing), Kigoma Region.

Mr. D.O.Z. Kweka	District Fisheries Officer, Kigoma District.
Mr. Mbaraka Shemweta	Technician, Water Quality Laboratory, Dept. of Water, Min. of Water, Energy and Minerals.
Mr. Theodore Mpyalimi	Technician, Hydrology Section, Dept. of Water, Min. of Water, Energy and Minerals.
Mr. Mark Deeble & Ms. Victoria Stone	BBC Television Filming Crew (Programme on L. Tanganyika Fish).
Mr. Ernest P. Temu	Regional Police Commander, Kigoma.
Mr. Asbjorn Mathisen	Coordinator, Kigoma Rural Integrated Development Programme (KIDEP).
Mr. Franz Fajs	Workshop Manager, AMI Tanzania, Kigoma Port.

+ Local Community Leaders, Fisherfolk, and Traders.

ANNEX II -- DOCUMENTS/DATA SETS: BURUNDI

- A.1 MAP OF LANDING SITES AND STRATA, L.TANGANYIKA,BURUNDI.

- B.1 CATCH RECORDING FORM, INDUSTRIAL FISHERY.

- B.2 FRAME SURVEY FORM.

- B.3 LANDING BEACH SAMPLE SELECTION FORM.

- B.4 CATCH/EFFORT RECORDING FORM, ARTISANAL FISHERY.

- B.5 CATCH/EFFORT RECORDING FORM, TRADITIONAL FISHERY.

- B.6 DATA REPORTING FORMATS, INDUSTRIAL AND ARTISANAL FISHERIES, 1991.

C.1 PROJET PNUD/FAO/BDI/90/002, 'STATISTIQUES ET INFORMATIONS PECHE': PUBLICATION LIST.

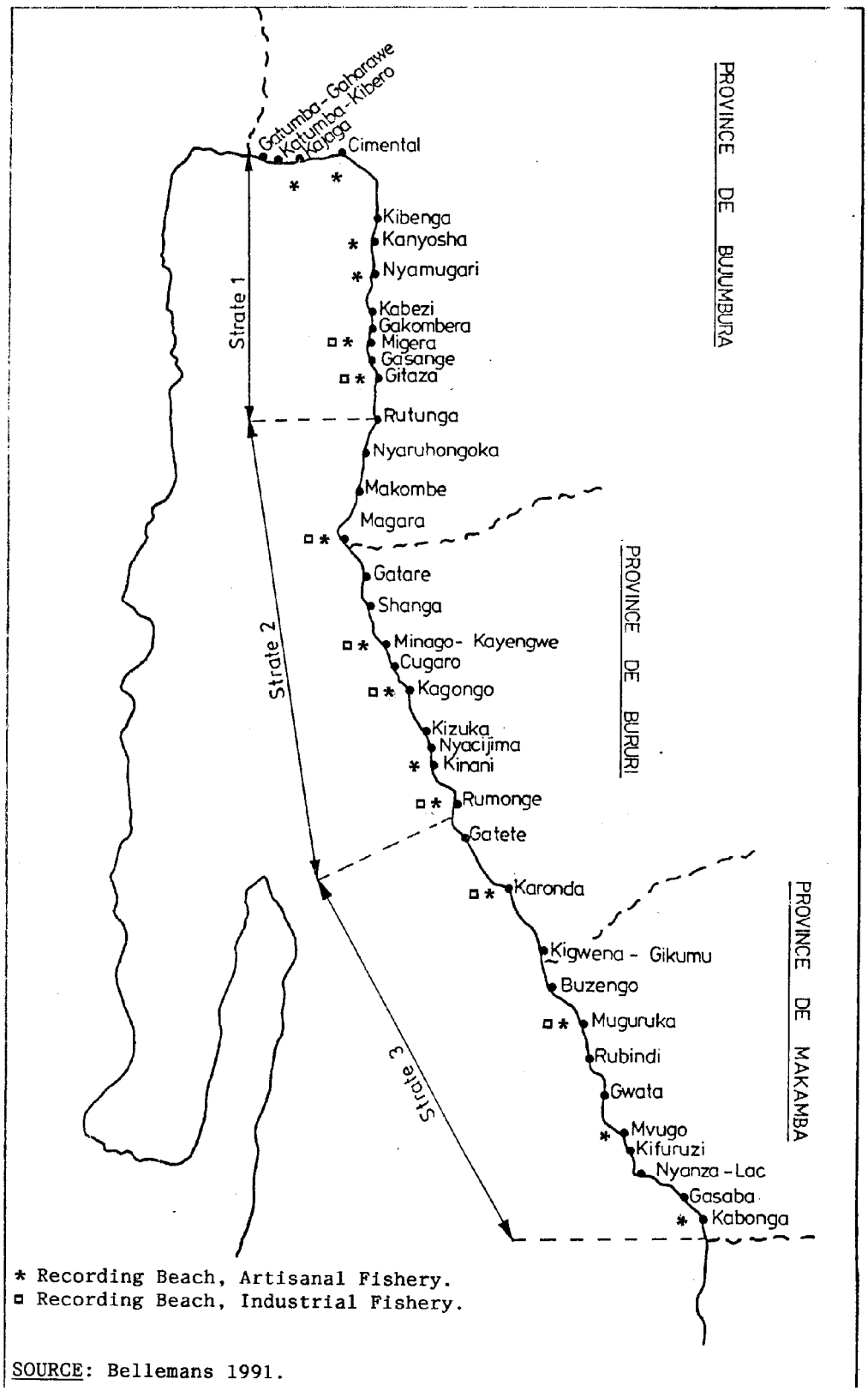
- D.1 MISCELLENEOUS DOCUMENTS (PRE-1980).

- D.2 MISCELLANEOUS DOCUMENTS (RECENT).

- E.1 SIL SYMPOSIUM, 'FISHERIES OF THE AFRICAN GREAT LAKES.'

- E.2 FIRST INTERNATIONAL CONFERENCE *ON* THE CONSERVATION AND BIODIVERSITY OF LAKE TANGANYIKA.

A.1 MAP OF LANDING SITES AND STRATA, LAKE TANGANYIKA, BURUNDI.



B.1 CATCH RECORDING FORM, INDUSTRIAL FISHERY

DEPARTEMENT DES EAUX
PECHE ET PISCICULTURE

MARCHE CENTRAL DE BUJUMBURA
PECHE INDUSTRIELLE M. 1.

NOM DE L'OBSERVATEUR : .....

DATE : .../.../1991

1	BATEAU: SAMOS	PLAGE : .....
KAHUZO Caisse: Prix:		NYAMUNYAMU Caisse: Prix:
NDAGALA Caisse: Prix:		MUKEKE Caisse: Prix:
SIJURE Poids: Prix:		SANGALA Caisse: Prix:
CAPITAINE Poids: Prix:		DIVERS Caisse: Prix:

2	BATEAU: ST. NICOLAS	PLAGE : .....
KAHUZO Caisse: Prix:		NYAMUNYAMU Caisse: Prix:
NDAGALA Caisse: Prix:		MUKEKE Caisse: Prix:
SIJURE Poids: Prix:		SANGALA Caisse: Prix:
CAPITAINE Poids: Prix:		DIVERS Caisse: Prix:

3	BATEAU: MARILENA	PLAGE : .....
KAHUZO Caisse: Prix:		NYAMUNYAMU Caisse: Prix:
NDAGALA Caisse: Prix:		MUKEKE Caisse: Prix:
SIJURE Poids: Prix:		SANGALA Caisse: Prix:
CAPITAINE Poids: Prix:		DIVERS Caisse: Prix:

4	BATEAU: HELENA	PLAGE : .....
KAHUZO Caisse: Prix:		NYAMUNYAMU Caisse: Prix:
NDAGALA Caisse: Prix:		MUKEKE Caisse: Prix:
SIJURE Poids: Prix:		SANGALA Caisse: Prix:
CAPITAINE Poids: Prix:		DIVERS Caisse: Prix:

5	BATEAU: MELINA	PLAGE: .....
KAHUZO Caisse: Prix:		NYAMUNYAMU Caisse: Prix:
NDAGALA Caisse: Prix:		MUKEKE Caisse: Prix:
SIJURE Poids: Prix:		SANGALA Caisse: Prix:
CAPITAINE Poids: Prix:		DIVERS Caisse: Prix:

6	BATEAU: ST.GEORGES	PLAGE: .....
KAHUZO Caisse: Prix:		NYAMUNYAMU Caisse: Prix:
NDAGALA Caisse: Prix:		MUKEKE Caisse: Prix:
SIJURE Poids: Prix:		SANGALA Caisse: Prix:
CAPITAINE Poids: Prix:		DIVERS Caisse: Prix:

7	BATEAU: TAXIARCHIS	PLAGE: .....
KAHUZO Caisse: Prix:		NYAMUNYAMU Caisse: Prix:
NDAGALA Caisse: Prix:		MUKEKE Caisse: Prix:
SIJURE Poids: Prix:		SANGALA Caisse: Prix:
CAPITAINE Poids: Prix:		DIVERS Caisse: Prix:

8	BATEAU: BARBARA	PLAGE: .....
KAHUZO Caisse: Prix:		NYAMUNYAMU Caisse: Prix:
NDAGALA Caisse: Prix:		MUKEKE Caisse: Prix:
SIJURE Poids: Prix:		SANGALA Caisse: Prix:
CAPITAINE Poids: Prix:		DIVERS Caisse: Prix:

B.1 CATCH RECORDING FROM, INDUSTRIAL FISHERY (Cont.)

9	BATEAU: ST.ANDRE	PLAGE : .....

KAHUZO Caisse:	NYAMUNYAMU Caisse:
Prix:	Prix:
NDAGALA Caisse:	MUKEKE Caisse:
Prix:	Prix:
SILURE Poids:	SANGALA Caisse:
Prix:	Prix:
CAPITAINE Poids:	DIVERS Caisse:
Prix:	Prix:

10	BATEAU: DIMITRI	PLAGE : .....

KAHUZO Caisse:	NYAMUNYAMU Caisse:
Prix:	Prix:
NDAGALA Caisse:	MUKEKE Caisse:
Prix:	Prix:
SILURE Poids:	SANGALA Caisse:
Prix:	Prix:
CAPITAINE Poids:	DIVERS Caisse:
Prix:	Prix:

11	BATEAU: MENIPPOS	PLAGE : .....

KAHUZO Caisse:	NYAMUNYAMU Caisse:
Prix:	Prix:
NDAGALA Caisse:	MUKEKE Caisse:
Prix:	Prix:
SILURE Poids:	SANGALA Caisse:
Prix:	Prix:
CAPITAINE Poids:	DIVERS Caisse:
Prix:	Prix:

12	BATEAU: ALEXANDRE	PLAGE : .....

KAHUZO Caisse:	NYAMUNYAMU Caisse:
Prix:	Prix:
NDAGALA Caisse:	MUKEKE Caisse:
Prix:	Prix:
SILURE Poids:	SANGALA Caisse:
Prix:	Prix:
CAPITAINE Poids:	DIVERS Caisse:
Prix:	Prix:

13	BATEAU: ST. MARIE	PLAGE: .....

KAHUZO Caisse:	NYAMUNYAMU Caisse:
Prix:	Prix:
NDAGALA Caisse:	MUKEKE Caisse:
Prix:	Prix:
SILURE Poids:	SANGALA Caisse:
Prix:	Prix:
CAPITAINE Poids:	DIVERS Caisse:
Prix:	Prix:

14	BATEAU: ST.MATHIEU	PLAGE: .....

KAHUZO Caisse:	NYAMUNYAMU Caisse:
Prix:	Prix:
NDAGALA Caisse:	MUKEKE Caisse:
Prix:	Prix:
SILURE Poids:	SANGALA Caisse:
Prix:	Prix:
CAPITAINE Poids:	DIVERS Caisse:
Prix:	Prix:

15	BATEAU: MANOS	PLAGE: .....

KAHUZO Caisse:	NYAMUNYAMU Caisse:
Prix:	Prix:
NDAGALA Caisse:	MUKEKE Caisse:
Prix:	Prix:
SILURE Poids:	SANGALA Caisse:
Prix:	Prix:
CAPITAINE Poids:	DIVERS Caisse:
Prix:	Prix:

16	BATEAU: AKAROVYI	PLAGE: .....

KAHUZO Caisse:	NYAMUNYAMU Caisse:
Prix:	Prix:
NDAGALA Caisse:	MUKEKE Caisse:
Prix:	Prix:
SILURE Poids:	SANGALA Caisse:
Prix:	Prix:
CAPITAINE Poids:	DIVERS Caisse:
Prix:	Prix:

17	BATEAU: MUIWENZI	PLAGE : .....

KAHUZO Caisse:	NYAMUNYAMU Caisse:	SANGALA Caisse:	CAPITAINE Poids:
Prix:	Prix:	Prix:	Prix:
NDAGALA Caisse:	MUKEKE Caisse:	SILURE Poids:	DIVERS Caisse:
Prix:	Prix:	Prix:	Prix:

B.2 FRAME SURVEY FORM

DEPARTEMENT DES EAUX
PECHES ET PISCCULTURE
- BURUNDI -

UNDP/FAO/BDI/90/002 PROJECT
STATISTIQUES ET INFORMATIONS
DE PECHE

F R A M E S U R V E Y
Form FS_1

Name of Recorder : _____ Province: _____
Survey date : ../../.. District: _____

S U B J E C T S O F I N F O R M A T I O N .	
1. Beach identification	1. Name of beach :_____ !_!_!

2. Structure of the beach (put an X)	1. The occcupation of the beach by the fishermen is ? continuous !_! (1) seasonal !_! (2) sporadic !_! (3)
	2. The fishing activity on the beach is ? permanent !_! (1) seasonal !_! (2) sporadic !_! (3)

3. used fishing gear	Which fishing gear is being used on the beach ? (fil out the table)				
	1. Fishing Gear		2. period of use	3. Nbrs on the beach	4. Average unit price
	Code	Name	(put an X on the months)		
	01	Beach Seine	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu
	02	Encercl.Gillnet	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu
	03	Driftin.Gillnet	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu
	04	Hook and lines	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu
	05	Longlines	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu
	06	Traps	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu
	07	Scoopnets	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu
	08	Castnets	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu
	09	Harpoons	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu
	10	Liftnets	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu
	11	Mosquitonets	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu
	12	Others (specify)	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu
		_____	1 2 3 4 5 6 7 8 9 10 11 12	.....	.....FBu

4. Operational fishing boats (indicate the number)	FISHING BOAT OF ...							
	ARTISANAL FISHERY			TRADITIONAL FISH.			TRANSPORT Goods and persons	"TUGGING" of fishing boats
	actif	non actif	out of use	actif	non actif	out of use		
	....	....	....	....	....	....	.....	.....

B.3: LANDING BEACH SAMPLE SELECTION FORM.

ESTIMATION DES APPORTS DU LAC TANGANYIKA - BURUNDI

NOMBRES DE SORTIES

NOM DE L'OBSERVATEUR : NOM DE LA PLAGE : FORMULAIRE F.1

CHIFFRES.

Dates	Unités Ex.	Unités Res.	Unités Sor.	
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
				Sorties Choisies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 [illegible] [illegible]

B.4 CATCH/EFFORT RECORDING FORM, ARTISINAL FISHERY

DEPARTEMENT DES EAUX
PECHES ET PISCCULTURE

FORMULAIRE A-1

PECHE ARTISANALE.

NOM DE L'OBSERVATEUR : _____

DATE : ../../..

NOM DE LA PLAGE : _____

EFFORT JOURNALIER : ..... sorties CATAMARANS
..... sorties APOLLOS

UNITE ECHANTILLONN.		1	2	3	4	5	6	7	8	9	10	11
TYPE/METHODE PECHE												
NOMBRE PECHEURS												
HEURE SORTIE												
HEURE RENTREE												
NOMBRE DE COUPS												
KAHUZO	PRISE TOT.											
	PRIX											
NDAGALA	PRISE TOT.											
	PRIX											
NYAMU-NYAMU	PRISE TOT.											
	PRIX											
MUKEKE	PRISE TOT.											
	PRIX											
SANGALA	PRISE TOT.											
	PRIX											
AUTRES	PRISE TOT.											
	PRIX											

B.5 CATCH/EFFORT RECORDING FORM, TRADITIONAL FISHERY

DEPARTEMENT DES EAUX
PECHES ET PISCCULTURE

FORMULAIRE A-1

PECHE COUTUMIERE.

NOM DE L'OBSERVATEUR : _____

DATE : ../../..

NOM DE LA PLAGE : _____

EFFORT JOURNALIER	
.... sorties Lusengas (1,1)	..... sorties Nasses (1,5)
.... sorties Sennes de Plage (1,2)	..... sorties Lignes (1,6)
.... sorties F.maill.Dormant (1,3)	..... sorties Moustiqu. (1,7)
.... sorties F.maill.Eucercl. (1,4)	

UNITE ECHANTILLONN.		1	2	3	4	5	6	7	8	9	10
TYPE/METHODE PECHE											
NOMBRE PECHEURS											
HEURE SORTIE											
HEURE RENTREE											
NOMBRE DE COUPS											
SINGA/KIBONDE/KIVUM BUKA/KAVUMGWE/JOMBO	POIDS										
N'GEGE/KUHE	POIDS										
NDAGALA	POIDS										
CAPITAINE	POIDS										
SANGALA	POIDS										
IMBIRIBI	POIDS										
AUTRES	POIDS										
PRISES TOTALES	POIDS										
	PRIX										

B.6: DATA REPORTING FORMATS, INDUSTRIAL AND ARTISANAL FISHERIES, 1991.

PRODUCTION ANNUELLE PAR CAMPAGNE - PECHE INDUSTRIELLE. - 1991.

Quantites en Tonnes - Valeurs en '000 FBu.

CAMPAGNE LUNAIRE du ../../.. au ../../..	Effort	KAHUZO		NDAGALA		NYAMUNYAMU		MUKEKE		SANGALA		SILURES		CAPITAINES		DIVERS		TOTAUX	
		QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR	QUANTITE	VALEUR
01/01/91 30/01/91	389	0.0	0.0	145.1	7835.6	0.0	0.0	23.7	3793.6	0.8	183.0	0.2	33.1	0.0	4.5	0.2	20.3	169.94	11870.15
31/01/91 28/02/91	367	0.0	0.0	256.5	12321.0	0.0	0.0	13.9	2160.4	0.5	129.0	0.0	4.6	0.0	0.0	0.0	0.0	270.90	14615.00
01/03/91 30/03/91	414	0.0	0.0	119.1	7470.4	0.0	0.0	4.1	661.0	1.1	282.5	0.0	3.8	0.0	0.0	0.1	2.6	124.40	8420.30
31/03/91 28/04/91	366	0.0	0.0	94.0	7460.8	0.0	0.0	10.7	1566.6	2.2	509.0	0.0	0.0	0.0	0.0	0.1	4.5	106.96	9540.86
29/04/91 28/05/91	329	0.0	0.0	75.6	6012.5	0.0	0.0	11.3	1882.1	1.2	295.7	0.0	0.0	0.0	0.0	0.0	0.0	88.05	8190.30
29/05/91 27/06/91	356	0.0	0.0	52.0	4653.3	0.0	0.0	27.5	4671.9	1.5	344.0	0.0	4.0	0.0	0.0	0.0	0.0	81.02	9673.20
28/06/91 26/07/91	362	0.0	0.0	76.4	6202.0	0.0	0.0	16.8	3248.4	2.8	735.5	0.0	1.0	0.0	0.0	0.0	0.0	96.06	10186.90
27/07/91 25/08/91	372	65.5	2617.8	38.9	2642.1	48.2	3532.4	8.4	1523.1	1.4	357.5	0.0	12.0	0.0	0.0	0.0	4.5	162.52	10689.38
26/08/91 23/09/91	384	75.8	2155.1	68.0	3025.5	98.5	6283.2	16.7	3036.5	0.5	135.5	0.0	3.5	0.0	0.0	0.0	0.0	259.59	14639.30
24/09/91 23/10/91	354	0.0	0.0	106.8	5876.7	2.6	160.5	23.8	4085.1	0.7	144.4	0.2	17.4	0.0	0.0	0.1	3.5	134.06	10287.55
24/10/91 21/11/91	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00
22/11/91 21/12/91	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00
TOTAL ANNUEL	3693	141.3	4772.9	1032.3	63500.0	149.3	9976.1	156.8	26628.7	12.8	3116.1	0.5	79.4	0.0	4.5	0.4	35.4	1493.50	108112.94

PRODUCTION ANNUELLE - PECHE ARTISANALE - CATAMARANS - 1991.

QUANTITES (en (Kgs)) ET VALEURS (en (FBu)).

Campagne lunaire du ../.. au ../..	Effort	KAHUZO		NDAGALA		NYAMUNYAMU		MUKEKE		SANGALA		DIVERS		TOTAUX	
		Quantités	Valeurs	Quantités	Valeurs	Quantités	Valeurs	Quantités	Valeurs	Quantités	Valeurs	Quantités	Valeurs	Quantités	Valeurs
du 01/01/91 au 30/01/91	11132	0	0	1422892	81279050	0	0	197745	24160563	1973	242811	0	0	1622608	105682424
du 31/01/91 au 28/02/91	11924	0	0	2372799	92851665	0	0	151853	14863750	320	62287	146	18490	2525118	107796193
du 01/03/91 au 30/03/91	14995	0	0	1389792	102507872	0	0	115116	11835408	3106	609139	0	0	1508014	114952417
du 31/03/91 au 28/04/91	8712	0	0	824299	59916039	0	0	118972	14072319	678	90508	430	32476	944380	74111244
du 29/04/91 au 28/05/91	8465	0	0	436902	43351294	0	0	258019	33419575	314	74458	12	3838	695247	76849165
du 29/05/91 au 27/06/91	8304	12864	1225181	610785	62125524	41585	3865410	334733	48878741	743	147904	252	48237	1000961	116290997
du 28/06/91 au 26/07/91	8058	99108	8599448	593952	62187027	249805	23530923	59428	10143113	294	82365	55	15230	1002642	104558108
du 27/07/91 au 25/08/91	10266	631799	41941860	614135	51788326	469015	40014198	131188	21135418	433	84259	34	7938	1846603	154972000
du 26/08/91 au 23/09/91	10977	285364	20400095	902049	55150355	653907	36620595	185197	24498434	108	32398	744	34568	2027369	136736445
du 24/09/91 au 23/10/91	11297	45763	3331871	1252323	91053551	240692	14300298	189836	32598483	476	100082	37	10928	1729128	141395213
du 24/10/91 au 21/11/91	10633	7155	478261	2033211	107451597	65442	5564997	6527	1261915	1430	494480	0	0	2113766	115251250
Total Annuel	114763	1082053	75976716	12453139	809662300	1720446	123896421	1748614	236867719	9875	2020691	1710	171705	17015836	1248595556
<Capture/Valeur> / Unite Effort		9	662	109	7055	15	1080	15	2064	0	18	0	1	148	10880

C.1 LISTE DES DOCUMENTS REDIGES DANS LE CADRE DU PROJET, PNUD/FAO/BDI/90/002, “STATISTIQUES ET INFORMATIONS PECHE".

ITEM NO.	TITLE
1.	Bilan de l’étude d’estimation des apports des pêcheries Burundaises. Rapport de terrain N° 1 - Bujumbura Décembre 1990 - Bellemans M. (68 pages; 22 annexes; 7 tableaux; 2 figures.)
2.	Résultats de I’enquête cadre des pêcheries Burundaises. Rapport de terrain N° 2 Bujumbura Janvier 1991 - Bellemans M. (41 pages; I annexe; 34 tableaux; 12 figures.)
3.	Production des pêcheries Burundaises - 1990 - Résultats statistiques. Rapport de terrain N° 3 - Bujumbura Janvier 1991 - Bellemans M. (60 pages; 2 annexes; 18 tableaux; 55 figures.)
4.	Programmes informatiques pour le traitement des données statistiques du secteur pêche au Burundi - Production. Rapport de terrain N° 4 - Bujumbura Février 1991 - Bellemans M. (154 pages; 7 tableaux; 6 figures.)
5.	Historique des pêcheries artisanales et coutumières au Burundi de 1952 à 1991. Rapport de terrain N° 5 - Bujumbura Juin 1991 - Bellemans M. (54 pages; 29 annexes; 6 tableaux; 3 figures.)
6.	Listings des programmes de traitement des données des fréquences de longueur du Ndagala au Burundi. Rapport de terrain N° 6 - Bujumbura Juin 1991 - Bellemans M. (189 pages; 2 annexes.)
7.	Statistiques commerciales de la pêche industrielle relevées au marché central de Bujumbura - observations. Rapport de terrain N° 7 - Bujumbura Juillet 1991 -Bellemans M. (47 pages; 5 tableaux; 30 figures.)
8.	Rapport de consultation du 27 mai au 13 juin 1991. Centre Agricole International, Wageningen, Pays-Bas - Août 1991 - Roest F.C. (6 pages; 3 annexes.)
9.	Estimation du seuil d’équilibre financier de divers types de pêche au Burundi. Rapport de terrain **N°** 8 - Bujumbura août 1991 - Bellemans M. (29 pages; 2 tableaux; 9 annexes.)
10.	Tentative de reconstitution de l’évolution de la production de la pêche artisanale dans la partie burundaise du lac Tanganyika de 1959 à 1990. Rapport de terrain N° 9 - Bujumbura Octobre 1991 - Bellemans M. (37 pages; 18 tableaux; 20 figures; 1 annexe de 210 pages.)
II.	Résultats de 1'enquête socio-économique des patrons de la pêche artisanale dans la partie burundaise du lac Tanganyika. Rapport de terrain N° 10 - (en préparation).

D.l. MISCELLENEOUS DOCUMENTS (PRE-1980).

ITEM NO.	TITLE
1.	W. Ferro, Limnological Observations from the North of L. Tanganyika (1972-1975)FI:DP/BDI/73/020/10.
2.	G. Grasset, Report on a Mission to Burundi 24/5 - 9/6/75. Rome 1975.

3. J.L. Turner, Status of Various Multi-Species Fisheries of Lakes Victoria, Tanganyika and Malawi based on Catch and Effort Data. Symposium on River and Floodplain Fisheries, Bujumbura, 21-26/11/77. CIFA/77/Symp. 11 Oct. 1977.

4. J.L. Turner **&** C. Herman, Status of the Pelagic Fisheries of Lake Tanganyika (Burundi) Based on Catch and Effort Data. FI:DP BDI/73/020/14 (Rn). Rome, 1977.

5. F.C. Roest, *Stolothrissa Tanganicae*: Population Dynamics, Biomass Evolution and Life History in the Burundi Waters of Lake Tanganyika. Symposium on River and Floodplain Fisheries, Bujumbura, 21-26/11/77. CIFA/77/Symp. 27 Oct. 1977.

6. C. Herman, Fishing in Lake Tanganyika: Present Situation and Prospects for Development. Symposium on River and Floodplain Fisheries, Bujumbura, 21-26/11/77. CIFA/77/Sylip. 20, Nov. 1977.

D.2. MISCELLANEOUS DOCUMENTS (RECENT).

ITEM NO. **TITLE**

1. Project Proposal (1990): Le rôle des écotones terre/eau dans le diversité biologique et les ressources du lac Tanganyika (Burundi).

2. Lindqvist, 0. & H. M61sd, 1990. Management for small-scale fisheries: is it ever possible? Paper presented at Symposium on Socio-econosic conditions for development of artisanal isheries in Africa. Tromso, 15-17.6.90.

3. Benemariya, H. et al. 1991. Atomic absorption spectrometric determination of zinc, copper, and selenium in fish from Lake Tanganyika, Burundi, Africa. In The Science of the Total Environment. 105 (1991): 73-85.

4. Programme for: Symposium on Limnology and Fisheries of Lake Tanganyika. 6-11.5.91. Kuopio, Finland.

5. Prospectus: University of Kuopio.

6. Prospectus: Master's Degree Tranining Programme in Fisheries for Foreign Students at the University of Kuopio, Finland.

E.1 SIL SYMPOSIUM, -FISHERIES OF THE AFRICAN GREAT LAKES' (Papers Relating to Lake Tanganyika).

ITEM NO. **TITLE**

1. Study of the inshore water cichlid fish potential of Lake Tanganyika around Kigoma, Tanzania. (S.G.M. Ndaro).

2. La production exploitée de la pêche industrielle au lac Tanganyika (Burundi). Variation des rendements: essai d'interprétation. (P. Petit, B. Nyakageni et J. Moreau).

3. Thirty years of exportation of the pelagic fish stocks in the Zambian waters of Lake Tanganyika. (M.J. Pearce).

4. Why so low clupeid catches in Kigoma waters of Lake Tanganyika? (D.B.R. Chitamwebwa).

E.2 FIRST INTERNATIONAL CONFERENCE ON THE CONSERVATION AND BIODIVERSITY OF L. TANGANYIKA

On file at FAO/FINNIDA Project Headquarters are copies of the Symposium Programme, the list of participants, and summaries of the following papers presented:

ITEM NO.	TITLE
1.	The decrease in fish production in the northwest part of Lake Tanganyika. (K.N. Ahayo).
2.	Patterns and controls of biodiversity within Lake Tanganyika. (A.S. Cohen).
3.	Current fishery catches in the Zairean part of Lake Tanganyika. (S.Elongo).
4.	Ecological diversity of Lake Tanganyika with special reference o fishes. (H. Kawanabe & M.M. Gashagaza).
5.	Fishing in Lake Tanganyika. (A. Kiyuku).
6.	Lake Tanganyika's unique fish fauna: its internationa importance for evolutionary studies and the special opportunities it offers for biological research. (R. Lowe-McConnell).
7.	The status of laws or regulations pertaining to conservation and national parks: a Tanzanian case study. (B.C. Mwasaga).
8.	Protection of certain species of endemic cichlids in Lake Tanganyika: the case *of Boulengerochromis microlepis* (Kuhe). (A. Ndikumako).
9.	Soil erosion and pollution of Lake Tanganyika in Burundi. (S. Nsabinana).
10.	Conservation of forestry resources of the Tanzania side of the Lake Tanganyika catchment.(L.Nshubesuki).
II.	Lianological studies on Lake Tanganyika and future prospects. (P. Ntahompagaze).
12.	The fauna of the plain of Lake Tanganyika's protected sites and its surrounding areas. (L. Ntahuga).
13.	Utilization and legislation pertaining to the Zambian section of the Lake Tanganyika basin. (M.J. Pearce).
14.	Chemical pollution of Lake Tanganyika in the vicinity of Bujumbura, Burundi. (C. Sahiri).
15.	Some data concerning the contamination of Lake Tanganyika's fish population. (E. Sindayigaya).
14.	The persistence of many fish species in Lake Tanganyika. (G. Ssentongo).
15.	Biodiversity of cichlids in Lake Tanganyika and their possible ancestral strains. (T. van den Audenaerde & L. de Vos).

ANNEX III -- DOCUMENTS/DATA SETS: ZAIRE

- A.1 RESEARCHERS AND TECHNICIANS, CRSN/UVIRA

- B.1 SAMPLE MONTHLY REPORT ON INDUSTRIAL FISHERY PRODUCTION, KALEMIE, MAY 1991.

- C.1 'PAPERS, REPORTS, AND ARTICLES ALREADY PUBLISHED OR IN PRESS': LAKE TANGANYIKA ECOLOGICAL AND LIMNOLOGICAL STUDY PROJECT.

- C.2 MAP OF FISHING VILLAGES AND STRATA, NORTHERN LAKE TANGANYIKA, ZAIRE.

A.1 RESEARCHERS **AND** TECHNICIANS, CRSN/UVIRA

1. Kwetuenda Menga Kuluki, Geographer (researcher) Director of CRSN/UVIRA.

2. Dr. Gashagaza Masta **Mukwaya,** Biologist (researcher) Chief of Hydrobiological Department.

3. Nshombo Muderhwa, Biologist (researcher).

4. Mulimbwa N'sibula, Biologist (researcher).

5. Mbokosima Keita, Biologist (researcher).

6. Malasi Ngandu, OIC Library (ethnobotanist).

7. Mambona **Wa** Bazolana, Statistician (researcher).

8. Kimbadi Sona, Chemist/researcher.

9. Tshibangu Kalala, Chemist/researcher.

10. Mukiranya Muke Sayira, Goegrapher (technician).

11. Kakogozo Bombi, Meteorologist (technician).

12. Bashonga Bishobibiri, Biochemist (technician).

B.1 SAMPLE MONTHLY REPORT ON INDUSTRIAL FISHERY PRODUCTION, KALEMIE, MAY 1991 (Reproduced).

REPUBLIC DU ZAIRE
REGION DU SHABA
SOUS/REGION DU TANGANIKA
COORDINATION SOUS/REGIONALE DE
L'ENVIRONNEMENT ET CONSERVATION
DE LA NATURE

RAPPORT MENSUEL DE LA PRODUCTION DE LA PECHE INDUSTRIELLE MOIS DE MAI 1991

Nom de Pêcherie	Noms des Unités	Luciolates Mikebuka	Lates Sangala	Limno. Lumbu	Stolo. Ndagaa	Divers	TOTAL KG.
METHODIST S.S.	Paopens	-	-	-	-	-	-
	Nyunzu	6.400	150	-	-	-	
	Lubudi	4.780	105	-	-	-	6.550
							4.885
LUTHERAN	Huruma	5.460	39	-	200	-	5.699
	Tumaini	6.500	24	-	320	-	6.844
	Neema	5.540	93	-	320	-	5.973
P.G.D.	Kabimba	14.640	345	620	1380	-	16.985
	Kemba	10.180	60	-	300	-	10.540
SOZAP	Pweto	5.760	6	-	-	-	5.766
	Lukuga	10.340	165	-	-	-	10.505
KATEBE KATOTO	Tanganyika	11.060	6	-	-	-	11.066
	Salongo	9.460	87	-	-	-	9.547
	Eneka	11.760	-	-	-	-	11.760
DEKA	Kizie	3.680	-	-	-	-	3.680
PELATE	Lubundu	3.860	-	-	-	-	3.860
TOTAL	-	109.420	1.080	620	2.540	-	113.660

Commentaires: La production de cette periode est favorable sauf quelques pannes techniques.

Fait à Kalemie, le 28 Mai 1991
LE MONITEUR PECHE STATISTICIEN
PORT S.N.C.Z.

C.1 'PAPERS, REPORTS, AND ARTICLES ALREADY PUBLISHED OR IN PRESS': LAKE TANGANYIKA ECOLOGICAL AND LIMNOLOGICAL STUDY PROJECT.

ABE, N. 1988a. Preliminary report on the feeding ecology of mastacembelids in Lake Tanganyika. Ecol. Limnol. Tanganyika, 5: 37.

-------, 1988b. Some notes on crabs at Mbemba. Ibid., 5: 61.

-------, 1989. Social organization and parental care of Afromastacembelus platysoma. Ibid.. 6: 38.

-------, unpublished. Parental care and social organization of the spiny eel, Afromastacembelus platysoma, in Lake Tanganyika.

ABE, T. 1987. Population structure of Lamprologus savoryi. Ibid, 4: 36-37.

ANKEI, Y. 1981a. Songôra-zoku no nôkô-seikatsu to keizai-katsudo (Agricultural life and economic activities of the Songola). Kikan Jinruigaku (Quart. J. Anthrop.), 12(l): 96- 178. (in Japanese)

-------, 1981b. Folk knowledge of the fish among the Songola and the Bwari. Comparative ethno-ichthyology of the Zaïre River and Lake Tanganyika. Ecol. Limnol. Tanganyika, 1: 36.

-------, 1982a. Folk-knowledge of the fish among the Songola and the Bwari. Comparative ethno-ichthyology of the Zaïre River and Lake Tanganyika fishermen. J. Af'r. Stud., 21: 1-56. (in Japanese with English summary)

-------, 1982b. Two folk tales from Zaïre, Central Africa. Mem. Okinawa Univ., 2: 141-166. (in Swahili with Japanese translation)

------- 1982c. Doku de uo wo toru (Fish poisons in Africa and the Ryukyus). Anima, 117: 58-59. (in Japanese)

------- 1984a. "Genshi-kahei" to shite no uo (Fish as "primitive money"). pp.337-421. In: Afurika-bunka no kenkyû (Studies on African cultures) (eds. Itani, J. & Yoneyama. T.)., Akademia Shuppankai, Tokyo. (in Japanese)

------- 1984b. Fish as "primitive money": Barter markets of the Songola. Senri Ethnol. Studies, 15: 1-68.

------- 1984c. Zaîru-gawa jôryû-bu no butsubutsukôkan-ichi (Barter market at upper reaches of River Zaïre). Minzokugaku Kenkyû (Bull. Ethnol. Stud.), 49: 169-173. (in Japanese)

------- 1985. Shuryômin to gyorômin no seikatsu no hikaku (Comparison of life styles between hunters and fishermen). pp.93-106. In: Afurika karano hassoo (ed. Kawai, M.). 214pp., Shoogakukan, Tokyo. (in Japanese)

------- 1986. Connaissance populaire du poisson chez les Songola et les Bwari: Ethno-ichtyologic comparée des pêcheurs du fleuve Zaïre et du Lac Tanganika. Africana Linguistica, 10:

------- 1985c. Uo no kôkan-keizai (Barter economy of fishes). Asahi-hyakka Sekai no Chiri (Asahi Encyclopedia on World Geography), 104:(in Japanese)

------- 1988. A comparative study on the barter markets of the upper Zaïre River. Afr.

Stud. Monogr., suppl. 4: 89-101.
------- 1989. Folk knowledge of fish among the Songola and the Bwari: comparative ethno-ichthyology of the Lualaba River and Lake Tanganyika. Afr. Stud. Monogr., suppl. 9: 1-88.
BAREL, C D. N., DORIT, R., GREENWOOD, P. I-L, FRYER, G., HUGHES, N., JACKSON,
P. B. N., KAWANABE, H., LOWE-MCCONNELL, R. 11, NAGOSHI, M., RIBBINK, A. J., TREWAVAS, E., WITTE, F. & YAMAOKA, K. 1985. Destruction of fisheries in Africa's lakes. Nature, 315: 19-20.
C.R.S.N. / UVIRA STATION. 1987. Seasonal changes in some eco-climatic conditions at Uvira. Ecol. Limnol Tanganyika, 4: 124-125.
ENOKI, A., MAMBONA, W. B. & MUKIRANIA, M -S. 1987. General survey of fisheries in northwestern part of Lake Tanganyika. Ibid., 4: 98-101.
ENOKI, A. 1989. Tanganyika-ko no gyogyô to gyomin. (Fisheries and fishermen of Lake Tanganyika). pp.298-312. In: Ningen-ni totte nôgyô towa (ed. Sakamoto, K.). Gakuyô-shobô, Tokyo.
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NOTE:

THE ABOVE LIST OF REFERENCES HAS BEEN PHOTOCOPIED FROM ECOLOGICAL AND LIMNOLOGICAL STUDY ON LAKE TANGANYIKA AND ITS ADJACENT REGIONS, VOL. VII, PART VII. ALL CORRESPONDENCE SHOULD BE ADDRESSED TO:

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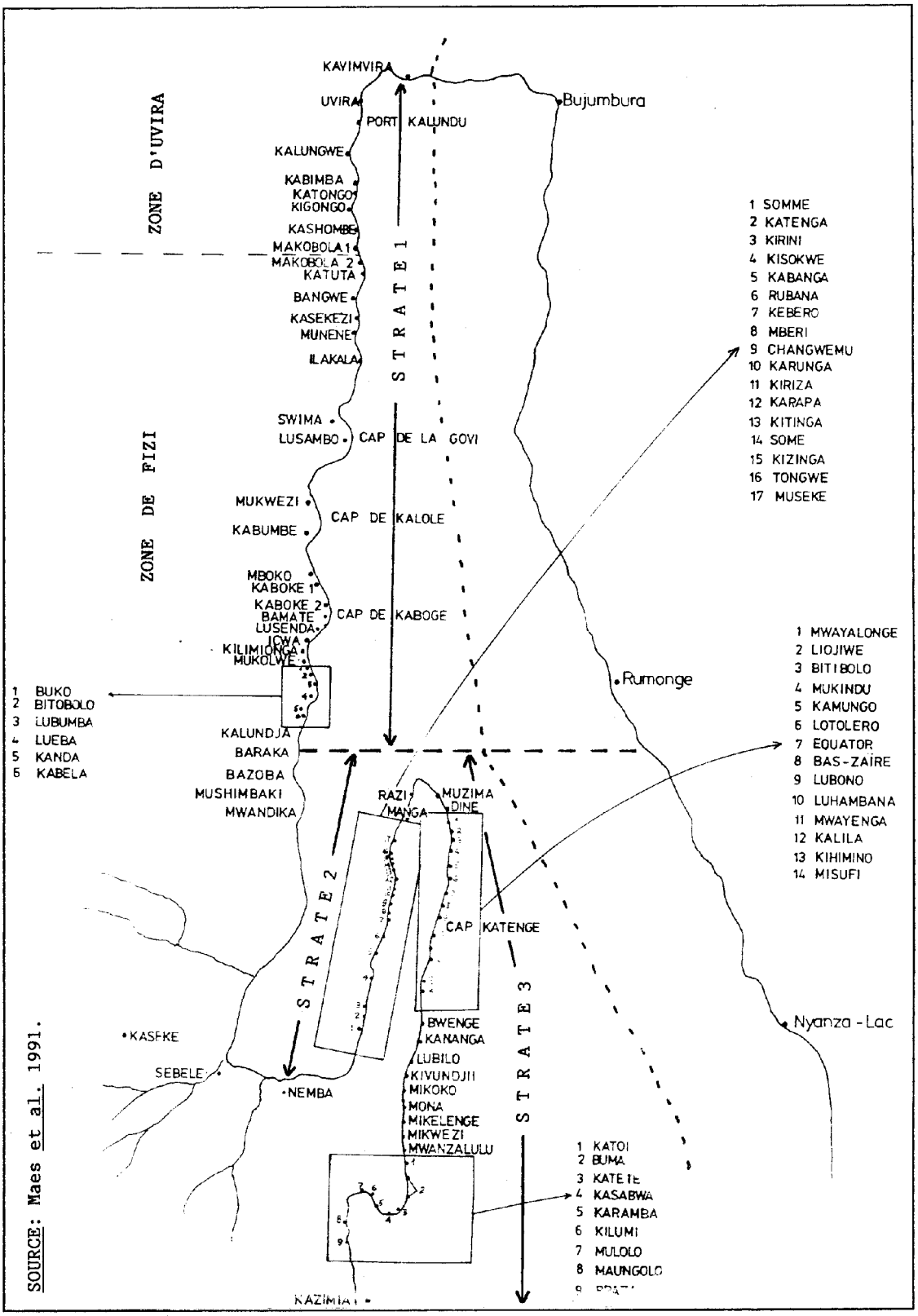
C.2 MAP OF FISHING VILLAGES AND STRATA, NORTHERN LAKE TANGANYIKA, ZAIRE.



ANNEX IV -- DOCUMENTS/DATA SETS: ZAMBIA

- A.1 DATA SETS/RESEARCH MATERIALS/NOTES FROM PAST STUDIES ON FILE/IN STORAGE AT DOF MPULUNGU.

- A.2 CATCH/EFFORT TIME SERIES DATA (1963-90), L. TANGANYIKA (ZAMBIA).

- A.3 LENGTH/FREQUENCY DATA BASE, L.TANGANYIKA (ZAMBIA).

- A.4 GILLNET SURVEY FORMS 1 & 2.

- A.5 GILLNET SURVEY FORM 3.

- A.6 CATCH ASSESSMENT SURVEY RESULTS, L.TANGANYIKA (ZAMBIA), 1977-90.

- B.1 INDUSTRIAL CATCHES RECORDING FORM.

  B.2 MAP OF LANDING SITES AND STRATA, L.TANGANYIKA,ZAMBIA.

- B.3 FRAME SURVEY DATA ENTRY FORM 1.

- B.4 FRAME SURVEY DATA ENTRY FORM 2.

- B.5 CATCH ASSESSMENT SURVEY FORM 1.

- B.6 CATCH ASSESSMENT SURVEY FORM 2.

- B.7 FRESH FISH SALES RECORDING FORM.

- B.8 DRY FISH SALES RECORDING FORM.

- B.9 FRESH FISH SALES MONTHLY SUMMARY SHEET.

- B.10 DRY FISH SALES MONTHLY SUMMARY SHEET.

  B.11 LIST OF ZAMBIAN FISHERIES STATISTICS COMPILED FOR 1991.

- B.12 LENGTH FREQUENCY RECORD SHEET NO.l.

- B.13 COMMERCIAL LENGTH FREQUENCY DATA FORM 1.

- B.14 COMMERCIAL LENGTH FREQUENCY DATA FORM 2.

- B.15 COMMERCIAL LENGTH FREQUENCY DATA FORM 3.

- B.16 ORNAMENTAL FISH RECORD FORM.

- C.1 LIST OF MAPS AVAILABLE.

A.1 DATA SETS/RESEARCH MATERIALS/NOTES FROM PAST STUDIES ON FILE/IN STORAGE AT DOF MPULUNGU.

ITEM NO.	CONTENTS/REMARKS
1.	Lake Tanganyika basic gill net data from two surveys in early 1960s (Coulter) and early 1970s (Kendall). Original data sets for which backup copies should be made.
2.	Collection of 5000 scale samples of eight common species. From early study project, but size/age/growth analysis never carried out.
3.	Original data/notes on Lufubu River discharge monitoring, 1957-1965. Data are spotty for some periods. Also original data for Lunzua River, 1955, 1959-65, and 1969-70.
4.	Sets of basic limnological data back to 1982. Also somewhat more detailed data for the 1982-84 period covering four stations in the Mpulungu area.
5.	Zooplankton abundance data back to 1962, intermittent. Complete sets for studies conducted in 1983 (Mubamba), 1988-90 (Pearce) and 1991 (Phiri).
6.	Records of gonad studies conducted 1971 (kapenta), 1980-83 (Luciolates), 1984-85 (Limnothrissa), 1986-87 (Limnothrissa), 1989 (Luciolates), and 1991 (Luciolates, Limnothrissa, and Stolothrissa).
7.	Notes on qualitative studies of stomach contents conducted in 1980-83 (Luciolates), 1989 (Luciolates), and 1991 (Stolothrissa and Limnothrissa).
8.	Report and field notes on 'Appraisal of fisheries potential of the Lufubu River' done in 1963 (Badenhuzen).

9. Daily performance records of fishing units of loanees in a credit programme for gillnet fishery in Kasenga area (1965-66).

10. Data set from 1963-66 study of feeding habits of dagaa and juvenile Lates. Also data on the biology of the pelagic prawns. (Matthes).

11. Preserved fish specimen collection. Many specimens not yet individually bottled.

12. Report on experimental lift net fishing trials at Mpulungu, 1988-89 (Pearce).

13. Research Report: Pearce, M.J. 1985(a). The deepwater demersal fish in the south of Lake Tanganyika. Research Report to the Dept. of Fisheries, Government of Zambia. **(Copy** also on file with Project).

14. Research Report: Pearce, M.J. 1985(b). A description and stock assessment of the pelagic fishery in the south-east arm of the Zambian waters of Lake Tanganyika. Research Report to the Dept. of Fisheries, Government of Zambia. (Copy also on file with Project).

15. Study of population dynamics of sardines in southern Lake Tanganyika. MSC Thesis - 1989 Univ. of Buckingham, U.K. (Lupikisha). At Chilanga DOF HQ.

16. Stock assessment of sardines in southern Lake Tanganyika. MSC Thesis - 1987 - Univ. of Wales, U.K. (Munandalu). At Chilanga DOF HQ.

NOTE: The following FAO projects were undertaken at Mpulungu in the past but there are no records or documentation available at the station-.

- Gear technology, catarmaran lift-net development, ca. 1975.
- Experimental fishing, underwater lights, early 1970s.
- Midwater trawling trials, early 1970s.

A.2 CATCH/EFFORT TIME SERIES DATA (1963-90), L. TANGANYIKA (ZAMBIA).

On file with the Project is an example print-out of one month's records from the catch/effort data base for the industrial fishery, L. Tanganyika (Zambia), in addition to printouts for the following time series compilations:

FILENAME	DATATYPE SPP/UNITS	FISHERY-AREA
FISH1	TOT.CATCH ALL SPP.	INDUST. MPULUNGU
FISHLA	TOT.CATCH KAPENTA	INDUST. MPULUNGU
FISHLB	TOT.CATCH STOLO.	INDUST. MPULUNGU
FISHIC	TOT.CATCH LIMNO.	INDUST. MPULUNGU
FISHID	TOT.CATCH LUCIOLATES	INDUST. MPULUNGU
FISHIE	TOT.CATCH MICROLEPIS	INDUST. MPULUNGU
FISHIF	TOT.CATCH MARIAE/ANGUST	INDUST. MPULUNGU
FISHIO	TOT.CATCH ALL SPP.	INDUST. NSUMBU
FISHIOA	TOT.CATCH KAPENTA	INDUST. NSUMBU
FISHIOB	TOT.CATCH STOLO.	INDUST. NSUMBU
FISHIOC	TOT.CATCH LIMNO.	INDUST. NSUMBU
FISHIOD	TOT.CATCH LUCIOLATES	INDUST. NSUMBU
FISHIOE	TOT.CATCH MICROLEPIS	INDUST. NSUMBU
FISHIOF	TOT.CATCH MARIAE/ANGUST	INDUST. NSUMBU
FISH2	TOT.EFFORT BOATNIGHTS	INDUST. MPULUNGU
FISH2A	TOT.EFFORT LIGHTS	INDUST. MPULUNGU
FISH2B	TOT.EFFORT HAULS	INDUST. MPULUNGU
FISH20	TOT.EFFORT HAULS	INDUST. NSUMBU
FISH20A	TOT.EFFORT BOATNIGHTS	INDUST. NSUMBU
FISH3	CATCH/EFF. TONNES/NIGHT	INDUST. MPULUNGU
FISH3A	CATCH/EFF. TONNES/LIGHT	INDUST. MPULUNGU
FISH3B	CATCH/EFF. TONNES/HAUL	INDUST. MPULUNGU

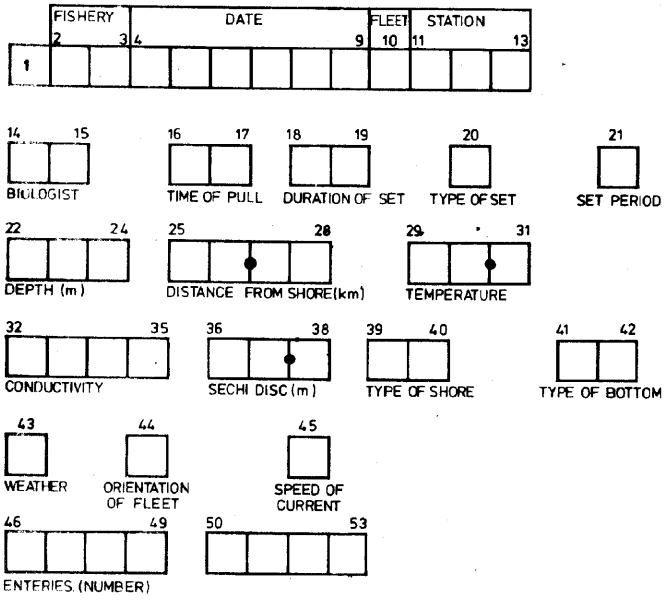
A.3 BASE DE DONNEES DE LONGUEUR/FREQUENCE, LAC TANGANYIKA (ZAMBIE).

On file with the Project is an example printout of one month's data set (June-July 1987).

A.4 GILLNET SURVEY FORMS 1 & 2.

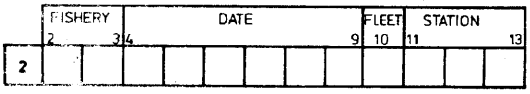
GILL NET SURVEY : NET RECORD

DOCUMENT NO.1



GILL NET SURVEY: NET RECORD

DOCUMENT NO.2



MESH SIZE (mm) 14–16	No. 17	NET DEPTH (m) 18–20	NET LENTH 21(m)22	HANG RATIO 23–24	TWINE No. 25–26	M 27	C 28	SPECIES 29–31	No. FISH 32–35	WT. FISH (g) 36–42	43–50
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			
								5,0,0			

A.3 GILLNET SURVEY FORM 3.

GILL NET SURVEY: CATCH RECORD _____ DOCUMENT NO. 3

	FISHERY 2 3	DATE 4 9	FLEET 10	STATION 11 13
3				

MESH(mm) 14 16	SPECIES CODE 17 19	LENGTH (mm) 20 23	WEIGHT (g.) 24 28	♀ 29	♂ 30	31	32

MESH(mm) 14 16	SPECIES CODE 17 19	LENGTH (mm) 20 23	WEIGHT (g.) 24 28	♀ 29	♂ 30	31	32

ENTRIES: _____ ENTRIES: _____

A.6 CATCH ASSESSMENT SURVEY RESULTS, L.TANGANYIKA (ZAMBIA), 1977-90.

The following printouts have been collected for Project files:

ITEM	CONTENTS
CAS Table 1:	Number of Primary Sampling Units.
CAS Table 2:	Number of Fishermen.
CAS Table 3:	Number of Boats.
CAS Table 4:	Number of Fishing Economic Units.
CAS Table 5:	Outboard Engines.
CAS Table 6:	Number of Kapenta Seines.
CAS Table 7:	Number of Tilley Lamps (Light Boats).
CAS Table 8:	Number of Gillnets.
CAS Table 9:	Number of Beach Seines.
CAS Table 10:	Estimates of Total Catch All Species Metric Tonnes.
CAS Table 11:	Estimates of Total Catch Kapenta : Metric Tonnes.
CAS Table 12:	Estimates of Total Catch Other Species : Metric Tonnes.
CAS Table 13:	Catch Per Net Night Gillnets Kilos
CAS Table 14:	Catch Per Boat Night Gillnets Kilos
CAS Table 15:	Nets Per Boat (Gillnets)

B.1 INDUSTRIAL CATCHES RECORDING FORM

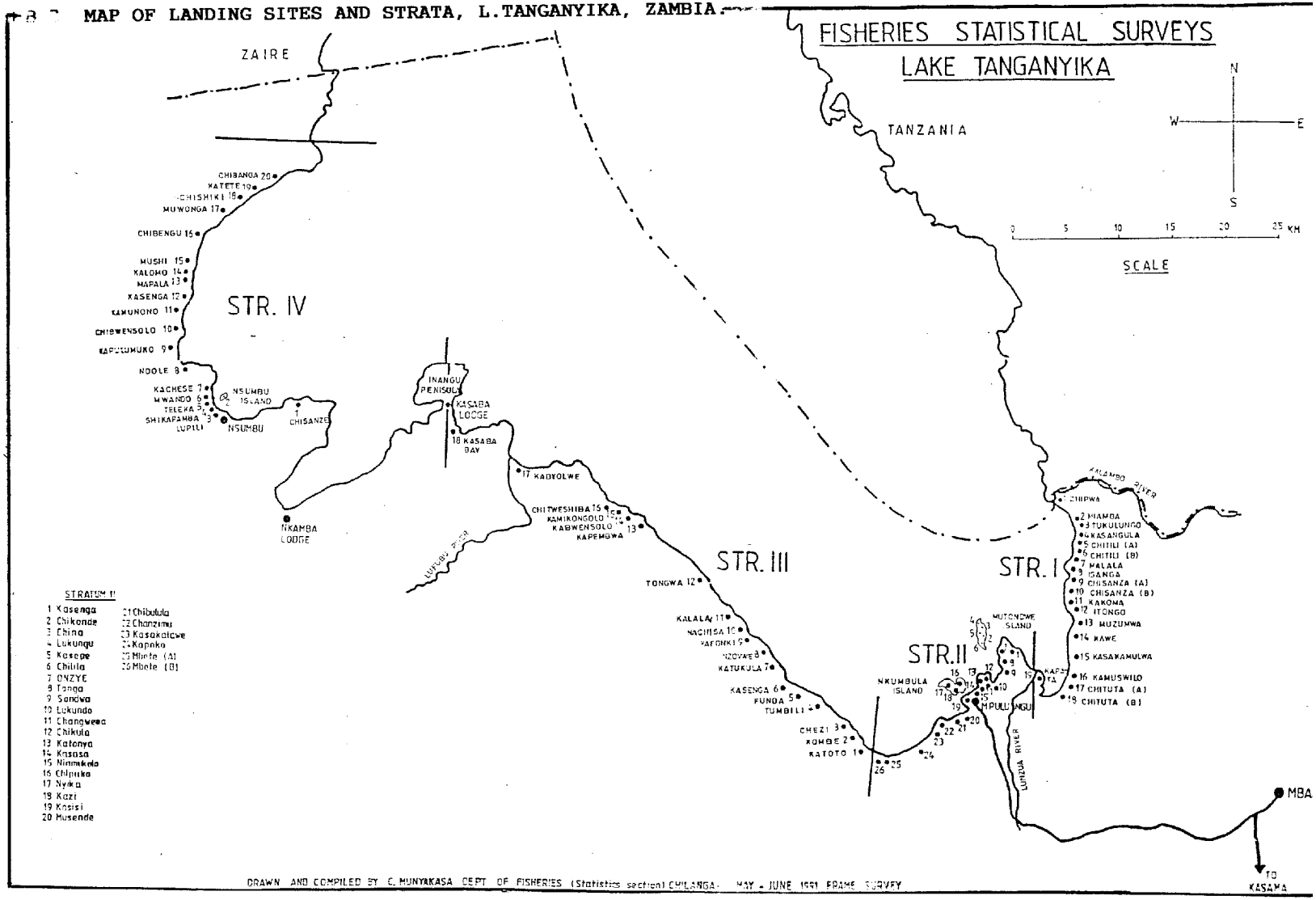
STAT. FORM 2
4cpds V462 7/87 4A

INDUSTRIAL CATCHES

1. Fishing Company.....
2. Month of.....
3. Vessel: Tyre.....
4. Type of Gear.....

Date	Locality	CATCHES IN KG					No. of Draws	No. of Light Boats
		Dagaa (wt.)	Pamba (wt.)	Mvolo (wt.)	Nyuvi (wt.)	Others (wt.)		
TOTALS								

MAP OF LANDING SITES AND STRATA, L.TANGANYIKA, ZAMBIA



DRAWN AND COMPILED BY C. MUNYAKASA DEPT OF FISHERIES (Statistics section) CHILANGA - MAY - JUNE 1991 FRAME SURVEY

B.3 FRAME SURVEY DATA ENTRY FORM 1.

Form 9
3m V450 6/87

FISHERIES STATISTICAL SURVEYS OF ZAMBIA

SUPPLEMENTARY FRAME SURVEY

Fishery _____ Survey RI Round [ ] Stratum [ ]

Serial Number	Name of Village	Date of Visit	Number of F/Men	Number of Fishing boats by Type:							Remarks
				Canoe	Plank boats		Fibreglass		Metal boats		
					without engine	with engine	without engine	with engine	without engine	with engine	

GCP/RAF/271/FIN-TD/01 (En)

B.4 FRAME SURVEY DATA ENTRY FORM 2.

FISHERIES STATISTICAL SURVEY OF ZAMBIA
SUPPLEMENTARY FRAME: BOAT USE

PAGE_____ FISHERY_____ YEAR_____ ROUND_____ STRATUM_____

No	Name of village	Date	Engine No.	Boat No.	Unused Boats	Non Fishing			Fishing Economic Units						Others	TOTAL
						Lifts	Helper	Lights	Kapenta Seines	Lift Nets	Beach Seines	Gill Nets	Hand Nets	Long Lines		
TOTL																

B.5 CATCH ASSESSMENT SURVEY FORM 1.

REPUBLIC OF ZAMBIA - DEPARTMENT OF FISHERIES

Name of Village _____

FISHERIES STATISTICAL SURVEYS CATCH ASSESSMENT SURVEY

Sample Code Number . . . [ ]

PS1-SURVEY

Date _____

FORM L1 LIST OF THE FISHING BOATS AND THEIR OWNERS OR OPERATORS			FORM A1 FISHING ACTIVITY "Did he go fishing...?"		
Serial Number	Type of Boat	Name of Owner or Operator	Today	Yesterday	Day before yesterday

PS2-SURVEY

Survey Day ___ Date _____

FORM L2 LIST OF THE OUTGOING BOATS AND INCOMING LANDINGS			
OUTGOING BOATS		INCOMING LANDINGS	
Name of Owner or Operator	Serial Number	Name of Owner or Operator	Sample Code Number

B.6 CATCH ASSESSMENT SURVEY FORM 2.

REPUBLIC OF ZAMBIA - DEPARTMENT OF FISHERIES

CATCH ASSESSMENT SURVEY

PS2-SURVEY FORM A2

RECORD OF LANDINGS OF LOCAL BOATS

Survey Day ___ Page ___

Fishery _____

Name of Village _____

Recorders _____

★

Document				Sample Code Number				Survey Day	Date			Survey Round	Total Landings	
Fisheries Production Survey 2				Fishery	Stratum	Mis-Str	PSU		Day	Month	Year			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

CARD 1	Selected Landing	Name of Owner or Operator	Gear Used: Type of Gear	No.	Mesh size mm.	No.	Mesh size mm.	No.	Mesh size mm.	No.	Mesh size mm.	Seine/Trap: No. of draw traps	Seine/Trap: Mesh size mm.	Boat: Type	Boat: Crew	01 Tilapia: Number	01 Tilapia: Kilograms	02 Serranochromis: Number	02 Serranochromis: Kilograms	03 Other Cichlids: Number	03 Other Cichlids: Kilograms	Next Card
19	20	21	22 23	24 25 26 27 28	29 30	31 32 33	34 35 36 37 38	39 40 41 42 43	44 45 46 47 48	49	50	51 52 53 54 55 56.57	58 59 60 61 62 63.64	65 66 67 68 69 70.71	72
1																						
1																						
1																						
1																						
1																						
1																						

CARD 2	Selected Landing		Type of Gear	04 Mormyridae: Number	04 Mormyridae: Kilograms	05 Hydrocyon: Number	05 Hydrocyon: Kilograms	06 Other Characids: Number	06 Other Characids: Kilograms	07 Citharinidae: Number	07 Citharinidae: Kilograms	08 Cyprinidae: Number	08 Cyprinidae: Kilograms	09 Schilbeidae: Number	09 Schilbeidae: Kilograms	10 Claridae: Number	10 Claridae: Kilograms	Next Card
19	20	21	22 23	24 25 26 27 28 29.30	31 32 33 34 35 36.37	38 39 40 41 42 43.44	45 46 47 48 49 50.51	52 53 54 55 56 57.58	59 60 61 62 63 64.65	66 67 68 69 70 71.72	73
2																		
2																		
2																		
2																		
2																		
2																		

CARD 3	Selected Landing		Type of Gear	11 Synodontis: Number	11 Synodontis: Kilograms	12 Bagridae: Number	12 Bagridae: Kilograms	13 Clupeidae (dagaa): Kilograms	14 Lates: Number	14 Lates: Kilograms	15 Others: Number	15 Others: Kilograms	Next Card
19	20	21	22 23	24 25 26 27 28 29.30	31 32 33 34 35 36.37	38 39 40.41	42 43 44 45 46 47.48	49 50 51 52 53 54. 55	56
3													
3													
3													
3													
3													
3													

01-01-76

7 FRESH FISH SALES RECORDING FORM

FISHERY _____

SALES RECORDS FRESH FISH
DAILY RECORDS

STAT. SR1 _____ DAY _____

FISHING CAMP _____ MONTH _____

RECORDER _____ YEAR _____

DATE	Number of Buyer	ice bought		Weight of fish sold(kg)			Total value of sales	Destination	Form of Transport	Estimated time to reach destination
		sources	weight	others	Kapenta	Total				
TOTALS										

B.8 DRY FISH SALES RECORDING FORM

FISHERY_____

SALES RECORDS DRY FISH
DAILY RECORDS

STAT. SR2 _____
FISHING CAMP_____
RECORDER _____

DAY _____
MONTH_____
YEAR _____

DATE	Number of Buyers	Method of Processing fish		Weight of fish sold (kg)			Total Value of sales	Destination	Form of Transport	Estimated time to reach destination
		Method	No.	Others	Kapenta	Total				
TOTALS										

B.' FRESH FISH SALES MONTHLY SUMMARY SHEET.

FISHERY _____

SALES RECORD OF FRESH FISH

MONTHLY SUMMARY

STAT. SR3_____

FISHING CAMP_____

RECORDER _____

DATE COMPILED_____

MONTH _____

YEAR _____

DATE	No of Buyers	Weight of fish Sold (kg)		Total Weight	Total value of sales	Weight of ice	Place from where ice was bought		Destination	
		Others	Kapenta				place	No	Place	No
							1		1	
							2		2	
							3		3	
							4		4	
							5		5	
							6		6	
							7		7	
							8		8	
							9		9	
							Method of Transport		Estimated time to reach destination	
									Place	No
							1		1	1
							2		2	2
							3		3	3
							4		4	4
							5		5	5
							6		6	6
							7		7	7
							8		8	8
							9		9	9
							10		10	10
							11		11	11
							12			

B.10 DRY FISH SALES MONTHLY SUMMARY SHEET.

FISHERY _____

SALES RECORDS DRY FISH

MONTHLY SUMMARY

STAT. SR4 _____ DATE COMPILED _____

FISHING CAMP _____ MONTH _____

RECORDER _____ YEAR _____

Date	No of Buyer	Weight of Fish Sold (kg)		Total	Total Value Sales	Method of Processing Used		Destination	
		Others	Kapenta			Method	No	Place	No
						1		1	
						2		2	
						3		3	
						4		4	
						5		5	
						6		6	
						7		7	
						8		8	
						9		9	
						10		10	
						METHOD OF TRANSPORT			
						Method	No		
						1			
						2			
						3			
						4			
						5			
						6			
						7			
						8			
						9			
						10			
						11			
						12			
						13			

B.11 LIST OF ZAMBIAN FISHERIES STATISTICS COMPILED FOR 1991.

The DOF National Fisheries Statistics Report compiled in July 1991 was obtained for FAO/FINNIDA Project files, and contains the following tables:

ITEM NO.	TITLE
Table 1:	List of Major Fisheries of Zambia, Their Stations and Provinces.
Table 2:	Provinces, Stations and their major fishing activities of Zambia.
Table 3:	Number of boats, fishermen and fishing Villages in major fisheries of Zambia.
Table 4:	Annual fish production of Zambia (1966 - 1990).
Table 5:	Commercial Catches (tonnes) of Lakes Kariba and Tanganyika (1980 - 1990).
Table 6:	Number of rigs (Kariba) and boats (Tanganyika) employed by Commercial companies of Lakes Kariba and Tanganyika.
Table 7:	National demand and production of fish since 1980.
Table 8:	Per capita consumption of fish (Kg/person/year).

B.12 LENGTH FREQUENCY RECORD SHEET NO. 1

DEPARTMENT OF FISHERIES

LENGTH FREQUENCY RECORD SHEET NO. 1

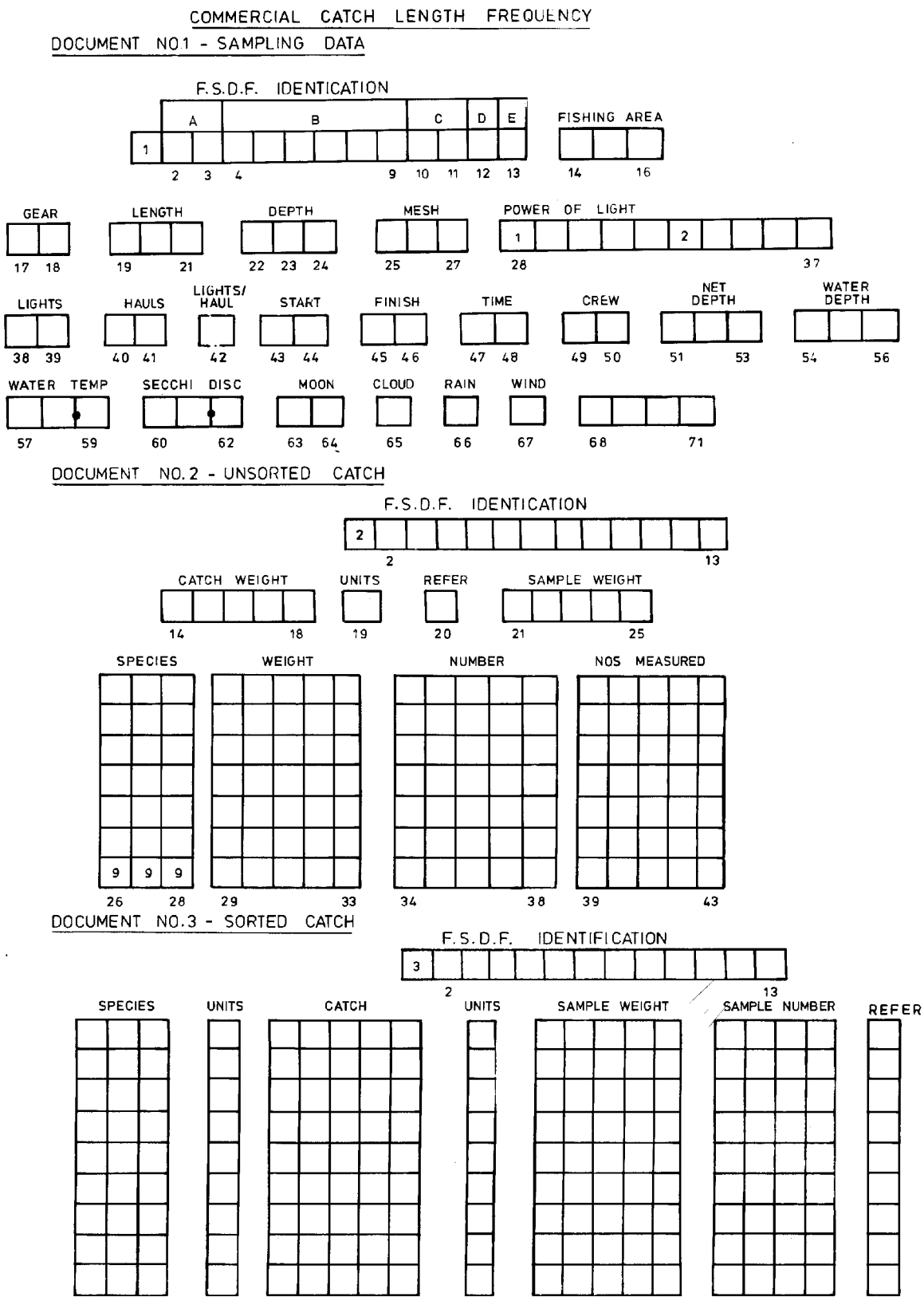
FISHERY .... **SPECIES**

LOCATION .... **SAMPLE WT** ....

DATE .... **CATCH WT** ....

1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
0		0	
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
0		0	
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
0		0	
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
0		0	
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
0		0	

B.13 COMMERCIAL LENGTH FREQUENCY DATA FORM 1.



B.14 COMMERCIAL LENGTH FREQUENCY DATA FORM NO.2

COMMERCIAL LENGTH FREQUENCY SAMPLE

UNSORTED CATCH

FSDF IDENTIFICATION

	FISHERY		DATE						SAMPLE				SPECIES		
4															
	2	3	4					9	10	11	12	13	14		15

UNITS (17)

TOTAL ENTRIES (18–22)

LENGTH (23–28)	Nos.	LENGTH (23–28)	Nos.	LENGTH (23–28)	Nos.	LENGTH (23–28)	Nos.	LENGTH (23–28)	Nos.	LENGTH (23–28)	Nos.
001		031		061		091		121		151	
002		032		062		092		122		152	
003		033		063		093		123		153	
004		034		064		094		124		154	
005		035		065		095		125		155	
006		036		066		096		126		156	
007		037		067		097		127		157	
008		038		068		098		128		158	
009		039		069		099		129		159	
010		040		070		100		130		160	
011		041		071		101		131		161	
012		042		072		102		132		162	
013		043		073		103		133		163	
014		044		074		104		134		164	
015		045		075		105		135		165	
016		046		076		106		136		166	
017		047		077		107		137		167	
018		048		078		108		138		168	
019		049		079		109		139		169	
020		050		080		110		140		170	
021		051		081		111		141		171	
022		052		082		112		142		172	
023		053		083		113		143		173	
024		054		084		114		144		174	
025		055		085		115		145		175	
026		056		086		116		146		176	
027		057		087		117		147		177	
028		058		088		118		148		178	
029		059		089		119		149		179	
030		060		090		120		150		180	

ENTRIES	ENTRIES	ENTRIES	ENTRIES	ENTRIES	ENTRIES

B.15 COMMERCIAL LENGTH FREQUENCY DATA FORM NO.3

COMMERCIAL LENGTH FREQUENCY SAMPLE

SORTED CATCH

FSDF IDENTIFICATION

	FISHERY		DATE						SAMPLE				SPECIES			UNITS	TOTAL ENTRIES				
5																					
	2	3	4					9	10	11	12	13	14		15	17	18				22

LENGTH Nos. 23–28		LENGTH Nos. 23–28		LENGTH Nos. 23–28		LENGTH Nos. 23–28		LENGTH Nos. 23–28		LENGTH Nos. 23–28	
001		031		061		091		121		151	
002		032		062		092		122		152	
003		033		063		093		123		153	
004		034		064		094		124		154	
005		035		065		095		125		155	
006		036		066		096		126		156	
007		037		067		097		127		157	
008		038		068		098		128		158	
009		039		069		099		129		159	
010		040		070		100		130		160	
011		041		071		101		131		161	
012		042		072		102		132		162	
013		043		073		103		133		163	
014		044		074		104		134		164	
015		045		075		105		135		165	
016		046		076		106		136		166	
017		047		077		107		137		167	
018		048		078		108		138		168	
019		049		079		109		139		169	
020		050		080		110		140		170	
021		051		081		111		141		171	
022		052		082		112		142		172	
023		053		083		113		143		173	
024		054		084		114		144		174	
025		055		085		115		145		175	
026		056		086		116		146		176	
027		057		087		117		147		177	
028		058		088		118		148		178	
029		059		089		119		149		179	
030		060		090		120		150		180	

ENTRIES	ENTRIES	ENTRIES	ENTRIES	ENTRIES	ENTRIES

B.16 ORNAMENTAL FISH RECORD FORM

REPUBLIC OF ZAMBIA

5m 8433 5/86

THE FISHERIES REGULATIONS, 1986

ORNAMENTAL FISH: RECORD FORM

PART I

PRODUCTION

No.....

Locality..... Date .....

Species	Number	Mortality	Fish Used for Research	No. of Fish Sold	No. of Fish Exported
TOTAL					

Destination of Exports.....

Signature of Exporter.....

Signature of Government Officer.....

C.l. LIST OF MAPS AVAILABLE

ITEM NO.	TITLE/DESCRIPTION
1.	Zambia (1:1,500,000).
2.	City of Lusaka.
3.	Zambia: Vegetation and Climate.
4.	Zambia: Land Use and minerals.
5.	SC-36-1. Mbala (Southern L.Tanganyika, 1:250,000).
6.	L. Tanganyika, Zambia. Bathymetric Sheet:l. (Sampling Transects).
7.	L. Tanganyika, Zambia. Bathymetric Sheet:2. (Sampling Contours).
8.	L. Tanganyika, Zambia. Bathymetric Sheet:3. (L. Tanganyika, Southeast Arm). *Note: Bathymetric Sheet:4 not available at Map office, Lusaka, Zambia.*
9.	Trace map, May-June 1991 Frame Survey, L. Tanganyika (Fishing villages by strata).

ANNEX V -- DOCUMENTS/DATA SETS: TANZANIA

A.1	L. TANGANYIKA FISHERIES RESEARCH & DEVELOPMENT PROJECT -- URT/71/012: WORKING PAPERS
A.2	MISCELLANEOUS URT/71/012 DOCUMENTS OBTAINED.
A.3	MISCELLANEOUS OTHER DOCUMENTS OBTAINED.
A.4	L. TANGANYIKA FISHERIES RESEARCH & DEVELOPMENT PROJECT -- URT/71/012: SAMPLE DATA SETS STORED IN TAFIRI LAB BLOCK.
A.5	LIST OF TAFIRI - KIGOMA SENIOR STAFF.
B.1	MAP OF LANDING SITES AND STRATA, KIGOMA REGION, L.TANGANYIKA, TANZANIA.
B.2	DAILY FISH LANDINGS WORK BOOK (FORM 21A - SAMPLE PAGE).
B.3	DAILY RECORD OF FISH LANDED (FORM 21B).
B.4	DAILY RECORDING SHEET FOR FRESH/PROCESSED FISH (FORM 22).
B.5	MONTHLY SUMMARY OF CATCH WEIGHTS, VALUES, ETC. (FORM 24).
B.6	AVERAGE PRICE PER KG. PER SPP. FOR EACH MARKET (FORM 25).
B.7	AVERAGE BOAT PRODUCTIVITIES (FORM 26).
B.8	LANDINGS IN PERCENTAGE BY SPECIES (FORM 27).
B.9	TRANSPORTATION OF FISH (FORM 28)-
B.10	MONTHLY DATA FOR SMOKED FISH (FORM 29).
B.11	ANNUAL COMPILATION OF RECORDED DATA (FORM 30).
B.12	ANNUAL FISHING SURVEY - INDUSTRIAL VESSELS FORM.
B.13	ANNUAL FISHING SURVEY - BOATS & GEAR FORM.
B.14	FISHERIES DIVISION ANNUAL REPORT - STATISTICS 1989.
C.1	LIST OF PAPERS RELATED TO L. TANGANYIKA PRESENTED AT THE RESEARCHERS' MEETING, MWANZA CENTRE, FEB. 1988.
C.2	MISCELLANEOUS DATA/ITEMS COLLECTED FROM MET. OFFICE AND WATER DEPARTMENT.
C.3	KIGONA WATER MASTER PLAN, CONTENTS.

A.1 L. TANGANYIKA FISHERIES RESEARCH & DEVELOPMENT PROJECT -- URT/71/012: WORKING PAPERS

ITEM REF.	GCP/RAF/271/FIN COPY	TITLE/DESCRIFfION/R
WP/l	+	The Sampling Design of the Catch Assessment Survey (CAS) (G.P. Bazigos,December 1973)
WP/2	+	Development of Fish Landing Facilities and Boatyard. 16 pp. w/31 figs (L.C.Kelly, 1973).
WP/3	+	Development of Fish Landing Facilities Sociological Considerations 2 pp; (J. Colaris, 1973).
WP/4	+	Freezing Facilities for Whole Fish 9 pp. (J. Moes, 1973).
WP/5	+	Handling and Processing in Fish Receiving Station. 9 pp. w/l fig (E. Kordyl, 1974).
WP/6	+	Fishery Development in Lake Tanganyika 9 pp. (D.W. Chapman, 1974).
WP/7	+	Preliminary Appraisal of Canoe Fishery of Lake Tanganyika (Tanzania) 15 pp. wl4 figs and appended 4 pp. questionnaires (D.W. Chapman and G.P. Bazigos), 1974).
WP/8	+	Acoustical Estimates of Biomass of Pelagic Fish in Lake Tanganyika. 8 pp. w/15 figs (D.W. Chapman, 1974).
WP/9	+	Preliminary Quantitative Estimates of Pelagic Fish Stocks in Lake Tanganyika. 9 pp. w/9 figs. (K.A. Johannesson, 1974).
WP/10	+	Improvement of the Organization and Technology of the Traditional Fishermen. Sociological studies. 33 pp. 4 Appendices (J. Colaris, 1973).
WP/ll	+	Distribution of Biomass of Pelagic Fish in Lake Tanganyika. (D.W. Chapman, 1974).
WP/12	+	Analysis of Test Fishing and Limnological Sampling in Tanzanian Waters of Lake Tanganyika in October 1974 (D.W. Chapman, Bayona, Ellis, 1974).
WP/13	+	Sociological Studies Implementation of the Survey system of the Main Survey (Colaris 1974).
WP/14	+	Lake Tanganyika Geochemical and Hydrographic Survey - 73. Cruig. Scripps University California.
WP/15	+	Evaluation of Importance of Fishing Sense for Purse-Seine Skippers on Lake Tanganyika (D.W. Chapman and P.M.A. Van Well, 1975).
WP/16	+	Characteristics of Layers and School of Pelagic Fish in Lake Tanganyika (D.W. Chapman, 1975).
WP/17	+	Growth and Mortality of Stolothrissa Tanganicae (P.M.A. van Well and D.W. Chapman, 1975).
WP/18	+	Extracts from: "Exploration Hydrobiologique du Lac Tanganyika (1946 - 47). Résultats Scientifiques Vol. I Inst. Royal Sciences Nat. de Belgique, Bruxelles 1952. (W. Ferro 1974).

WP/19	+	Marketing Aspects of Commercial Purse-seine Fishing in Lake Tanganyika (J.K. Smart, 1975).
WP/20		Collective Preliminary report of Scientists from Overseas Research Institutions on their work on Lake Tanganyika, (G. Coulter, E. Fee & Dr. Hecky, Dr. M. Burgis, Dr. Edmond & Stallard, 1975).
WP/21	+	Summary of Several Pelagic Ichthyomass Assessment with Acoustics in Lake Tanganyika (D.W. Chapman, 1975).
WP/22	+	Some Aspects of Fish Meal Production in Central Africa (E.S. Kordyl, 1975).
WP/23	+	Guidelines for Quality Assessment of Fish (E.S. Kordyl, 1975).
WP/24	+	A Note on the Work On Insect Infestation of Dried Fish in Kigorna (E.S. Kordyl, 1975).
WP/25	*	Catch Assessment Survey March 74/Feb. 75, (G.P. Bazigos, 1975).
WP/26	+	Marketing of Fish from Lake Tanganyika. (U. Midtgaard, 1975).
WP/27		Frame Survey at Lake Tanganyika (Tanzania), Aug. 1975 (V.K. Sasidharan, 1975).
WP/28	+	Preliminary Report on a Mission for the Lake Tanganyika Fisheries Project, April 19 - May 23, 1975. (Ole A. Mathisen 1975).
WP/29	+	(a) Notes on Luciolates based on a study of Length Frequency Diagrams from the Ring Net Fisheries in Lake Tanganyika. (b) On the large size of Limnothrissa in the Catches of the Ring Net Fishery in Tanzania. (H.F. Handerson, 1976).
WP/30		Purse Seine fishing in Lake Tanganyika (A. Andrianos, 1976).
WP/31	+	Preliminary analysis of Zooplankton Sampling and Estimates of Fish Abundance in Lake Tanganyika in October 1975, (H. Rufli and D.W. Chapman, 1976).
WP/32		Sociological Surveys - Typical example concerning the conduct of a survey. (J. Colaris, 1974).
WP/33		Preliminary Report on age and growth analysis of Lates mariag in Lake Tanganyika (H. Rufli and D.W. Chapman, 1976).
WP/34		Preliminary Report on Luciolates population analsis (P. Van Well and D.W. Chapman, 1976).
WP/35		Acoustical estimates of fish movements in Lake Tanganyika, (P. Van Well, H. Rufli, Z. Ndugumbi, A. Andrianos and D.W. Chapman, 1976).
WP/36	+	Distribution and spawning season of Limnothrissa off Kigoma in Lake Tanganyika. (Z. Ndugumbi and D.W. Chapman, 1976).
WP/37		Seasonal changes in Zooplankton abundance and composition off Kigoma. (H.Rufli and D.W. Chapman, 1976).

WP/38	+	Preliminary observations on the biology Lates pp in Lake Tanganyika (H. Rufli, Z. Ndugumbi & D.W. Chapman, 1976).
WP/39	+	Summary of Limnological Observations in Lake Tanganyika near Kigoma 1974 - 1975 (Van Well, P. and Chapman D.W., 1976).
WP/40	+	Calculated weights of layers and schools of pelagic fish in Lake Tanganyika. (Chapman, D.W., 1970).
WP/41	+	An analysis of the results of the catch assessment survey at Lake Tanganyika (Tanzania) April '75 - March '76. (Sasidharan, V.K. 1976)
WP/42	+	Final report of FAD Marine Engineer. (Richards, L.G.W. 1976).
WP/43	+	Lusenga and Kipe fishery of Lake Tanganyika (Tanzania). (Sasidharan, V.K. 1976).
WP/44	+	Preliminary analysis on Zooplankton sampling in Lake Tanganyika in May 1976. (Rufli, H. and Chapman, D.W., 1976).
WP/45	+	Summary of Biological research on Lake Tanganyika from July 1973 to September 1976. (Chapman, D.W. 1976).
WP/46-*		
WP/47	+	Experimental fishing with a view to improvement of Traditional fishery methods and gear of the artisanal fisheries of Lake Tanganyika. (K.E. Stride, 1976).
WP/48**		
WP/49		Survey consumption of fish products in villages of Kigoma district. (Smart, J.K. and Msuku, B., 1976).
WP/50		The economics of an arti sanal ri ng net on Lake Tanganyika. (Smart, J. K. , 1977).
WP/51	*	Artisanal purse seine on Lake Tanganyika (first fishery trials). (Haling, L.J.S. and Andrianos, E.D. 1976)
WP/52	+	The introduction of more efficient fishing techniques for the small-scale fisheries of Lake Tanganyika. (Andrianos, E.D. 1976).
WP/53	**	
WP/54	**	
WP/(?)		Fishery biology and stock assessment. (FAO (1978) Rome).
WP/(?)		A preliminary report on the catch assessment survey (CAS) at Lake Tanganyika. (Statistics unit Kigoma Tanzania. 1975).
WP/(?)		Landings and their facilities on Lake Tanganyika. (Kelly, L.C. 1975).
WP/(?)		The present state of teh traditional fishery of Lake Tanganyika - Analysis of the results of CAS. (Bazigos, G.P. 1975).
WP/(?)		The statistical efficiency of echo Surveys with special reference to Lake Tanganyika. (Bazigos, G.P. 1975).

KEY: + COPIES AVAILABLE IN FAO/FINNIDA PROJECT FILES.
COPIES NOT FOUND AT TAFIRI-KIGOMA BUT MAY BE AVAILABLE AT FAO FISHERIES LIBRARY.
COPIES NOT FOUND AT TAFIRI-KIGOMA, STATUS UNKNOWN.
WP TITLE UNKNOWN.
? WP NUMBER UNKNOWN.

A. 2 MISCELLANEOUS URT/71/ 012 DOCUMENTS OBTAINED

ITEM NO.	TITLE/DESCRIPTION
1.	Project File List (Re File Cabinet Contents, TAFIRI Director's Office).
2.	List Working Papers - URT/71/012.
3.	Project Progress Report - March 1979.
4.	Extracts from Appraisal Fisheries Dev. Project (IDA) as Relevant to Lake Tanganyika. ('Confidential' - no date).
5.	Notes on 'What Do We Know About Pelagic Fish on L. Tanganyika'. Meeting on Status of Research on Fish Production in L. Tanganyika 31/10/75.
6.	URT/71/012 - Summary of Project Status April 1976.

A.3 MISCELLANEOUS OTHER D0CUMENTS OBTAINED

ITEM NO.	TITLE/DESCRIPITION
1.	Bazigos G.P., The present state of the traditional fishery 1975 of Lake Tanganyika (Tanzania).
2.	Chapman D.W., Characteristics of layers and schools of pelagic fish in Lake Tanganyika (no date).
3.	Thiessen H., Methodology for the Design of a Cost Earning Survey for Ujamaa Fishing Villages Tanzania (no date).
4.	Chifunda W., et al. Relationship Between Artisanal and Industrial Utilization of Kapenta (Ndagaa) in the Mpulunqu area. (1975)

A.4L. TANGANYIKA FISHERIES RE.('-IkR(.'H & DEVELOPMENT PROJECT URT/71/012: SAMPLE DATA SETS STORED IN TAFIRI LAB BLOCK.

A large stock of data files is stored in the Lab Block - 118 in all. A complete list of their titles and was made and this has been placed with FAO/FINNIDA Project documents at Bujumbura. The listing was done in the or-der files were found. The first ten items on the list are shown below as an example.

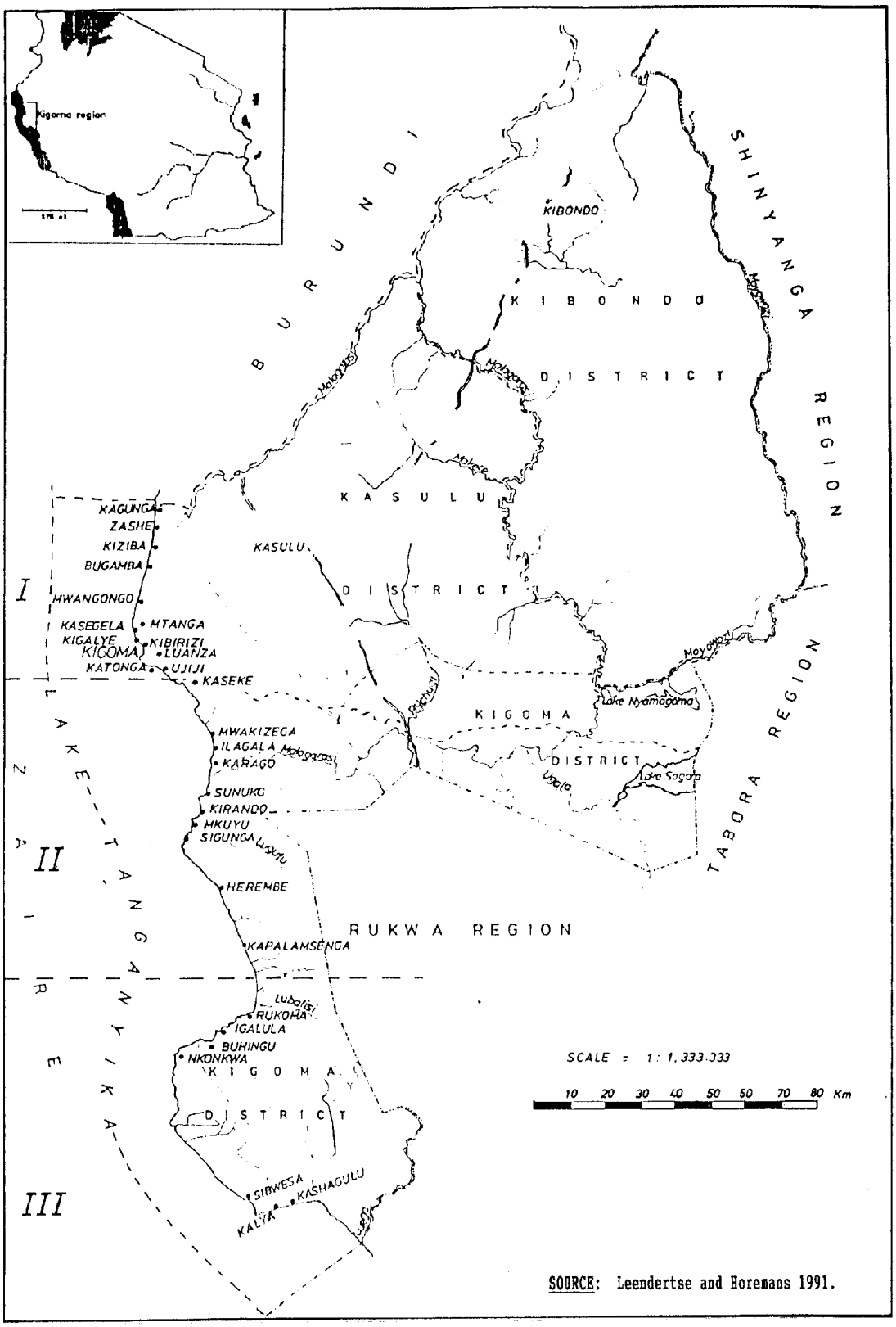
ITEM NO.	FILE TITLE
1.	Angelo's Boat - Dec. 1973 *Lates* Data (LF'S) - 15 sheets.
2.	KGP/BD/17 - Dec. 1973 to October 1976 - *Lates* spp data on condition factor (LF'S) - 51 sheets.
3.	LT/CFD/18 Angelo's Boat - Dec. 1973 to Dec. 1974 - "Dagaa" spp. Data on length frequency (LF'S) - 36 sheets.
4.	Sampling summary sheets for boats MV France, Kigode & Angelo's - Dec. 1973 to Dec. 1974 - Data on landing date, day/lunar, area, sets, sampling, samples, sampler & catch by species of fish. (LF'S) - 9 sheets.
5.	LT/LFD/10 MV France - Nov. 1974 to Dec. 1974 - *Stolothrissa*, *Limnothrissa* and Juv. *Luciolates* data on length frequency distribution. (LF'S) - 217 sheets.
6.	KGP/BD/05 MV France - Jan - Dec. 1974 - *Lates* spp data on length, weight **(kg),** sex & Gonad state. (LF'S) - 236 sheets.
7.	Kigodeco Boat - August 1974 - *Stolothrissa* & *Limnothrissa* spp data on catch (boxes), fish sold, fishing operation, and length frequency for Stolothrissa. (LF's) - 22 sheets.
8.	CPE Kigodeco Boat - Dec. 1974 to June 1977 - *Luciolates* sp, *Lates* spp, *Stolothrissa* & *Limnothrissa* data on mean length and weight (for *Luciolates*); No. of nets set, total catch and CPE (for the first and last two spp.), etc. (LF's) - 8 sheets.
9.	GP/BD/20 - Nov. 1974 to July 1977 - *Lates* spp data on monthly gonad stages comparison. (LF'S) - 2 sheets.
10.	KGP/BD/16 - Jan. to Sept. 1974 - *Lates mariae* & *L. microlepis* data on estimation of lengths vs weights by linear regression. (LF's) - 26 sheets.

NOTE: Also stored in the Lab Block are 14 file binders containing miscellaneous documents/articles and L. Tanganyika Project (URT/71/012) Correspondence. A large-scale echosoundi ng map of the entire Lake is also in storage, having been transferred to the Director's office.

A.5 LIST OF TAFIRI - KIGOMA SENIOR STAFF.

NAME	POSITION/DUTIES	QUALIFICATIONS
K.I. Katonda	Centre Director	B.Sc. (Makerere) M.Sc. (Wales)
M.B.S. Kissaka	Research Officer II - Aquaculture - Fisheries Biology	Dip. Fish.(Kunduchi) B.Sc. (Dar) M.Sc. (Nigeria)
A.N.I. Kalangall	Research Officer III - Fisheries Biology - Limnology	Dip. Fish.(Kunduchi) B.Sc.(Dar)
A.D.B. Kihakwi	Research Officer III - Fisheries Biology	Dip.Fish.(Kunduchi) B.Sc.(Dar)
S.L. Mtega	Research Officer III - Limnology	Dip.Ed.(Mkwawa) B.Sc(Dar)
E.W. Lyoba	Principal Technician - Fish Processing	Cert.Fish.(Nyegezi) Dip.Fish.(Kunduchi)
S.K. Muhoza	Senior Technician - Fish Processing	Dip.Fish.(Kunduchi)
A.B. Mayaru	.Technician - Repair & maint. cold storage facilities	Cert.Fish.(Nyegezi) Dip.Refrig.(Mbegani)
N.R.M. Nombo	Second Officer - Head of Fishing - Skipper	Cert.Fish.(Nyegezi) Dip.Navigation(Norway)
N.A. Challe	Second Officer - Gear Technologist - Skipper - In charge of Engineering	Cert.Fish.(Nyegezi) Dip.Fish.(Kunduchi) Dip. Navigation(Norway) Dip. Gear Technology(Norway)

B.1 MAP OF LANDING SITES AND STRATA, KIGOMA REGION, L. TANGANYIKA, TANZANIA



B.2 DAILY FISH LANDINGS WORKBOOK (FORM 21A - SAMPLE PAGE)

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF NATURAL RESOURCES AND TOURISM
FISHERIES DIVISION

DAILY FISH LANDINGS WORK BOOK

Name of Recorder .....

Station: .....

Date: _____ **19**____

Type of Boat	Boat Reg. No.	Gear Size	No. of Gear	No. of Men	Species	Weight (Kgs.)	Value (Shs.)

B.3 DAILY RECORD OF FISH LANDED (FORM 21B).

F.S.F. 21B.

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF LANDS, NATURAL RESOURCES AND TOURISM

FISHERIES DIVISION

DAILY RECORD OF FISH LANDED

TYPE AND SIZE OF GEAR ____________

NOTE: In the columns below put weight in kilograms in (a) and value in Shillings in (b).

Region: ____________ Station: ____________ Water: ____________

1	2	3	4	5	6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25		26	
Date	Type of Boat	Boat Registration No.	No. of Gear	No. of Men	SPECIES																																								TOTAL	
					a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
	TOTAL																																													

Recorder's Name: ____________ Designation: ____________

B.4 DAILY RECORDING SHEET FOR FRESH/PROCESSED FISH (FORM 22).

The United Republic of Tanzania

Ministry of Natural Resources and Tourism

Fisheries Division

F.S.

RETAIL MARKET FISHERIES SURVEY - DAILY RECORDING SHEET FOR *FRESH / PROCESSED FISH

Region : ..... Market .....

* Delete the inapplicable.

Source :			Source :			Source :			Source :		
Type and Species †	Weight (Kgm)	Value in Shs. (Multiply weight by approximate price per kilo)	Type and Species †	Weight (Kgm)	Value in Shs. (Multiply weight by approximate price per kilo)	Type and Species †	Weight (Kgm)	Value in Shs. (Multiply weight by approximate price per kilo)	Type and Species †	Weight (Kgm)	Value in (Multiply by approx price per
TOTAL :			**TOTAL :**			**TOTAL :**			**TOTAL :**		

† Specify type as fresh or smoked, dried, sundried, salted or fried.

Date : ..... 19.... Surveyed by : ..... Designation : .....

3.5 MONTHLY SUMMARY OF CATCH WEIGHTS, VALUES, ETC. (FORM 24).

: United Republic of Tanzania

Ministry of Natural Resources and Tourism
Fisheries Division

F.S.F. 24

MONTHLY SUMMARY OF RECORDED WEIGHTS IN KILOGRAMS AND VALUES IN SHILLINGS BY SPECIES AND NUMBER OF RECORDED GEAR, FISHERMEN AND BOAT LANDINGS

FOR THE MONTH OF ..... 19.....

TE: In the columns below, put weight in kilograms in (a) and value in Shillings in (b).

Region : ..... Station : ..... Waters : .....

1	2	3	4	5	6		7		8		9		10		11		12		13		14		15		16	
					SPECIES																					
ine and Type of Gear	No. of Gear Landings	No. of Boat Landings	No. of Fishermen Landings	No. of Days Recorded																					TOTAL	
					a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
TOTAL																										
VERAGE PRICE PER KILOGRAM = Total Value / Total Weight																										

6 AVERAGE PRICE PER KG. PER SPP. FOR EACH MARKET (FORM 25).

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF NATURAL RESOUECES AND TOURISM

FISHERIES DIVISION

FSF.25

AVERAGE PRICE PER KILOGRAM PER SPECIES FOR EACH STATION/MARKET

FOR THE MONTH OF .....19.....

REGION: .....

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	28	29	30
STATION/ MARKET.	SPECIES																											STATION AVERAGE PRICE PER KG (ALL SPE-CIES)
	SHILLINGS AND CENTS																											
REG.AVERAGEP.P. KLG. BY SPECIES.																												

B./ AVERAGE BOAT PRODUCTIVITIES (FORM 26).

UNITED REPUBLIC OF TANZANIA

MINISTRY OF NATURAL RESOURCES AND TOURISM

FISHERIES DIVISION

F.S.F. 26

REGION:.....

YEARS:.....

MONTH:.....

AVERAGE BOAT PRODUCTIVITIES (CATCH PER LANDING-C.P.B.L)
FOR ALL STATIONS

a) Weight in Kgms
b) Value in shs.

SPECIES

STATION	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b

C.P.B.L. = TOTAL WEIGHTS (VALUES)
BOAT LANDINGS

(FROM DATA ON F.S.F. 24)

8 LANDINGS IN PER[illegible] BY SPECIES (FORM 27).

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF NATURAL RESOURCES AND TOURISM
FISHERIES DIVISION

FSF .27

RECORDED LANDINGS IN PERCETAGE BY SPECIES
FOR EACH STATION

REGION:.....

WATERS.....

MONTH:.....

STATION																								TOTAL

B.5 TRANSPORTATION OF FISH (FORM 28).

The United Republic of Tanzania

Ministry of Natural Resources and Tourism

Fisheries Division

FSF.28

TRANSPORTATION OF FISH

From:.....During the Month of.....198

NOTE: In the columns below(1) "Type" - Fresh, Frozen, Dried, Smoked, Fried.

(2) "Mode of Transport" - Rail, Road, Bus, Air, Private Transport

TYPE AND SPECIES	MODE OF TRANSPORT	PLACE OF DESTINATION										Total (Kilogra
		WEIGHT IN KILOGRAMS										

B.10 MONTHLY DATA FOR SMOKED FISH (FORM 29).

THE UNITED REPUBLIC OF TANZANIA

F.S.F. 29

MINISTRY OF NATURAL RESOURCES AND TOURISM
FISHERIES DIVISION

MONTHLY COMPLIED DATA FOR SMOKED FISH

REGION: .....

MARKET:.....

MONTH:.....

NO. OF DAYS MARKET RECORDED:.....

NO. OF DAYS MARKET OPEN: .....

SOURCE			SOURCE			SOURCE			SOURCE		
Species & type	Weight (kgm)	Value (shs)	Species & type	Weight (kgm)	Value (shs)	Species & type	Weight (kgm)	Value (shs)	Species & type	Weight (kgm)	Value (shs)

N.B. For Fresh Fish - Estimate monthly stockes by multiplying (Complied Data x No. of Days Market open)
No. of Days Market Recorded.

B.11 ANNUAL COMPILATION OF RECORDED DATA (FORM 30).

The United Republic of Tanzania

Ministry of Natural Resources and Tourism
Fisheries Division

ANNUAL COMPILATION OF RECORDED DATA
FOR THE YEAR 19____

Region : _____ Station : _____ Waters : _____

MONTH																									TOTAL
January																									
February																									
March																									
April																									
May																									
June																									
July																									
August																									
September																									
October																									
November																									
December																									
TOTAL																									

ANNUAL FISHING SURVEY - INDUSTRIAL VESSELS FORM.

MINISTRY OF LANDS, NATURAL RESOURCES AND TOURISM - FISHERIES DIVISION
INDUSTRIAL FISHERIES - LIST OF VESSELS

I.F.F. 1

Marine water I_I Fresh waters I_I Year:_____

Vessel							Licence Validity		Monthly activity (Number of days)													Remarks
Name	Type	Flag	GRT	Length	Gear	HP	from - to	Number	J	F	M	A	M	J	J	A	S	O	N	D	

C.13 ANNUAL FISHING SURVEY - BOATS & GEAR FORM.

FISHING VILLAGE SURVEY ..... 19.....

FOR THE FRESH WATERS OF ..... IN THE REGION .....

R: Registered Boats

UR:= Unregistered Boats

'ation id villages n area of 'ation	FISHERMEN		BOATS BY TYPE						ENGINES		GEAR BY TYPE AND SIZE											
	Resident	Non-Resident	BOATS		CANOES		TOTALS		O/B	I/B												
			R	UR	R	UR	R	UR														

B.14 FISHERIES DIVISION ANNUAL REPORT - STATISTICS 1989.

A copy of this report has been placed with Project files,

C.1 LIST OF PAPERS RELATED TO L. TANGANYIKA PRESENTED AT TH6 RESEARCHERS' MEETINCR, @ZA CENTRE, FEB. 1988.

ITEM NO.	TITLE
1.	Ngatunga B.P, Efficiency of Six Commercial Purse-Seiners Operating off Kigoma in Lake Tanganyika.
2.	Bayona J.D.R., Estimation of Fecundity Growth and Mortality of *Boulengerochromis Microlepis* 'Kuhe' in L. Tanganyika (Tanzania)
3.	Bayona J.D.R., Investigation of Some Aspects of the Biology of *Boulengerochrolis Microlepis* (Kuhe) in L: Tanganyika (Kigoma Region).
4.	Msuya F.E.M., Fish Marketing Survey in Rural and Urbaa Kigoma.

C.2 MISCELLANEOUS DATA/ITEMS COLLECTED FROM MET. OFFICE AND WATER DEPARTMENT.

ITEM NO.	TITLE/DESCRIPTION
1.	Water Quality Laboratory - Kigoma. Analytical Report Data Form
2.	Lake Tanganyika Water Level Records, Hydrology Section, Water Dept., Kigoma.
3.	Data Report Form - Directorate of Meteorology
4.	L. Tanganyika Rainfall Data 1908 - 1989 (All Available Records)
5.	Correspondence on plan for Marine Meteorological Services, L. Victoria. (Same system intended for L. Tanganyika),
6.	Monthly Meteorological Data (1986) - Kigoma Station
7.	Monthly Meteorological Data (1987) - Kigoma Station
8.	Monthly Meteorological Data (1988) - Kigoma Station
9.	Monthly Meteorological Data (1989) - Kigoma Station
10.	Monthly Meteorological Data (1990) - Kigoma Station

C.3 KIGOMA WATER MASTER PLAN, CONTENTS.

ITEM NO.	TITLE/CONTENTS
· Vol. 1:	Executive Summary (Complete volume in Project files).
· Vol. 2:	Water Development Atlas (Selected maps only in Project files).
· Vol. 3:	Water Supply Planning, Kigoma District (Example Village Information Form in Project files -- All villages in Region similarly covered).
· Vol. 4:	Water Supply Planning, Kasulu District.
· Vol. 5:	Water Supply Planning, Kibondo District.
· Vol. 6:	Water Development in Kigoma Region.
· Vol. 7:	Hydrology (Complete volume in Project files).
Vol. 8:	Hydrology - Updated 1989 (Complete volume in Project files).
· Vol. 9:	Water Quality (Complete volute in Project files).
· Vol.10:	Water Management and Utilisation.
· Vol.11:	Water Laboratory Operation.

NOTE 1:

A detailed User Guide indexing subjects to volumes and chapters is included in Vol. 2 - Water Development Atlas.

Base data for Vols. 3, 4, 5, 8 and 9 are filed in the Regional Water Engineer's Office.

Compaterised base data for Vol. 7 are filed with the Norwegian Water Resources and Electricity Board in Oslo.

All original fair drawings and films for Vol. 2 are filed with Norconsult A.S. in Sandvika.

NOTE 2:

A SIMILAR WATER MASTER PLAN REPORTEDLY HAS BEEN PREPARED FOR RUKWA REGION. FOR FURTHER INFORMATION THE FOLLOWING PERSON SHOULD BE CONTACTED:

MR. PELLE EKDAHL
ASST. REGIONAL WATER ENGINEER
MAJI - MKOANI - RUKWA
SUMBAWANGA, TANZANIA.