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REPORTS OF TRAVEL 46-60 OF PROJECT GCP/RAF/271/FIN

by
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(ed.)

FINNISH INTERNATIONAL DEVELOPMENT AGENCY

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

Bujumbura, March 1995

PREFACE

The Research for the Management of the Fisheries on Lake Tanganyika Project (Lake 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) and the Arab Gulf Programme for United Nations Development Organizations (AGFUND).

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 LTR 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; and

* A series **of manuals and field guides (GCP/RAF/271/FIN–FM)** related to training and field work activities 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)** and/or French **(Fr)**.

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GCP/RAF/271/FIN/TRAM/46

Report of Travel

to

Senga Bay, Malawi
(06–17.05.94)

by

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LTR/Kigoma, Tanzania

GCP/RAF/271/FIN.10

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1. INTRODUCTION

1.1 Objective

The objectives of the mission were: (1) to attend the seminar organized by SADC/ODA on the project's achievements; (2) to evaluate the experience gained during the project's execution as Lake Malawi/Nyassa project has many direct affinities with LTR project.

1.2 Itinerary

	Arrival	Departure
Kigoma		06.05.1994
Dar es Salaam	06.05.1994	07.05.1994
Lilongwe	07.05.1994	08.05.1994
Senga Bay	08.05.1994	13.04.1994
Dar es Salaam	13.05.1994	17.05.1994
Kigoma	17.05.1994	

1.3 Persons met

Dr. H. Mikkola, FAO Res. Rep. Malawi
Prof. P. Bwathondi, Director General TAFIRI
Mr. A.D. Mulenga, Senior Programme Officer, FAOR Malawi
Dr. R. Mubamba, Assistant Director, Dept. of Fisheries, Zambia
Dr. R. H. Lowe-Mcconnell, UK.
Prof. J. Sarvala, Turku University, Finland
Dr. A. Menz, UK/SADC Project Team Leader/Fishery Acoustician
Dr. G. Patterson, Limnologist
Dr. K. Irvine, Planktologist
Dr. A. Thompson, Fishery Biologist
Dr. E. Allison, Fishery Biologist
All the seminar participants (Annex I)

2. ACTIVITIES AND RESULTS

2.1 UK/SADC pelagic resources assessment project background

UK/SADC Lake Malawi/Nyassa Pelagic Resources Assessment Project started in 1989 for a five years duration to end on May 1994, Overseas Development Agency (ODA) was the executing agency and the available budget was approximately of 3.8 million GBP. Project objectives were to increase the knowledge on the lake pelagic ecosystem components, to study the pelagic fish stocks, to assess their production in order to plan the future exploitation of the lake pelagic fish resources (i.e. fishery management plan).

Project headquarters was established on the lakeshore at Senga Bay in Malawi. Premises for offices and laboratories were purchased by ODA from a construction company and extensively rehabilitated. Project equipment and personnel, both expatriates and nationals from the three riparian countries, were posted in Senga Bay. Support land—based stations were in Kyela (Tanzania) and in Metangula (Moçambique). These substations were never really involved in project activities as these were carried out only at project headquarters in Malawi.

A 15 m long catamaran type R/V, the “Usipa”, powered with two 135 h.p. diesel engines was built in U.K. and eventually dismounted in seven pieces to be transported by boat/truck via Dar es Salaam to Lake Malawi/Nyassa.

Within the five years of project execution, effective data collection work was implemented during the last two years.

Project professional staff consisted in:

Team leader/fishery acoustician
2 Limnologist/Remote sensing expert
2 Zooplanktologist
4 Fisheries biologist
1 Electronics engineer

Research staff was supported by several laboratory technicians, one ODA administrative officer, various other general staff. A crew of four was in charge of the R/V Usipa.

Project’s main activities and results from the different scientific components are briefly summarized hereafter. As project final report was not yet ready and no documents were circulated to seminar participants, many details are missing. Terminal report and comprehensive publication of results should be available by August 1994.

2.2 R/V Usipa and lakewide surveys

The UK/SADC Pelagic Resource Assessment Project’s research vessel, R/V Usipa, is of catamaran type with a length of 15 m; beam of 7.1 m. The boat has two diesel engines. The advantage of this is that the work programme of the vessel was never interfered due to engine problems. If one engine had some problem the other engine was used while engineers and technicians repaired the faulty one. R/V Usipa performed eleven lakewide acoustic surveys and nine fishing cruises. The LTR team was able to visit the vessel on 11.05.1994 in the company of Dr. A.B. Thompson (UK/SADC Project Scientist) and Mr. Gondwe (vessel’s captain).

R/V Usipa has the following facilities:

* accommodation for six scientists and four crew;

* kitchen and dinning room;

* dry lab where acoustic equipment (BioSonics) and computer are based;

* wet lab where limnology, zooplankton and fish biology biometric data were to be measured. Laboratory space, however, was not enough to
allow the above mentioned activities to be done on board. Hence fish stomachs were collected and preserved while fish samples stored in a deep freezer for analysis to be done after the cruise. Part of
limnology and zooplankton samples were also stored for analysis to be later ashore;

* midwater trawl for pelagic fishing;

* monofilament gill nets for fish sampling at different depths;

* high speed plankton net for plankton sampling;

* facilities for limnology sampling; and

* navigational (two GPS's) and communication equipment.

The acoustic survey cruise track followed is shown in Annex 2. Criteria for choosing turning points were: Malawian and Tanzanian cost — 05 nautical miles or 50 m depth, whichever was furthest from the coast and Mozambique, due to security reasons, minimum distance from coast was 3 nautical miles. Also, due to security, parallel transects along Mozambican coast could not be executed, then zig-zag transects design had to be adopted although it is statistically less "robust" than parallel transects design. Details of BioSonics equipment, settings and use are given by Mitson in GCP/RAF/271/FIN-TD/04.

The conversion of the relative integrator estimates of fish abundance into absolute numbers was an area of concern, especially when considering the complex species composition of pelagic fish. Traditionally, one approach is the direct calibration of the integrator measuring the target strength of individual fish from underwater cage where known fish species is kept *(in situ* calibration), another, less precise, is to extrapolate it from net catches. The UK/SADC Lake Malawi Project used this method, whereby, when possible, catch from gill—nets set in pelagic waters were used to estimate the species detected by acoustic recordings. Unluckily, it was not possible to carry out simultaneously the acoustic work and midwater trawling.

Problems encountered during the survey were bad weather due to strong winds. The research vessel, however, was able to withstand the bad conditions of Lake Malawi.

2.3 Limnology and plankton study

Water samplers were of two types: 3.5 L PWS bottles (Hydrobios) for taking samples for physical and chemical property determination and 2 L Van Dorn samplers mainly for chlorophyll a and phytoplankton enumeration. A torpedo-shaped, high speed, plankton net was used for sampling zooplankton. Sampling depth ranged from 0 to 300 m.

Temperature was measured with reversing thermometers (Kahlsico) fitted to PWS bottles. Lakewide temperatures were monitored through satellite images processed by the project's equipment purchased at GBP 50,000. A hydrographic probe was used to determine oxygen and pH.

All samples for nutrient determination were filtered through prewashed Whatman GFC filters. Soluble reactive phosphorus ($P0_4$-P) and ammonia nitrogen (NH_4-N) were determined using molybdate and indophenol blue methods, respectively. Nitrate nitrogen ($N0_3$-N) was determined simultaneously with nitrite nitrogen ($N0_2$-N) using the automated hydrazine reduction method and soluble reactive silicate (SO_2) was analyzed using automated molybdate method, both of which are according to American Public Health Association (ALPHA).

Chlorophyll a was determined by first filtering through Whatman GFC filters, then the pigment was extracted using near boiling 90% methanol followed by pigment extract measuring by fluorescence method (using Turner Series 10 Fluorometer).

Surface temperatures of Lake Malawi ranged between less than 26°C to more than 28°C. The temperature dropped to slightly below 23°C in the hypolimnion. The thermocline varied between about 30 and 100 m. The lake was strongly stratified from January through April; weak stratification occurred between June and August when partial mixing of the water column (down to 300 m) takes place aided by surface cooling and strong south easterly trade winds.

Lakewide surface temperature images by NOAA satellite were taken only during the night as in daylight hours penetration was reduced to only 3 cm and, therefore, too much affected by local phenomena.

Conductivity increased with depth while pH values showed the reverse trend. Oxygen concentration decreased sharply after the thermocline and was negligible beyond 250 m. Phosphate and silicate nutrients were present in low quantities in the epilimnion but increased thereafter. The nitrogenous compounds were also found in very low quantities: nitrate nitrogen had its maximum at about 75 m depth while ammonium nitrogen was almost absent in the epilimnion and nitrite nitrogen was largely undetectable.

Phytoplankton consisted of more than 100 species. It was overall dominated by the cyanophytes followed by bacillariophytes, chlorophytes and pyrrophytes, in that order. Highest chlorophyll *a* values (>0.8 µg/l) occurred around June, indicating highest primary production just after the onset of mixing. Satellite images of chlorophyll a pattern could not be used due to the very low concentration at surface.

The zooplankton community was found to be dominated by the cyclopoid and calanoid copepods with *Tropodiaptomus cunningtoni* making up the bulk of the population. Cladocerans were very rare. Highest zooplankton production occurred in July-August period. During the last phase of the project zooplankton rearing experiments were successfully carried out. Results provide important insights on growth rate and production—biomass ratio of *T. cunningtoni* as well as on effect of food abundance on the species growth performance (development time) during the different development stages. Also, laboratory rearing experiments of *T. cunningtoni* highlighted the relationship among food supplement and fecundity.

The lakefly instar larvae also contributed substantively to the zooplankton community. After hatching, the eggs of the lake fly become planktonic larvae which undergo four instar stages. From the first to the third instar stages the larvae are transparent and therefore invisible in water. The fourth instar larvae together with the pupae are coloured and visible. Emergence of adults from the pupae probably takes place in the

early morning. Adults are most likely short-lived and do not feed as abdominal cavity of females are fully filled with eggs. Large swarms of mating adults are seen over the lake from early morning to late afternoon. Emerging adults are preyed on heavily by fish, e.g., *Engraulicypris sardella, Bathyclarias* spp., *Rhamphochromis* spp., *Copadichromis* spp. and *Diplotaxodon* spp. Thus, it is an efficiently used resource within the ecosystem and not a wasted one as previously thought.

Limnologically, Lake Malawi was found to be most productive at the southern end, less productive at the northern end least productive at less than halfway from the north; but, generally, the lake was considered as oligotrophic.

2.4 Fish biology

Fish sampling by midwater trawling was originally supposed to take place during the execution of the acoustic lake—wide surveys together with collection of data on limnology, plankton and fish larvae. Eventually it was realized that this was not feasible due to logistic difficulties caused by different sampling operations/priorities.

During the two years of data collection eight lake-wide fishing cruises were carried out. Initially R/V Usipa was equipped with a small midwater trawl with 8 mm codend mesh size towed for 4 hours only during the night at the speed of 3.5 knots. In the last phase of the project, due to unsatisfactory results, it was decided to use the F/V of Malawi Department of Fisheries, equipped with a midwater trawl whose opening was twenty times larger than the one of R/V Usipa. While this vessel was towing the net, R/V Usipa would have carried out on parallel course the acoustic survey. Also, experimental set of gill—nets placed at different depths was used to investigate the fish vertical distribution pattern within the 24 hours.

Fishing cruises were based on a systematic sampling design consisting in six stations (transects when in case of midwater trawling) allocated on a longitudinal central line to divide the lake in two halves. The sampling design did not include any coastal or inshore sampling.

Commercial catch sampling was not implemented based on the assumption that there is no pelagic fishery on the lake. Indeed, for some time now, Engraulicypris sardella (locally known as Usipa) has been exploited by one purse seiner in the southern sector of the lake.

Some of the major findings from the fishing cruises are that species composition in open waters of Lake Malawi/Nyassa is much more complex than expected and *E. sardella* is not the most important exploitable pelagic species.

The dominant offshore fish recorded were mainly a group of planktivorous and predatory fish and two genera of catfish. The unexpected occurrence of the latter in open deep water seems associated with feeding on emerging pupae of the lake fly, *Chaoborus edulis*. Two species of *Diplotaxodon* (both to be determined as there is no taxonomic specific description), one species of *Copadichromis*, *E. sardella* and the catfish *Synodontis nyassae* and *Bathyclarias* spp. were mainly caught by pelagic trawl while the predatory cichlids *Rhamplochromis longiceps* and *R. ferox* were mainly caught by monofilament gillnets. Gillnet settings at different depth provided valuable information on the vertical distribution of these species which has been compared with acoustic survey results.

Overall, data obtained from fish sampling resulted in not being representative of the population of any fish species as only adult specimens were caught. Such biased fish size distributions provided poor and meaningless information on population biology of the sampled species.

This situation coupled with difficulties in reading growth increments from fish otoliths – image analysis system was available – has made it impossible to estimate population parameters, such as growth and mortality rates, which are of critical importance for stock assessment work.

2.5 Other matters

Miss P. Chifamba from Lake Kariba Fisheries Research Institute was at the meeting, therefore the mission could evaluate her possible collaboration with LTR to analyze otolith collection from Lake Tanganyika. Mrs Chifamba is nowadays very busy and almost on the way to UK to pursue her Ph.D., then she is not in the best position to ensure an effective collaboration with LTR.

Prof. J. Sarvala's attendance to the seminar provided a good opportunity to discuss many issues related to LTR scientific programme as, among the others, otoliths reading for the purpose of fish aging, and zooplankton rearing experiments for growth and production/biomass estimates. Seemingly, Prof. Sarvala has the proper personnel and scientific facilities to carry out the above activities in coordination with LTR field staff. Actually, Prof. Sarvala's proposal to LTR should be underway to be finalized.

3. CONCLUSIONS

3.1 General remarks

UK/SADC Lake Malawi/Nyassa and LTR projects have some obvious affinities as they aim at the comprehension of the pelagic environments of lakes which have many bio–physical similarities. In both cases research work is finalized to identify and propose well–sounded fishery management actions. Some observations from the comparison of the two projects can be useful.

First of all, it was clearly showed during the UK/SADC seminar that two years of data collection work is not enough time to provide a comprehensive understanding of ecosystem dynamics. This period was enough to identify the major phenomena regulating the mechanisms of biological production. Despite the limited study period, it has to be stressed that project was very successful in pointing out some of the major abiotic and biotic factors explaining the lake's pelagic environment dynamics. The full understanding of interrelationship among such variables, of cause–effect mechanisms, and the acquirement of proper knowledge for fisheries management obviously call for much more research work than what was, still very efficiently, possible to carry out in two years time.

UK/SADC and LTR projects have different approaches to studying the lakes. LTR has established fully equipped stations around the lake and,

consequently, international staff has been by number unevenly distributed among the stations, while in Lake Malawi/Nyassa national and ODA staff was posted only in Senga Bay as well as all the research and support equipment. Thus, a kind of scientific community was established with continuing exchange of information among staff involved in different research components. Moreover, such centralization has made possible that all the scientific personnel was committed only to research work being the administrative ODA officer and local staff in charge of general matters.

On the other side, LTR has achieved remarkable involvement of local counterparts and it is implementing an effective standardized local sampling work around the lake, while waiting for the research vessel for lake—wide surveys. But this decentralized strategy has brought about logistic problems due to the huge size of the lake and its remoteness. Also, for the international staff, being in charge of operational, administrative and scientific activities, the available time left to work on data is consequently reduced.

3.2 Lakewide surveys

UK/SADC project main sampling work was carried out during the execution of lakewide surveys and almost all the scientific staff was committed to it with no time left to implement other complementary sampling programmes. All the various and different sampling activities could not be performed simultaneously during one single cruise. It was necessary to run acoustic surveys and fishing cruises separately, remaining on—board scientific work was fitted following these two priorities. With reference to LTR this stresses that careful evaluation of lakewide cruise objectives (i.e. survey priorities) and of available staff (taking into account the land-based ongoing work) plays a determinant role in making feasible and successful forthcoming LTR scientific cruises.

3.3 Limnology and plankton study

Although the limnological results of Lake Malawi may differ in magnitude from those of Lake Tanganyika, they show the same trends: wind regimes and stratification patterns are similar. Perhaps a wider range of surface temperatures in Lake Malawi accounts for the deeper layer of mixing.

It is likely that sampling zooplankton with a high speed net towed horizontally at a given depth could be a more efficient method for getting unbiased samples, both qualitatively and quantitatively. It is suggested that this method be adopted by LTR.

It has to be stressed, also on the basis of results from Lake Malawi/Nyassa, the determinant role and necessity of laboratory rearing experiments to estimate zooplankton growth and production rates.

3.4 Fish biology

Problems encountered in fish biology are partly explained by the type of systematic sampling design adopted and which was not modified during the time to attempt to acquire more representative samples of fish populations. Apparently, only the open waters were surveyed for fish sampling as the project’s aim was to study the pelagic environment. It is widely known that

pelagic fish from African great lakes spend or may spend part of their life cycle in inshore shallow waters, therefore sampling strategy could have been adjusted consequently. Also, commercial catch sampling could have provided useful and complementary information.

Therefore, a very conservative and wise approach was used to estimate fish biomass and sustainable yield, this latter being mainly based on cautious “guess estimates”. It is the opinion of the mission that the lack of basic fish population parameters for all the exploitable fish species makes it hazardous and premature to provide estimates of sustainable yields.

4. ACKNOWLEDGEMENTS

Mission member Piero Mannini wishes to acknowledge the timely and efficient assistance from FAOR Malawi and FAOR Tanzania which allowed him to complete the mission as scheduled despite being stolen of all his travelling documents. We also wish to acknowledge Dr. A. Menz who invited LTR to take part and also cover the cost of participation of one of us (D.B.R.C.).

Annex 1

UK/SADC PELAGIC FISH RESOURCE ASSESSMENT PROJECT
SENGA BAY, MALAWI

PROJECT SEMINAR
9 – 10 MAY 1994

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GCP/RAF/27l/FIN/TRAM-47

Report of travel

to

Uvira (Zaïre)

(02—04.06.1994)

and

Karonda (Burundi)
(15.06. 1994)

by

Petra Paffen
APO - Fisheries Biologist

GCP/RAF/271/FIN/10

cc: Blessich, FIDO
Kapetsky, FIRI
All LTR stations
Dr. Gashagaza, LTR/Uvira
Chrono
TRAM
Diary: Paffen

1. Introduction

Preliminary data presented by Pierro Mannini (LTR's field coordinator of fish biology) at the SSP—meeting in Kigoma, April 1994, showed a difference in results between the LTR stations Bujumbura, Uvira, and Karonda. Uvira and Bujumbura are both situated at the most northern part of Lake Tanganyika. Most samples from Uvira are collected at Mulongwe beach. Fishermen arriving at Mulongwe beach often fish south of Uvira while fishermen arriving at Bujumbura mostly fish close to the Rusizi delta. Karonda is situated approximately 75 km south of Bujumbura.

1.1 Objective

The objective of this travel was to verify that differences in results between the visited stations are caused by differences in the location of fishing grounds and not by any other factor. Hence, the collection of fish samples and data was to be controlled and improved when necessary. Therefore, one sampling day was to be conducted working together with the sampling team at both stations.

1.2 Itinerary

	Arrival	Departure
Bujumbura		02.06.94
Uvira	02.06.94	04.06.94
Bujumbura	04.06.94	15.06.94
Karonda	15.06.94	15.06.94
Bujumbura	15.06.94	

1.3 Persons met

in Uvira

Dr. M. Gashagaza, LTR/Uvira
Mr. W. Mbemba Mavula, technical assistant, LTR/Uvira
Mr. E. Bahane Byeragi, laboratorian, LTR/Uvira

in Bujumbura

Ms. T. Janssen, FAO Representative a.i., Burundi

in Karonda

Mr. J.M. Niyibigira, technical assistant LTR/Karonda

2. Results and Conclusions

2.1 in Uvira

At six o'clock a.m., 03.06.1994, Mulongwe beach in Uvira was visited with Mr. Bahane, Mr. Mbemba, and Dr. Gashagaza. The collection of samples at Mulongwe is not as easy as at Bujumbura. This is due to the hesitation of fishermen to sell less than their whole catch and is probably caused by the fact that Mulongwe beach is located just in front of the market where the fish is sold. Nonetheless, Mr. Bahane is able to choose the boats to be sampled at random.

The collection of data at the beach was carried out according to the rules applying for all LTR stations (i.e. information was collected concerning the type of boat, the type of net, the size of the net, the stretched mesh size, the number of lamps, the number of hauls, and the total catch). The arrival direction of boats at Mulongwe was not only from

the south, and some boats were found to be equipped with an outboard engine.

The laboratory work (i.e. sample/species weight, length frequency, sex, and maturity measurements) was conducted smoothly and exactly. However, a new part of the sampling procedure which was supposed to have started in May 1994, and which concerns the collection of data from individual fish, was first applied during this visit. There was some unclarity concerning the differences between maturity stages 1 (immature), 2 (maturing), and 3 (mature). Firstly, there was no available magnifying glass for the detection of the early development in stage 2. Secondly, the distinction between late stage 2 and early stage 3 was due to some subjectiveness. The latter was easily cleared by providing some additional rules.

Data entry on the computer was carried out satisfyingly by Mr. Mbemba. In case of any problem or uncertainty, Dr. Gashagaza has aided Messrs. Mbemba and Bahane.

2.2 in Karonda

The travel to Karonda was made possible according to the PNUD security regulations by the FAOR a.i., Ms. Janssen, who provided a radio equipped car. I was accompanied by Mr. Gasasa, LTR's driver, and Mr. Ndimunzigo who is a member of the fish biology team in Bujumbura, and who is acquainted with the location of the beach in Karonda. From six to nine o'clock a.m. sampling was conducted at the beach together with Mr. Niyibigira. This sampling was conducted at random and according to the above described rules. Some of the boats arriving in Karonda are equipped with an outboard engine.

Data on sample/species weight, length frequency, sex, and maturity class was collected in the shade close to Mr. Niyibigira's home. Apart from the fact that the total weight of each species in the sample was sometimes forgotten to be taken, data collection was exact and as demanded. This also accounts for data collection on sex and maturity class which has just started in Karonda. Apparently, the monthly training sessions of Mr. Niyibigira in the laboratory in Bujumbura were successful. Normally, Mr. Niyibigira is said to be assisted by a friend who, however, was not in Karonda during this visit.

3. Recommended actions

1. In order to facilitate data collection on mesh size, a triangular measuring device is being constructed in Bujumbura. It will be distributed to all stations as soon as possible. (Action: P. Paffen.)

2. It was agreed that LTR/Uvira will start collecting information concerning the arrival direction of the sampled boats.
(Action: Mr. Bahane in Uvira.)

3. LTR/Uvira and Karonda will start to note whether the sampled boats are equipped with an outboard engine.
(Action: Mr. Bahane in Uvira, Mr. Niyibigira in Karonda.)

4. In order to detect the early development of male and female gonads, a magnifying glass will be provided to Uvira station. (Action: P. Paffen.)

5. Due to the extra work load caused by conducting individual measurements, Mr. Mbemba has agreed to help Mr. Bahane with the laboratory work.
(Action: Messrs. Mbemba and Bahane, LTR/Uvira.)

GCP/RAF/271/FIN-TRAM/48

Report of Travel

to

Irkutsk (Russia)
(9—19.05.94)

by

Victor Podsetchine
LTR Researcher

GCP/RAF/271/FIN.10

cc: Lindqvist, Kuopio University
Mölsä, Kuopio University
Kapetsky, FAO, Rome
Hanek, FAO/FINNIDA, Bujumbura
Huttula, TAVY
Frisk, TAVY
Luoma, TAVY
Kellomäki, HäLH
Kauppi, VYH
Diary: Podsetchine

The International Workshop “Baikal as a Natural Laboratory for Global Change” was organised by the Limnological Institute of the Siberian Branch of the Russian Academy of Sciences, sponsored by the International Association for the Promotion of Cooperation with Scientists from the Independent States of the Former Soviet Union (INTAS). The participation of the author of this report was funded by a special grant from University of Kuopio. More than 250 scientists (about 50 from Western countries: Switzerland, UK, the USA, - and 200 participants from the Russian side) took part in its work. Among the main goals of this Workshop were: to summarize results of joint projects within the frame of the Baikal International Centre of Ecological Research and to discuss directions of future studies.

The Plenary Meeting on May, 12, was opened by G. Zherebtsov, Director of Irkutsk Scientific Centre (ISC), Siberian Branch of Russian Academy of Sciences. The next speaker, G. Waagenar (Belgium), Secretary of INTAS, pointed out main lines of INTAS policy. They are:

1) At least two partners must be from different INTAS member states;
2) The project coordinator must be from an INTAS member state;
3) Duration of projects - up to 3 years;
4) 80 % of the budget is to be spent in FSU (Former Soviet Union) countries.

In private conversation he stressed that the Baltic countries, due to political reasons, are considered as Eastern and Central European countries. It means that projects including Baltic countries are not supported by INTAS.

The Table below shows INTAS funding.

Year	Budget, Million ECU	No. of projects
First call	4	50
1993	21	509
1994	21	4,800

The number of environmental projects during the first action was 14, in 1993 there were 62 projects from 550 proposals and in 1994 there are about 750 proposals. During the Plenary Meeting on 12, 13 and 14 of May there were presented more than 30 papers, devoted to different aspects of Lake Baikal geological history, hydrophysical, hydrochemical, hydrobiological, paleoclimatic and geochemical studies in Baikal region.

During the next days the Workshop had several sections:

“Past Global Change”, “Present Global Change”, “Geology, Geophysics, Geodynamics”, Biological Section, “Physical and General Limnology”, “Landscapes and Biota of Baikal Region”.

An original approach to study rates and variability of deep water renewal was presented by Prof. Ray Weiss (Scripps Institution of Oceanography University of California, San Diego, USA). Measurements of the distributions of anthropogenic gases, like chlorofluocarbons CFC-l1 and CFC-12, dissolving in surface water layers from the atmosphere, gives possibility to estimate the “age” (i.e. period, when these waters had no contact with atmosphere) of lake waters at different depths. The accuracy of these estimations is about 1/2 year, but in special studies it

can be improved considerably (to several weeks). Results of the 1988 and 1991 expeditions in Lake Baikal give as an apparent age of water in the deepest basin (with maximal depth 1637 m) about 17 years. Mean year flux of deep waters per unit area is 73 in $year^{4}$ for all three deep basins. It was found also that near bottom waters are younger (8 years) than overlying waters (16 years). Similar measurements in the small deep Crater Lake (Oregon, USA, maximal depth = 589 in) give a vertical mixing rate of 120 m $year^{4}$. Understanding of the vertical mixing mechanism in deep lakes is very important for the study of biological production and its variation with time. During discussion, Prof. R. Weiss expressed his interest to conduct similar studies in Lake Tanganyika.

Similar problems were discussed by Prof. D. Imboden (Swiss Institute of Technology, Switzerland), leading two INTAS projects connected with Lake Baikal studies. The age of Baikal water from tritium measurements is about 15 years. Measurements of temperature, salinity, conductivity, tritium, helium and water currents conducted in the summer of 1993 during the joint Russian-Swiss project BIPWEX (Baikal International Project on Water Exchange) enabled to study the influence of large tributaries and density currents induced by tributary waters with different chemical properties. One of the important conclusions is that the equation of state for fresh water should also include salinity, despite of it’s small value. Temperature variations alone cannot explain the complex processes of mixing and generation of frontal zones. It is more correct to speak not of thermal bar, but of density front.

The lecture of Prof. Jean Klerkx (Royal Museum of Central Africa, Tervuren, Belgium, Leader of 7 INTAS Projects) and V. Golubev (the Institute of Earth Crust Siberian Branch of the Russian Academy of Sciences, Irkutsk, Russia) was devoted to hydrothermal outflow in Florikha bay. Outflow sites extend from the depth of 280 in up to 500 in and occupy a wider area, than has been recognized earlier. Discussion with Prof. Klerkx showed that he is interested in establishing long-term cooperation with the LTR Project. At present he is leading the KASIMIR(?) Project, aiming at geological, hydrogeological and hydrochemical studies in Lake Tanganyika. In the Royal Museum of Central Africa (Tervuren, Belgium) they have a computerized data base of hydrometeorological data of several meteostations in the region of Lake Tanganyika up to the 1960, which are available for general use. Professor J. Klerkx kindly invited a LTR Project member to visit Tervuren. During this year he is concentrating more on INTAS Projects in Lake Baikal and Lake Teletskoye in Eastern Siberia, but for the next year they are planning field studies in Lake Tanganyika. Some field work and data processing was done during the year 1992 by P. Branchu from Laboratory of Environmental Geoscience (University of Marseilles, France). Among other activities in the scientific community he mentioned about the initiative of Tom Jonson from the University of Minnesota (at present Marseille University, France) to launch IDEAL (International Decade of East African Great Lakes).

Interesting ideas about connections of Diatom abundance cycles and climate change were presented by Dr. D. Jewson (University of Ulster, UK).

Dr. D. Llewellyn-Jones with colleagues (University of Leicester, UK) discussed about new possibilities of getting satellite images of lakes from an ATSR Radiometer. Medium-resolution (resolution about 1 kin) images are well—matched to spatial and temporal scales of lake scale or basin—scale dimensions. A new generation of satellites with 9 channels will enable to scan not only surface water temperature, but also some water quality variables, like transparency and concentration of chlorophyll-a.

Dr. E. Tsvetova (Computer Centre SB RAS, Novosibirsk, Russia) presented a three—dimensional large—scale circulation model of Lake Baikal, based on the Boussinesq and hydrostatic approximations, and a two—dimensional vertical model based on the full equations of motion of a compressible fluid. The second model is suitable for modelling of short-term events, like genesis of frontal zones or erosion of thermocline, with the same order of horizontal and vertical scales.

The poster titled “Hydrophysical studies in Lake Tanganyika” by V. Podsetchine, T. Huttula, A. Peltonen and H. Mölsä, described the data of hydrological and meteorological measurements during the cruise in summer 1993 and also the results of numerical modelling of the upwelling with the 2D vertical model of the lake. This presentation got positive comments from the members of the Session “Physical and General Limnology” and was noted by the Chairman of the Session Prof. Pinneker.

On May 17 in his closure speech, Prof. J. Klerkx outlined the main themes of future studies, where the Baikal International Centre of Environmental Research (BICER) should concentrate main efforts. In his opinion, they are as follows:

1. Active tectonics and evolution of the lake basin's present displacements;
2. Seismic and tectonics hazards: catastrophes, landslides;
3. Sedimentary fill, deep drilling projects;
4. Hydrothermalims;
5. Palaeoclimatology.

It is impossible to mention all interesting presentations made during this Workshop. Summarizing, it should be stressed that participation in the work of this Symposium was important, since it gave opportunity to see the main lines of interdisciplinary studies of a deep lake. Another outcome is establishing good contacts with researchers from different countries, who are conducting or have conducted research projects in Lake Tanganyika.

The author of this report would like to express his gratitude to Prof. Ossi V. Lindqvist, Scientific Coordinator, and Prof. Hannu Mölsä, Deputy Coordinator of the FAO/FINNIDA Project "Research for the Management of the Fisheries on Lake Tanganyika" (GCP/RAF/271/FIN) for their active support, which has made this trip possible.

RATES AND VARIABILITY OF DEEP WATER RENEWAL AND BIOLOGICAL PRODUCTION IN LAKE BAIKAL

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Deep water renewal in deep temperate lakes is accomplished by an instability which depends upon the decrease in the temperature of maximum density of fresh rater with increasing pressure. Action by the wind or other external forcing is required to mix the surface layer downward to a depth of about 20 to 250 m before convection into the deeper layers can take place. The effect of this episodic mixing process in Lake Baikal (1637 m), as reflected in the deep—water distributions of temperature and chemical properties in each of the lake's three deep basins were measured during two separate expeditions in July 1988 (1) and June 1991. The rates of deep water renewal were determined from the distributions of the time-dependent anthropogenic chlorofluorocarbons CFC—11 and CFC—12, which dissolve in surface waters from the overlying atmosphere. The mean of the 1988 and 1991 observations gives a average residence time of deep raters below 250 m of about 8.5 years, and mean flux of deep water per unit area of about 70 m per year for each of the three deep basins. The least-ventilated water in Lake Baikal, found near the bottom in the deepest basin, has a mean apparent age of approximately 17 years. By combining the deep water renewal rate with the observed deep—water oxygen depletion, a mean rate of deep—water oxygen consumption by in situ respiration of about 4.3 micromoles per kg per year is obtained. This consumption must be balanced by a mean annual rate of photosynthetic "new production" in surface waters of about 26 grams of carbon per square meter per year. Lake Baikal is strongly oligotrophic, and nutrient elements in the surface layer are recycled an average of about four times before being removed to deep waters. Although the two Lake Baikal

expeditions found similar patterns of deep water renewal, the integrated rate of renewal decreased about 10 percent during the intervening three years. This decrease was accompanied by less vigorous formation of cold deep water, a general warming of deep waters by about 0.03°C, and reductions in the deep water oxygen consumption rate and the corresponding new production rate of about 8 percent. These results illustrate the close coupling between physical mixing and biological production in Lake Baikal. The implications of this study, and of a similar study on much—smaller Crater Lake (589 m) for understanding the mechanisms of deep water renewal in deep temperate lakes will also be discussed.

Weiss R. F., Carmack E. C. and Koropalov V. M.. Nature. 339. 665—669 (1991)

DEEP WATER FORMATION: THE PHYSICAL MYSTERY OF LAKE BAIKAL

Imboden D.

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The direct influence of the wind shear stress on vertical mixing in the ocean and in lakes hardly extends over more than the top few hundred meters of the water column. In the ocean the exchange of water below the seasonal thermocline is driven by horizontal density gradients which. in turn, are caused by horizontal temperature and salinity differences between water masses from different latitudes. This water masses may lead to mixtures which are denser than the surrounding waters. They then sink to deeper layers and thus cause vertical exchange. There is no equivalent in lakes to this so—called thermohaline circulation of the ocean, since even the largest lakes are still located within relatively uniform climatic zones. How then can deep

lakes ventilate, i.e. , bring their deep water to the surface where its oxygen content is replenished? Measurements of the vertical distribution of chlorofluorocarbons (CFCs) in Lake Baikal by Weiss et al. (1991) have shown that nowhere within the water column does the water age (measured as the time since the water has last been exposed to the surface) exceed a value of 20 years. This result has been confirmed by the measurement of tritium and helium isotopes from which water age can be calculated independently of the CFC model. Since ever scientists

have been aware of the large degree of oxygen saturation in the deep water of Lake Baikal they have speculated on the mechanism which drives vertical exchange. One theory which has been proposed by Weiss *et al*. (1991) is related to the pressure dependence of the thermal expansion coefficient of water (thermal baricity). As believed by Shimaraev *et al*. (1993), this phenomenon is responsible for sinking of water at thermal bars i.e, at fronts where the surface temperature is 4°C.

Another possible mechanism involves the major inlets which, due to their chemical composition, may he denser than the lake water. Measurements made in summer 1993 during the joint Russian-Swiss research project BIPWEX (Baikal International Project of Water Exchange) include high resolution CTD-profiling, water chemistry, current speeds, tritium and helium analysis. Primary results show that river—induced density currents bring warmer, but more saline water to the deeper layers of the lake. This process alone would lead to a gradual warming of the bottom water and cannot explain the frequent observation of cooling near the bottom. Traces of cold water penetration during the weeks immediately following the ice break in early summer were found near the bottom of the northern basin. The nature and origin of this cooling process is not yet understood and will be the target of the expeditions planned for 1994 and 1995.

Expeditions on Lake Baikal which yielded the data discussed in the present report have been organized by the Baikal International Centre for Ecological Research.

1 Weiss R. F., Carmack E. C., Koropalov V. M., 1991. Deep-water renewal and biological production in Lake Baikal. Nature, 649, 665—669.

2. Shimaraev M.N., Granin N.G., Zhdanov A.A., 1993. Limnol. Oceanogr., 38. 1068-1072.

HYDROTHERMAL OUTFLOW IN LAKE BAIKAL AND ITS EFFECTS ON THE PHYSICAL STATE OF THE WATER: THE CASE OF FROLIKHA BAY.

Klerkx J.[1], Golubev V.[2]

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[2] Institute of the Earth's Crust, Siberian Branch of the Russian Academy of Sciences, Lermontova 128, 664033, Irkutsk, Russia

Hydrothermal outflow in Frolikha Bay has been recorded since several years. It has been confirmed by intense investigations during the last years. During field campaigns in 1992 and 1993, the geological conditions of the hydrothermal venting, and the behaviour of the thermal outflow in the area around Frolikha Bay have been investigated in detail by heat flow probing, CTD-profiling of the water column, chemical analyses of the thermal water and detailed bathymetric mapping.

The thermal flow constitutes a warm and dense layer which concentrates on the bottom of the lake, and which varies in temperature, salinity and thickness.

It has been recognized that thermal venting is not limited to the sites which have been investigated previously, but that different outflow sites are aligned along an almost E-W line and extend from depths of 280 m up to 500 m.

This alignment probably corresponds to a transverse fault affecting the lake basin. This alignment is confirmed both by extreme positive temperature and electric conductivity anomalies of the bottom water (more than 0.05°C and close to 1×10^{-4} S/m), as well as by heat flow anomalies.

The anomalies of near-bottom water also exhibit a chemical composition which differs from the mean Baikal water and which parallels the chemical trend of the Hakhusi thermal spring on land.

The dense thermal outflow, which concentrates on the bottom of the lake, reaches thickness of tens of meters.

It concentrates according to the bottom topography, and flows down toward the deeper parts of the lake. Particularities of the flow have been investigated in the Frolikha area up to depths of more than 600 m.

The thermal outflow also has been traced in the deepest parts of the North Baikal basin, which testifies for a concentration of the thermal water in the axial part of the northern basin.

However, in July, 1993, negative bottom water anomalies, most probably resulting from input of cold surface water in the lake, have been observed in the southern part of the northern basin. Competition between warm and cold water for occupying the bottom layer also has been observed in the Frolikha area.

Although the hydrothermal flow results in changes on physical and chemical conditions affecting up to the deepest parts of the northern basin, its effects are counted by the input of cold water reaching the bottom of the lake. This prevents the continuing accumulation of anomalous thermal water in the northern lake basin.

CAN DIATOMS HELP TO UNDERSTAND CLIMATE CHANGE IN LAKE BAIKAL ?

Jewson D.H.

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United Kingdom

In the last few decades, diatoms have been used extensively to estimate the rate of environmental change because their silica cell walls are preserved in many lake sediments. However, to interpret the sedimentary record in Lake Baikal, we need to know more about how individual species are adapted to the unusual environmental conditions, particularly mixing processes. This paper will discuss the story of one of the endemic species. *Aulacoseira baicalensis*, which is the dominant diatom in the plankton now, as well as in recent sediments, but has not always been so. One aspect of the ecology of *A. baicalensis*, which has been the focus of study for many years, is the intriguing mystery of its cycles of abundance, called “Melosira years”. Some of the clues to what is happening come from the work of Skabitchevsky in the 1920’s. Other more recent results, from the last two years, are beginning to clarify how different stages in the life history are adapted to hydromechanics. One of the most novel discoveries is related to the diatom “Sex Clock”. Diatoms have an unusual mechanism for timing sexual reproduction that is connected to the size of their cell diameter. Such a mechanism is needed because the diatoms are single—celled organisms that must switch from asexual to sexual reproduction at times that

will not impede vegetative growth of the population. So, cells must be below a size (age) threshold and have a right environmental cue, before sexual differentiation can be initiated. In Baikal, the crucial period for sexual reproduction is under the ice in winter. The influences of snow—cover, mixing-depth and chemistry are specially important in determining the degree of success in producing viable offspring. The results from an interdisciplinary research programme this winter have been especially revealing, and Lake Baikal is one of the rare sites where such events have been quantified in nature. So, in addition to providing an insight into the present lake processes, the investigation of Lake Baikal diatoms offer an exciting opportunity to study life history strategy and mechanisms of evolution. The added bonus is that, because diatoms leave recognizable fossils, these studies will also improve our understanding of the unique sedimentary record.

This is a publication of Baikal International Center for Ecological Research.

MATHEMATICAL MODELLING OF LAKE BAIKAL HYDRODYNAMICS

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Numerical models of Lake Baikal were developed at the Computer Center as part of research efforts for the study of the hydrodynamics of lakes. As the emphasis of the work is on the understanding of different physical processes, a variety of adequate numerical models is required.

Only two basic models are presented here. The models are: (1) a 3D large—scale circulation model: and (2) a 2D cross—section model. The first one is the time-dependent variable-density model, which can describe the currents and temperature throughout the lake. Two basic approximations, the hydrostatic assumption and the Boussinesq assumption, are used in the governing equations. Specific features of the lake are included into the model by means of the description of real bottom topography and shorelines and with parameterization of atmospheric influence. The non-linear equation of state is adopted in which density is the function of temperature and pressure. Modifications of the model with different boundary conditions at the surface make it possible both to solve the climatic problem for a long-time period and to calculate short—time events like strong storms.

The 2D model is intended to simulate small-scale short-time local phenomena such as fronts, upwellings and downwellings, thermocline erosion, etc. These movements are characterized by the fact that their horizontal and vertical scales are almost the same. The hydrostatic assumption is not valid here, that is why the vertical accelerations are presented in the model.

Application of both models have been made and are discussed.

GCP/RAF/271/FIN/TRAM/49

Report of Travel

to

Mpulungu, Zambia

(23.07.1994 – 31.07.1994)

by

Heini Kurki
APO-Fisheries Biologist

GCP/RAF/271/FIN.10

cc: Blessich FIOA
Kapetsky, FIRI
FAOR, Tanzania
FAOR, Zambia
LTR, Bujumbura
LTR, Kigoma
LTR, Mpulungu
LTR, Uvira
Lindqvist/Mölsä, Kuopio
Vuorinen, Turku
TRAMS
Chrono
Diary: Kurki

1. INTRODUCTION

1.1. Objectives

The objectives of this travel to the LTR Mpulungu station were:
1) to discuss the second year of SSP, especially concerning the zooplankton subcomponent; 2) to check how counting and zooplankton sampling is being done; and 3) to discuss and give some suggestions on analysis of zooplankton data.

1.2. Itinerary

	Arrival	Departure
Kigoma		23.07.1994
Mpulungu	25.07.1994	29.07.1994
Kigoma	31.07.1994	

1.3. Persons met

Dr. P.-D. Plisnier, Limnologist, LTR Mpulungu
Ms. E. Bosma, APO-Fisheries Biologist, LTR Mpulungu
Mr. P. Verburg, APO-Fisheries Biologist, LTR Mpulungu
Mr. L.M. Mwape, Researcher, OIC, DOF Mpulungu
Mr. S. Sichivu, Fisheries Assistant, DOF Mpulungu
Mr. I. Zulu, Fisheries Assistant, DOF Mpulungu
Mr. K. Kaoma, Fisheries Assistant, DOF Mpulungu
plus all other staff of DOF Mpulungu

2. RESULTS

LTR Mpulungu premises were visited and station work routines were explained by Ms. Bosma.

The second year of SSP was discussed, first with Ms. Bosma and later on with Dr. Plisnier upon his arrival to the station. It was confirmed to do three replicate zooplankton tows to get more representative pelagic zooplankton samples and reduce the probability of collecting sample from a patch. Timing of the intensive sampling was also discussed. The effect of the full moon period on zooplankton distribution and migration pattern is an interesting study area. However, the way in which the sampling was done up to now was not adequate to properly study this phenomenon, because of too infrequent sampling. Therefore, it was suggested and agreed to cancel the full moon sampling and to do the sampling in the future during the new moon period, every second month.

Zooplankton sampling and oxygen measurements methodology were demonstrated to Mpulungu SSP staff using R/V Silver Shoal. Sampling was done according to the instructions given in the field manuals by Vuorinen and Kurki (FMs 6 & 9).

Zooplankton counting was done together with the zooplankton team, Messrs. Sichivu, Zulu and Kaoma, and the zooplankton

station responsible, Ms. Bosma. A tendency to wrongly identify *Tropodiaptomus simplex* males as females was observed. Therefore, extra training was given in correct identification of those specimens. The lack of appropriate species identification manuals might be the reason. The purchase of a microscope objective with a bigger magnification might also facilitate identification as well as photographs of the species and of their different development stages.

Ms. Bosma suggested to supply the research vessel with a closing net for quantitative vertical zooplankton sampling. The issue of new locally made counting chambers was again raised. It was decided already during the second SSP meeting in Kigoma that LTR Bujumbura would make the chambers.

Zooplankton data processing was discussed with Ms. Bosma, some ideas were exchanged and suggestions were given for analysis work:

1) graphic presentation of percentage distribution over the water column during each 24 hours sampling should be done;
2) the same as above but pooling together new moon and full moon sampling data;
3) analysis of variance could be used to test if there is statistical difference in the vertical distribution of zooplankton between day and night;
4) monthly summaries should be prepared of weekly regular sampling results.

The Kigoma limnology data were checked together with Dr. Plisnier and errors and obscure results discussed. The forthcoming fish larvae sampling programme was briefly discussed with Mr. Verburg and Mr. Mwape. The hydrodynamics team of Mpulungu prepared detailed practical instructions for the hydrodynamic team of Kigoma concerning the use of Corel draw software to facilitate the drawing of water current maps.

3. CONCLUSIONS AND FOLLOW-UP

The zooplankton subcomponent in Mpulungu station is run by qualified personnel. The field work and laboratory work is properly carried out and data analysis can be done effectively.

Following this visit, the following actions should be taken by the zooplankton field coordinator:

— inform LTR Bujumbura of the changes in zooplankton sampling and propose corrections for the new sampling schedule as discussed in Mpulungu;

- give specifications of the closing net to be purchased for the research vessel;

— ask LTR Bujumbura about the counting chambers; and

— prepare suggestions for zooplankton data analysis.

GCP/RAP/271/FIN/TRAM/5O

Report of travel

to

Dar es Salaam, Tanzania

(24.07.94 – 31.07.94)

by

E. Coenen, Biostatistician

and

P. Paffen, APO Fishery Biologist

GCP/RAF/271/FIN.10

cc: Kato/Doeff/Blessich, FIO
Kapetsky, FIRI
FAOR, Dar es Salaam
Maembe/Lyimo, DOF, Dar es Salaam
Bwathondi, TAFIRI, Kunduchi (Dar)
LTR, Bujumbura
LTR, Kigoma
LTR, Mpulungu
LTR, Uvira
Lindqvist/Mölsä, Kuopio
Chrono
Trams

1. INTRODUCTION

1.1 Objectives

The objectives of this travel were (1) at the Statistical Unit of the Fisheries Division Headquarters, to discuss the modalities of the planned simultaneous frame survey on Lake Tanganyika in February 1995; to discuss fisheries statistics for the Tanzanian part of L. Tanganyika, in general, and especially about the decentralized computer input of fisheries statistical data in the Regions; and to check for and collect any references (missing in the Documentation Center (DC) in Bujumbura) related to L. Tanganyika fisheries in general and especially concerning fisheries statistics; (2) at TAFIRI Headquarters in Kunduchi (Dar), to discuss various matters related to LTR; and to check for and collect any references (missing in the DC in Bujumbura) related to L. Tanganyika fisheries research and statistics.

1.2 Itinerary

	Arrival	Departure
Bujumbura		24.07.94
Dar es Salaam (Center)	24.07.94	27.07.94
Dar es Salaam (Kunduchi)	27.07.94	29.07.94
Dar es Salaam (Center)	29.07.94	31.07.94
Bujumbura	31.07.94	

1.3 Persons met at FAOR, Dar:

Mr. R.W. Fuller, FAO Representative, Tanzania
Mr. J. Salminiitty, APO - Programme Officer
Mr. J. Yonazi, Programme Assistant
Ms. J. Backhouse, Admin. Officer

At Fisheries Division Headquarters, Dar:

Mr. T.W. Maembe, Director of Fisheries
Ms. E. Lyimo, Head Fisheries Statistical Unit
Mrs. F. Sobo, Fish. Off., Statistics
Mr. Shindika, Ass. Fish. Off., Statistics
Mr. Dadu, Ass. Fish. Off., Statistics
Mrs. C. Msigwa, Ass. Fish. Off., Statistics

At TAFIRI Headquarters Kunduchi:

Prof. P.O.J. Bwathondi, Director General TAFIRI
Mr. J.D.R. Bayona, Research Officer
Mrs. S. Mwaiko, Research Officer
Mr. B. Ngatunga, Research Officer
Mr. S. Kamugisha, Librarian

At Kunduchi Fisheries Institute:

Mr. A.B.C. Kilango, Principal

At Finnish Embassy, Dar:

Mr. I. Rantakari, Ambassador of Finland

2. RESULTS

2.1 At FAOR

The FAO Representative and Programme Officers were briefed about the mission's objectives and practical mission details were arranged with the Administrative Officer. The probable attendance of the FAO Representative of Tanzania to the Third Joint Meeting of LTR's Coordination and International Scientific Committees in Kigoma, Tanzania, planned to be held from 28-30.11.94, was also discussed.

2.2 At Fisheries Division

The Director of Fisheries was briefed about the mission's objectives and several general project matters were discussed. The rest of the time was spent with the Fisheries Statistical Unit. The Head of Statistics informed the mission that:

- the decentralized computer data input by the Fisheries Officers in Rukwa and Kigoma Regions was not running smoothly. Kigoma Region sent a disk containing wrong files (programme files 1.0. data files) and Rukwa Region only submitted the Lake Tanganyika data for the first half of 93;

- that the new system of total enumeration of all boats landing during 16 chosen days per month is not working properly. Too often, beach recorders only record catches from a few fishing boats;

- that the Fisheries Department hardly received any budget for the financial year July 94 - June 95. The Government decided to avail part of the fishing tax revenues to the Fisheries Department budget, but the practical procedures for channeling that money are not yet in place. As a result, supervision travel by Headquarters staff to the Regions is almost impossible.

— that communication with the remote Regions around Lake Tanganyika is very difficult. The mission promised to contact LTR, Kigoma to allow the fisheries statistical officers of Kigoma to use this station's HF radio to get in contact with the statistical unit in Dar es Salaam every Tuesday at 10.00 a.m. TT (Tanzania time) on 9280 KHz. The HF radio of the Fisheries Department in Dar is operational every working day from 7.30—15.30 TT. The mission also promised to find out what frequency is used by the station in Kipili (Rukwa Region) and to inform the Head of Statistics accordingly.

A long discussion was held on the planned simultaneous Frame Survey (FS) for Lake Tanganyika in February 1995. Due to the above mentioned budget constraints, FS costs will most probably have to be covered by LTR, unless additional money would become

available by that time from fishing tax revenues. Therefore, considering the budget constraints which also LTR is facing, a less expensive and practical method for carrying out the FS in the Tanzanian waters of L. Tanganyika was sought for. The following FS methodology was proposed and agreed upon:

- the FS data are to be collected using form 1 (beach survey); form 2 (household survey) is only to be used when no fisherman is present at the fish landing beach; the FS forms are to be provided by the Fisheries Department;

- the FS will be carried out during 10 days by 38 beach recorders (2 per section of the +/- 600 km long shore of L. Tanganyika in Tanzania); supervision is to be carried out by 2 Regional Officers, 5 District Officers and 1 Headquarters (HQ) staff in each Region; total number of officers involved: 47;

– in each section, the 2 recorders will cover all fish landings in the area by moving from one landing to another using whatever transport means needed (bicycle, taxi, by foot, by boat); as the renting and operation of 2 boats (1 per Region) was considered to be too expensive, this option was cancelled;

- tentative budget:

* 45 field staff	X 10 days X	1440 Tsh/day	= 648	000 Tsh.
* 2 HQ staff	X 14 days X	4800 Tsh/day	= 134	400 Tsh.
(4 days extra for travel from and to Dar)				
* 19 sections X 5000 Tsh. travel budget			= 95 000 Tsh.	
* miscellaneous expenditures			= 22 600 Tsh.	

TOTAL = 900 000 Tsh.
or 1 780 US$
(exchange rate June: 1 US$ = 506 Tsh.)

- a final meeting with the statistical coordinators of all four riparian countries will be organized by LTR, probably to coincide with the Third Joint LTR Meeting in Kigoma, Tanzania (28-30.11.94); the points of discussion will be the fisheries statistical outputs (FS and CAS) for L. Tanganyika, in general, and the final arrangements for the simultaneous FS in February, 1995.

Finally, the mission received spare copies and/or photocopies of Fisheries Statistics Annual Reports for Tanzania which were not present in the Documentation Center (DC) in Bujumbura (only the Annual Reports of 1988, 1989 and 1990 were available):

– spare copies of 1991 and 1992 Annual Reports;

- photocopies of the L. Tanganyika sections from the Annual Reports of 1967, 1968, 1971, 1972, 1973, 1974, 1977, 1984, 1985, 1986 and 1987.

2.3 At TAFIRI HQ

The Director General of TAFIRI was briefed about the mission's objectives and several general project matters were discussed:

— it was agreed to try (Kunduchi has numerous power failures) to have radio contact every Thursday at 10.00 a.m. TT on 10500 KHz, code name of TAFIRI being SAMAKI;

— the HF radio from Mwanza station, which was promised to be transferred to L. Tanganyika, for use by LTR (e.g. in Kipili station), is missing several spare parts and has to be repaired. The radio was manufactured in 1976, brand name unknown. The Director informed the mission that LTR will receive the brand name and model number of the radio through Mr. Katonda (Kigoma TAFIRI Centre Director) to enable LTR to find out if spare parts are still available. He also informed the mission that another HF radio might become available for LTR once the Regional Project for L. Victoria avails two new radios (one for Mwanza station; one for a Mwanza vessel);

- the Director General also informed the mission that the presumed Bongo net (promised for LTR fish larvae sampling) was in fact a zooplankton net and thus not suitable for that purpose;

- he also informed the mission that TAFIRI will organize their annual research meeting for 1994 in Kigoma, most probably just after LTR's Third Joint Meetings (Kigoma, 28-30.11.1994); and that he would send to LTR his activities report for LTR's Newsletter and the TAFIRI Research Bulletin Nr. 3 (in press) as soon as possible;

— he also expressed the wish, being Tanzania's member of LTR's Scientific Committee, to visit Kipili and Mpulungu stations.

The mission searched the TAFIRI Library and Prof. Bwathondi's collection of publications for L. Tanganyika publications, missing in LTR's DC. The following information was collected:

- photocopies of the L. Tanganyika sections of the Annual Statistics Reports of 1975, 1978 and 1979;

- a copy of TAFIRI's Research Bulletin Nr. 1 (includes publication on L. Tanganyika fisheries statistics by E. Lyimo); Bulletin Nr. 2 does not include any L. Tanganyika publications and was not copied;

- two reprints of Bayona (1991 a and b, *Afr. Study Monographs)* of which references were not yet available in DC's database;

— five new references on Lake Tanganyika, all from the *Africa Study Monographs* series: Kawanabe (1981), Nagoshi (1983), Yamaoka (1983), Gashagaza (1986) and Yamaoka (1988).

Also, a short discussion on general matters was held with Mr. J.D.R. Bayona, Senior Research Officer. Finally, the mission members visited the facilities of the Kunduchi fisheries compound (TAFIRI, Marine Biological Station of the University of Dar es Salaam, Kunduchi Fisheries Institute).

2.4 At Finnish Embassy

A courtesy call was paid to the Ambassador of Finland in Tanzania, Mr. I. Rantakari. He was briefed about the mission's objectives and the Third Joint Meeting of LTR's Coordination and International Scientific Committees in Kigoma, Tanzania, planned to be held from 28-30.11.94. The Ambassador's probable attendance to the Joint Meetings was also discussed. The

Ambassador praised LTR for its Newsletters and the successful progress of the project, in general and expressed his sincere greetings to all project staff.

3. CONCLUSIONS AND FOLLOW-UP

- LTR Kigoma to contact the Kigoma Region's fisheries statistical officers to inform them about wrongly sent fisheries statistics TANFISH data disks; allow weekly radio contact with Statistics HQ in Dar; inform Statistics HQ Dar about radio frequency used by Kipili station;
(action: Coenen, LTR Buja; Mannini, LTR Kigoma)

- submit the estimated FS budget for Tanzania to LTR Project Coordinator for his approval to be supported by LTR; (action: Coenen and Hanek, LTR Buja)

— organise a meeting with the statistical coordinators at the end of 1994 (end of November) to finalize procedures for simultaneous FS;
(action: Coenen, LTR Buja)

— transmit the new publications and references to DC, Bujumbura for entry in Procite database;
(action: Coenen and Ndahigeze, LTR Buja)

- start a weekly radio contact with TAFIRI, Kunduchi; (action: Coenen and Varayannis, LTR Buja)

— check the availability of spare parts for Mwanza radio, once its specifications are known;
(action: Katonda, TAFIRI Kigoma; Coenen and Varayannis, LTR Buja)

- examine the possibility for Tanzania's Scientific Committee Member to visit Kipili and Mpulungu in 1994;
(action: Hanek, LTR Buja)

GCP/RAF/271/FIN/TRAM/5l

Report of Travel
to
Rome, Italy (31.7—5.8.94)

by

George Hanek
LTR Coordinator

GCP/RAF/271/FIN.10

cc: Kato/Doeff/Blessich, FIDI
Kapetsky, FIRI
Everett, FIPP
Kambona/Ssentongo, FIPL
Fitzpatrick/Turner, FIIT
Padroni, FIDX
Patterson, DDFO
LTR/Finland
LTR/Bujumbura
LTR/Kigoma
LTR/Mpulungu
Chrono
Diary: Hanek

1. INTRODUCTION

1.1 Objectives

The objectives of this duty travel were: (1) to brief FAO-HQ officers on LTR progress to date; (2) to prepare budgetary allocations; (3) to discuss commissioning of R/V Tanganyika Explorer; (4) to propose programme for 3rd Joint Meeting of LTR's Committees; and (5) to deal with number of other matters.

1.2 Itinerary

	Arrival	Departure
Bujumbura		28.7.94
Rome	30.7.94	5.8.94*

* continued on Family Visit

1.3 Persons met

Dr. W. Krone	ADG-FI a.i.
Mr. M. Doeff	SPOO, FIDO
Ms. D. Blessich	P00, FIDO
Dr. J. Kapetsky	SFRO, FIRI
Mr. J. Fitzpatrick	Director a.i. FIID
Mr. J. Turner	SFIO, FIIT
Mr. B.F. Dada	Director, FIPD
Mr. G. Everett	SFPO, FIPP
Mr. J. Kambona	Chief, FIPL
Mr. G. Ssentongo	FLO, FIPL
Mr. R. Shotton	FRO, FIRM
Mr. G. Padroni	P0, FIDX
Mr. F. Mancini	AC, FIDX
Ms. J. Collins	Librarian, FIBL
Ms. E. Parlanti	P0, AFPE/Field
Mr. El Batal	DDFR
Mr. R.G. Patterson	SPO, DDFO
Ms. B. Stenius—Mladenov	Finnish Embassy

2. RESULTS

2.1 LTR Progress

LTR progress to date was outlined during meetings with numerous officers as well as during general meeting attended by all key Fl officers as well as representatives of DDFR and Finnish Embassy. In addition, the following aspects were covered:

* budgetary allocations under *GCP/RAF/271/FIN* and *GCP/RAF/221/AGF* - it was noted that FINNIDA 'covered' the differences caused by devaluation of FM of other projects; consequently, all efforts should be made to ensure that LTR receives the due funds. It was also agreed that yet another attempt will be made to secure the due funds from AGFUND;

* cooperation with GEF - latest developments will be known after Cooney's (DDFA) return from N.Y.;

* programme for 3rd Joint Meeting of LTR Committees - was outlined and approved; similarly, the proposed timing (28.11-1.12.94) was accepted;

* timing of Evaluation Mission - agreed upon for May 1995;

* R/V Tanganyika Explorer — its commissioning is now previewed for early November 1994;

* schedule of remaining Workshops/Seminars — agreed to as follows: in Planning and Management for April 1995; in Acoustics for September 1995; and the Final Seminar on Project Findings for 1996 to coincide with the 7th Session of CIFA Sub-Committee for Lake Tanganyika.

2.2 LTR operational and technical matters

A number of operational and technical matters was treated as follows:

* GCP/RAF/271/FIN budgetary revisions G and H (=two options) were prepared;

* CSA4 for University of Kuopio was proposed;

* **personnel matters:**

  — replacement for Mr. Coenen: to be proposed asap BUT ensure that Evaluation Mission takes place while Coenen still under contract (thus Evaluation Mission must start late April or early May 1995);

  — Mafurugutu: it was agreed that AFPE/Field (Ms. Parlanti, D—222) will deal with this case immediately in order to secure disability pension for Mafurugutu as he is unable to carry out his duties;

  — Mannini: promotion to P-4 was granted, effective 1.8.94;

  — Seppala: his case is almost resolved;

—Kurki: once her terminal report is received, extension of her contract will be proposed;

— Varayannis — will be examined by Pajot or other francophone fisheries technologist during R/V Tanganyika Explorer's precommissioning and given chance to participate in mid—water trawl training (=Pajot consultancy);

- Kotilainen - 3rd year extension and thus his HL approved; and

- contract extensions up to the end of 1995 for all other LTR international staff likely;

* 3rd Joint Meeting of LTR Committees - documentation for this meeting was discussed with P00 and several changes in LTR/94/1 and LTR/94/Inf. 1 and 3 made. It was also agreed that duty travel to Dar—es—salaam should take place in October 1994 in order to finalize numerous arrangements with Tanzanian authorities, Finnish Embassy and FAOR. It was agreed further that invitations for this meeting will be sent to the members of both Committees, FINNIDA (through Univ. of Kuopio **???),** Amb. Rantakari, FAOR/Tanzania, SADC, PTA, GEF/N.Y. (through RR/UNDP-BDI); those for Tanzanian authorities to be determined during duty travel to Dar. Lastly, an attempt will be made to determine if other Ministries in all four participating countries wish to be invited;

* Evaluation Mission - timing agreed on early May, 1995. Itinerary to be proposed my myself to P00 in due course together with a list of 'resource persons' (one for each country);

* R/V Tanganyika Explorer - it was agreed that Turner (FIIT) makes next inspection in early September 1994. He is to also obtain updated quotes for fishing gear so that FPO or PR can be placed at that time. It was agreed that Mr. Pajot or other francophone fisheries technologist will be contacted and short consultancy proposed (tasks: to rig the trawl, to conduct training course in mid—water trawling and to test Varayannis). Decisions re: for still needed equipment (autopilot, etc) were taken and Coenen instructed to place three FPO's. It was also arranged that Danish technicians are retained to do the wiring while still in Bujumbura and thus Savinainen's consultancy will be limited to 'interfacing' the electronical equipment only and take place probably in early November 1994;

* schedule for Seminars/Workshop — agreed schedule was given under 2.1 above. However, the final decision will be made during our 3rd Joint Meeting in November 1994. It was also agreed that LTR Technical Document on Management will be prepared during October 1994; it should outline its principals and detail the steps to achieve them. This document should also propose the steps on how to achieve the key recommendations of the 6th Session of CIFA Sub-Committee for Lake Tanganyika i.e. establishing the Lake Tanganyika Fisheries Commission and to establish a resource base to achieve sustainable development of the lake.

2.3 Security situation in Burundi

Security Phase III was declared in Bujumbura in April 1994 and, subsequently, all dependents were evacuated. One of the effects is that our entitlements were reduced; for example it is no longer possible to exercise the right to education grant travel (NOTE: UNDP introduced increased flexibility in the use of education grant travel some time ago!!!). Similarly, it would seem logical that the staff member who had his family evacuated should be entitled to family visit. Several attempts were made (memos HanekPadroni refer) to determine if alternatives actions could be considered so that personnel serving in Bujumbura does not have to be penalized; this was followed by meeting with Mr. Padroni (FIDX) who, unfortunately, was not able to explain why FAO does not follow UNDP in modifying rules re: education grant travel nor why a logical modification of existing rules can not be considered to ensure fair treatment of staff members serving in duty stations like Bujumbura.

3. CONCLUSIONS AND FOLLOW-UP

3.1 Prepare list of persons to be invited for 3rd Joint Meeting of LTR Committees and obtain clearance from P00.
(Action: LTR Coordinator and P00)

3.2 Prepare duty travel to Dar—es—salaam; authorize it. (Action: LTR Coordinator and P00)

3.3 Prepare itinerary for Evaluation Mission. (Action: LTR Coordinator)

3.4 Prepare list of actions required to commission R/V Tanganyika Explorer. (Action: Turner (FIIT)

3.5 Prepare draft Technical Document on ‘Management of fisheries resources of Lake Tanganyika.
(Action: LTR Coordinator)

3.6 Seek assistance of FAO Field Staff Association re: entitlements of staff members serving in Bujumbura.
(Action: LTR Coordinator)

GCP/RAF/271/FIN/TRAM/52

Report of Travel

to

Kigoma, Tanzania

(23.08.94 - 30.08.94)

by

Victor Th. Langenberg,
APO Fishery Biologist

GCP/RAF/271/FIN.10

CC: Kato/Doeff/Blessich, FIO
Kapetsky, FIRI
Lindqvist/Mölsä, Kuopio
Maembe, Director of Fisheries, Dar es Salaam
FAOR/Tanzania
LTR/Uvira
LTR/Bujumbura
LTR/Kigoma
LTR/Mpulungu
Mr. P.R. Janus, APR. to FAO and WFP, Rome
Chrono
TRAMS

1. INTRODUCTION

1.1 Objectives

The objectives of this travel to the LTR station in Kigoma, Tanzania were: (1) to check the execution of the limnological subcomponent of the Scientific Sampling Programme (SSP); (2) the calibration of equipment used for limnological analyses;(3) to provide training to national and international staff in the preparation, programming, usage, and maintenance of the STD probe (Salinity-Temperature-Dissolved oxygen); (4) to provide training to national and international staff in the STD's Software and all necessary data and file handling; and (5) the installation of newly arrived equipment for Chlorophyll measurements.

1.2 Itinerary

	Arrival	Departure
Bujumbura (Burundi)		23.08.94
Kigoma (Tanzania)	24.08.94	29.08.94
Bujumbura	30.08.94	

1.3 Persons met

in LTR station TAFIRI. Kigoma

Mr. M.B.S. Kissaka, Scientist
Mr. N.A. Challe, Technician
Mr. A.D.B. Kihakwi, Fisheries biologist
Mr. E.W. Lyoba, Technician
Mr. P. Mannini, LTR fisheries biologist
Ms. H. Kurki, APO-Limnologist
Mr. E. Seppela, Technician
Mr. Kisisiwe, Annalist
Mr. Kadula, Technician
Mr. Kashushu, Technician
Mr. R. Wakafumbe, Technician
Mr. I. Shaabani, Technician
Mr. D.B.R. Chitamwebwa, Limnologist

2. RESULTS

2.1 Limnology subcomponent execution

On Wednesday the 24th, a short meeting was held with the national and international staff responsible for the execution of the subcomponent limnology. The reasons of my visit were explained and a five days working schedule was made. It was decided to carry out an extra V (vertical) sampling on Friday the 26th in order to have the opportunity of following one

complete limnological sampling day and to start the first hauls with the STD probe.

2.2 STD training

Because of their earlier experience with the STD probe in the beginning of this year, training was principally given to Mr. Kissaka and Mr. Chitamwebwa. A complete explanation of the STD probe *(i.e.,* preparing the probe for deployment, operation in the field and at the surface, retrieving data from the probe and its maintenance) was given as well as all the necessary data file handling.

3. CONCLUSIONS

3.1 General limnology execution

The methodology followed during the extra planned V sampling was carried out in a satisfactory way, according to the new guidelines of the limnology field manual Nr. 13 (in preparation)

Although the determination of most of the parameters of the limnological subcomponent was running in a proper way, some adjustments had to be made concerning the Phosphate analyses. Furthermore, some practical tips and hints were given in order to increase the analytical speed of the laboratory work. On the last day of the visit, calibration, cleaning and readjustments of the Ph meter and Conductivity meter were carried out, although these apparatuses hardly needed any maintenance or calibration.

The small changes and remarks made during this visit were discussed and agreed upon.

3.2 STD probe usage

The short course about the STD probe appeared to be effective. The complete installation, programming and maintenance of the STD probe, as well as the preliminary hauls made with the probe were carried out without any problems. Retrieving data from the STD probe, the translation/importing of huge data files into Excel 4.0, and the manipulation and graphical routines to present the STD data were understood and carried out correctly by the Kigoma staff.

3.3 Chlorophyll equipment installation

The proper installation of the vacuum pump and erlenmeyer, filtercarrier, filters, tubes, pieces and valves which will be used to filtrate lake water to obtain measurable Chlorophyll concentrations, was showed and explained to Kigoma staff. Still, some simple adjustments must be carried out to make the installation fully operational.

4. FOLLOW-UP

- Ordering of a new 1 ml tensette pipet and some other spare parts of equipment and chemicals used for limnology; (Action: Langenberg, LTR Buja)

- Calibration of the turbidity meter used at Kigoma station, results are to be send to LTR Mpulungu;
(Action: Chitamwebwa, LTR Kigoma)

- Preparation of the database, obtained during all STD hauls in Kigoma, in a compact way and with the explained standardised filing system. These data are to be send to Mr. P.—D. Plisnier, Mpulungu;
(Action: Kissaka, LTR Kigoma)

- Preparation of a complete inventory of all chemicals and spare parts of equipment used for limnology and preparation of a new ordering list of the limnological equipment needed for the whole new limnological sampling year which started in August 1994;
(Action: Chitamwebwa and Kurki, LTR Kigoma)

- An increase of the cleaning frequency of the laboratory (at least once a week during dry season);
(Action: LTR Kigoma)

GCP/RAF/271/FIN/TRAM/53

Report of travel

to

Mpulungu, Zambia

(07.09.94 – 20.09.94)

by

E. Coenen, Biostatistician

and

V. Langenberg, APO Fishery Biologist

GCP/RAF/271/FIN.10

cc: Kato/Doeff/Blessich, FIO
Kapetsky, FIRI
FAOR/ Zambia
Mudenda, Director DOF, Chilanga
Mubamba, Ass. Director DOF, Chilanga
LTR/Bujumbura
LTR/Kigoma
LTR/Mpulungu
LTR/ Uvira
Lindqvist/Mölsä, Kuopio
Janus, APR to FAO/WFP, Rome
Chrono
Trains

1. INTRODUCTION

1.1 Objectives

The objectives of this travel to the LTR station in Mpulungu were (1) to check the overall progress of the Scientific Sampling Programme (SSP) execution, with special emphasis on the limnology and fisheries statistics subcomponents; (2) to provide training to national and international staff in the use, data compilation and analysis of the STD (Salinity-Temperature-Dissolved Oxygen) probe; and (3) to discuss operational and administrative matters with LTR, Mpulungu staff. The mission members stopped briefly at LTR, Kigoma station in Tanzania on the onward as well as on the return trip to Mpulungu. General operational and administrative matters were discussed with LTR, Kigoma staff.

1.2 Itinerary

	Arrival	Departure
Bujumbura (Burundi)		07.09.94
Kigoma (Tanzania)	08.09.94	08.09.94
Mpulungu (Zambia)	10.09.94	17.09.94
Kigoma (Tanzania)	19.09.94	19.09.94
Bujumbura	20.09.94	

1.3 Persons met

In LTR, Kigoma:

Mr. P. Mannini, Fishery Biologist
Mrs. H. Kurki, APO - Fishery Biologist
Mr. K.I. Katonda, Director TAFIRI, Kigoma
and other TAFIRI staff present at LTR Kigoma station

in LTR, Mpulungu:

Mr. P.-D. Plisnier, Limnologist
Ms. E. Bosma, APO - Fishery Biologist
Mr. P. Verburg, APO - Fishery Biologist
Mr. L. Mwape, Fisheries Research Officer, DOF
Mr. G. Milindi, Fisheries Research Officer, DOF
Mr. D. Kabakwe, Fisheries Development Officer, DOF
Mr. E. Chipulu, Fisheries Assistant, DOF
Mr. W. Chomba, Fisheries Assistant, DOF
Mr. S. Sichivu, Fisheries Assistant, DOF
Mr. J. Chimanga, Fisheries Assistant, DOF
Mr. K. Kaoma, Fisheries Assistant, DOF
Mr. C. Lukwessa, Fisheries Assistant, DOF
Mr. L. Makassa, Fisheries Assistant, DOF
Mr. M. Syapila, Fisheries Assistant, DOF
Mr. I. Zulu, Fisheries Assistant, DOF
Mr. B. Kassikila, Skipper R/V Silver Shoal
and other DOF, Mpulungu staff present

2. RESULTS

2.1 SSP execution

2.1.1 Overall SSP execution

The overall SSP execution in Mpulungu station seems to run quite smoothly, without any major problems for any of the subcomponents. Regarding hydrodynamics, the station is still waiting for a new 9 V battery for the buoy wind sensor and for two 3 V batteries for the automatic water level station, the latter which was moved again, this time to the new jetty in front of the station. On 13.09.94, a water level gauge, received from Water Affairs in Mpulungu, was installed at the jetty. Special attention was given to the subcomponents of fisheries statistics and limnology (see 2.1.2 and 2.1.3). International and local subcomponent responsibles and/or subcomponent field coordinators are all very busy to compile data and finish soonest their station or overall subcomponent reports for the first year of
SSP.

2.1.2 Fisheries Statistics

Six main topics regarding fisheries statistics were discussed and decisions and/or adjustments were made where necessary: (1) Frame Survey (FS) done in June-July 1994; (2) Catch Assessment Survey (CAS) done in June-July 1994; (3) Continuous CAS monitoring at one (two) selected landing site(s);
(4) Planned lake wide simultaneous FS in February 1995; (5) Fisheries statistics extracted from fish biology samples; (6) Industrial fishing records.

(1) Frame Survey (FS) done in June-July 1994:

This FS was done together with the CAS round from 16.6 to 12.7.94 by 4 teams of 2 DOF recorders and covered the complete Zambian coastline of Lake Tanganyika. The DOF's FS and CAS forms were changed according to LTR's needs. Therefore, the analyses of the survey results will be done by LTR Mpulungu (and not by DOF, Chilanga). Mr. Mwape, Research Officer I/C of DOF Mpulungu, will be responsible for checking the FS data, their input into Excel files, and the final analysis, interpretation of the results and preparation of a Technical Document (TD). Because of the urgency of having the major FS results available by mid-October for their inclusion in the Fisheries Statistics report needed for LTR's Third Joint Meeting of the Coordination and International Scientific Committees, Kigoma 28-30.11.94, it was agreed that Mr. Mwape would send a summary of the principal FS results to Bujumbura as soon as possible. A TD on the detailed FS results could be prepared later.

(2) Catch Assessment Survey (CAS) done in June-July 1994:

Most of the observations mentioned for the FS, apply also for the CAS. However, the checking, data input and analysis of the CAS results will be much more time consuming (and not available for presentation during LTR's Third Joint Meeting). Therefore, it was agreed that Mr. Mwape, as well as Mr. Verburg, together with Dr. Plisnier as the overall responsible, will prepare a detailed TD on the CAS results, preferably to be finalized by the beginning of 1995.

(3) Continuous CAS monitoring at one (two) selected landing site(s):

Since DOF Zambia does not carry out a continuous CAS for the Zambian waters of Lake Tanganyika (but maximum 3 to 4 one monthly CAS rounds; the last one done in 1992), it was already decided earlier to initiate a continuous CAS monitoring of 2 landing sites, one around Mpulungu and one in the Nsumbu area. However, due to problems with (non motivated?) DOF staff in Nsumbu station (other LTR samplings were also cancelled there), a Daily CAS Recording Form was prepared (see Annex 1) for the earliest monitoring (3 times per week, from about midnight to midday), using total enumeration as much as possible, of the fishing units landing at Kasasa landing site, close to LTR Mpulungu station. Daily, monthly, seasonal, yearly CAS estimates, by species (group) and by unit of fishing gear type, can then be calculated for this landing site and possibly, using the latest FS results, be extrapolated for all other landing sites. It was also agreed that Mr. Verburg will be responsible for the starting up, supervision and data analysis of this new sampling exercise.

(4) Planned lake wide simultaneous FS in February 1995:

Due to financial constraints of DOF Zambia (since 1993, no FS/CAS rounds were carried out by DOF for the Zambian waters of Lake Tanganyika), LTR Mpulungu will organize and sponsor the execution of the planned lake wide FS for the Zambian waters of the Lake in February 1995. It was proposed to carry out the FS (this time without the CAS round) using again 4 teams of 2 recorders. The estimated duration of the FS was estimated at 9 days for which LTR would cover the cost of the recorders's night allowances for 5 days (in the same way as was done for the last FS, the remaining days will be compensated as extra leave days) and operating expenses (fuel, oil, miscellaneous), the latter estimated at 240.000 Kw. or about 350 US$. It was agreed that Mr. Mwape, together with Dr. Plisnier (for the logistics-financial aspects), would be responsible for the preliminary preparations of this FS. Final FS details (exact timing, minimum requirements of data to be collected, etc.) will be discussed during a meeting with the fisheries statistical coordinators of the 4 riparian countries, probably at the end of November 1994, in Kigoma. It was proposed that Mr. Lupikisha, the fisheries statistical coordinator for Zambia, who informed us last June that some DOF money might be available to contribute partly in the FS expenses, will use this budget to organize his trip from Chilanga to Mpulungu to supervise the FS on the Zambian side.

(5) Fisheries statistics extracted from fish biology samples:

Since some time, LTR stations started to work on extracting fisheries statistical information (monthly average catches, also by species(group), per fishing type, etc.) from the fish biology sampling sheets. For LTR Mpulungu, some problems for the first year of SSP were observed, mainly due to the fact that, for some types of gears, fish biology samples were taken from already sorted catches. This, of course, made extrapolations of species composition in the total catch impossible. Therefore, some adjustments were already made on the recording sheet of the fish biology sampling in Mpulungu to enable the immediate calculation of the species composition of the total sampled, sorted catch. Mr. Milindi, DOF Research Officer and responsible for the fish biology subcomponent in Mpulungu, was consulted and informed accordingly. Mr. Verburg, with whom the necessary adjustments to the fisheries statistics/fisheries biology Excel spreadsheet file were made to solve the above problem, was named responsible for the future extraction of fisheries statistical data from fish biology samples.

(6) Industrial fishing records:

Catch records from the industrial fishing units (purse seiners) from Mpulungu are obtained regularly. Mr. Verburg, responsible for the compilation of these records, prepared a file on the available 1984-1994 data from Mpulungu. However, for Nsumbu area, the original Nsumbu industrial fishing record books appear to be very incomplete and messy. In theory, monthly compilations are to be sent to the Provincial Fisheries Officer of Northern Province, in Kasama (at 250 km from Mpulungu). If these compilations do exist and are indeed available there, could not yet be checked. As already mentioned above (2.1.2-3), the problem in Nsumbu area could probably be solved by sending a more responsible and motivated DOF fisheries officer to Nsumbu to correct this situation and also to enable an active involvement in LTR's SSP in the Nsumbu area by motivated DOF staff posted there.

2.1.3 Limnology

On Monday the 12th, a short meeting was held with the international staff to formulate a one week schedule. It was decided to follow closely the execution of a horizontal sampling (sample collection and the analyses in the laboratory).

The limnological methodology in the field was followed during the horizontal sampling. It was carried out in a satisfactory way, according to the guidelines of the new limnology field manual Nr. 13. Small differences and improvements were discussed afterwards with the staff responsible for limnology.

Although the determination of most of the parameters of the limnological subcomponent was running in a proper way, some adjustments had to be made concerning the Phosphate analyses. Furthermore, some practical tips were given concerning the laboratory work.

On Thursday the 15th cleaning of the Ph meter and calibration and readjustments of the Conductivity meter were carried out.

Some other logistical, technical and practical ideas, misunderstandings, and differences, which occurred during the first limnological sampling year, were discussed and mostly cleared with the field coordinator of limnology, Dr. Plisnier.

2.2 STD training

After a general introduction about the STD probe, a short course was scheduled and given on Wednesday the 14th to all national and international staff involved (in particularly Mr. Lukwessa).

The short course about the STD probe was effective. The installation, programming and general maintenance of the STD probe were explained. A haul was made with the probe without any problems. Retrieving data from the STD probe, the translation/importing of data files into Excel 4.0, and the manipulation and graphical routines to present the STD data were understood and carried out correctly by the Mpulungu staff.

2.3 General operational and administrative matters

- DOF Zambia did not carry out any CAS/FS rounds in the Zambian waters of Lake Tanganyika since 1993 although they were done for other waterbodies in Zambia. Apparently, it is the task of the Provincial Fisheries Officer to obtain in time the necessary budgets to carry out these surveys in his Province. Since 1993, the Provincial Officer of Northern Province, responsible for Lake Tanganyika, did not obtain any budget for the surveys, because he did not do any effort or maybe because he thought that it was LTR's responsibility to sponsor these surveys, which is absolutely not the case (already existing routine operation inputs from government budgets should continue during project life, cf. project document)! This situation should be corrected as soon as possible, before the next scheduled CAS/FS round, later this year;

- the efficiency of PRA (Performance Related Allowance) was discussed and compared to local salary and allowance levels which increased lately;

— Mr. Mwape promised to prepare soonest some preliminary results on the fish larvae sampling carried out in Mpulungu area since May 1994, although the R/V Silver Shoal, even at its slowest speed, is too fast for fish larvae sampling;

- due to a feeling of lack of communication between DOF and LTR, Mpulungu, it was suggested that DOF and LTR responsibles in Mpulungu spend some more time in discussing (formally and informally) each other's programmes, find together solutions for joint problems, etc. in order to avoid situations of "no transparency";

- due to an unauthorized absence (39 days!!!, calling for disciplinary action) by the DOF driver of Mpulungu station, Mr. Mbanda, LTR renounced the services of the latter and hired a new driver, Mr. Chisambo;

— the importance of meteo data (to correlate with limnology and other subcomponent results), and especially for Mpulungu area, was discussed. Therefore, the timely distribution of meteo data between LTR stations was stressed and the possibility of moving Bujumbura's automatic weather station (after 2 years of data recording in Buja) to Mpulungu was discussed again;

— home and annual leave proposals of LTR Mpulungu's international staff were discussed and finalized. It was proposed that Dr. Plisnier passes through Kigoma and Bujumbura before going on home leave in order to deal with pending matters and check the limnology subcomponent progress in other stations;

— because 2 students from the University of Namur (Belgium), under supervision of Prof. Descy, might come to Mpulungu next year for a period of 6—8 months to carry out scientific research (phyto/zooplankton; fish stomach analyses; etc.) on Lake Tanganyika (of which the results should benefit to LTR), the availability of housing for them was discussed with Mr. Mwape. The latter confirmed that, in case he moves permanently to the new staff house built by LTR, the students will always have a place in the DOF guest house or training school;

- a list of spares for the R/V Silver School, to be ordered as soon as possible by LTR Bujumbura, was received and taken back to Bujumbura;

- the spare 100 µm zooplankton net from Mpulungu station, plus

100 m rope was sent to Kipili substation in Tanzania; 3 new 100 µm zooplankton nets have to be ordered by LTR, Bujumbura;

– due to a reduction in the number of civil servants in Tanzania (imposed by the World Bank), several beach recorders in stations on the shores of Lake Tanganyika left the Tanzanian Fisheries Division. This is also the case for Mr. Nzota, responsible for SSP in Kipili, who in future will be paid by the project;

3. CONCLUSIONS AND FOLLOW-UP

– write letter to the Director of Fisheries with copy to Mr. Ndonna, Provincial Officer of Northern Province, on the obtention of a budget for CAS/FS rounds and the problem of non motivated/ qualified DOF staff in Nsumbu area;
(Action: Hanek and Coenen, LTR/Buja; Mwape, DOF/Mpulungu)

- inform Lupikisha on proposal for February's 1995 lake wide FS; (Action: Hanek and Coenen, LTR/Buja)

– send soonest to LTR, Mpulungu, the missing Bujumbura weather station data of 22.04–19.05.94;
(Action: Coenen and Paffen, LTR/Buja)

– start continuous CAS monitoring of Kasasa landing site in Mpulungu as soon as possible;
(Action: Verburg, LTR/Mpulungu)

- analyse and report soonest on Zambia's FS/CAS round of 6–7/94; (Action: Plisnier, Verburg and Mwape, LTR/DOF/Mpulungu)

– check records on industrial fishing of Nsumbu area in Provincial Office in Kasama;
(Action: Verburg and/or Mwape, LTR/DOF/Mpulungu)

– order spares R/V Silver Shoal;
(Action: Hanek, Varayannis and Gonçalves, LTR/Buja)

– order 3 new 100 µm zooplankton nets;
(Action: Hanek and Langenberg, LTR/Buja)

- order a new wind speed rotor for LTR, Kigoma and two 3 Volt CR 126005E batteries for the 2109 water level recorder of LTR/ Mpulungu;
(Action: Hanek and Coenen, LTR/Buja)

– increase the cleaning frequency of the laboratory and equipment (at least once a week during this dusty time of the year); (Action: LTR/Mpulungu)

– prepare 30 counting chambers for the zooplankton subcomponent, to be divided between the stations;
(Action: Langenberg, LTR/Bujumbura)

– prepare and send to all stations a detailed questionnaire concerning the limnological methodology followed at all stations. The results are to be sent to Mpulungu Station;
(Action: Langenberg, LTR/Bujumbura; Plisnier, LTR/Mpulungu)

- contact the CRRHA project in Bujumbura to try to compare their limnological data with ours, to obtain a better insight of the high fluctuations of some limnological parameters;
(Action: Langenberg, LTR/Bujumbura)

- contact HACH Belgium about all the uncertainties, vague things and even faults we encountered in their methodology manuals during the first limnological sampling year;
(Action: Plisnier, LTR/Mpulungu)

– continue the seasonal sampling at the project's stations until all the gaps in the seasonal data base of the last limnological year are covered;
(Action: LTR stations)

– send as soon as possible all missing limnological data (accuracy checks, STD probe files, regular sampling, etc.) of the previous sampling year to the limnology coordinator, Dr. Plisnier;
(Action: all LTR stations)

- start the measurements of Chlorophyll *a*, using the HACH spectrophotometer, with the new equipment available in the stations (an updated methodology version is to be sent to the stations by Langenberg, LTR/Bujumbura). This in order to test, practice, and maybe adjust the methodology for the determination for Chlorophyll *a*. However, when the new spectrophotometers arrive, an updated version of the methodology for the Chlorophyll *a* determination will be sent by Langenberg, LTR/Bujumbura to all stations;
(Action: LTR stations; Langenberg, LTR/Bujumbura)

- Langenberg, LTR/Bujumbura to coordinate the ordering of all equipment for limnology and zooplankton. Additionally, all replenishment and stock files concerning the management of the limnological equipment are to be sent to LTR/Bujumbura;
(Action: all LTR stations)

– order a new 1 ml tensette pipet and other spare parts of equipment and chemicals used for limnology;
(Action: Langenberg, LTR/Buja)

- LTR, Mpulungu and Kigoma to prepare a complete inventory of all chemicals and spare parts of equipment used for limnology. The new ordering list of the limnological equipment needed for the rest of the new limnological sampling year has to be sent to LTR Bujumbura as soon as possible;
(Action: Plisnier and Bosma, LTR/Mpulungu; Chitamwebwa and Kurki, LTR/Kigoma)

ANNEX 1 : DAILY CAS RECORDING FORM Stat.frm1

Research for the Management of the Fisheries on Lake Tanganyika

DATE(DDMMYY)	/ /	Landing site:							
GEARS		Numb. of Units (U.)	Kapenta total (kg)	*(Kapenta-sample* Limno. (kg)	Stolo. (kg)	L.stap. (kg)	Lat.spp. (kg)	Others (kg)	TOTAL (kg)
Beach seine	**TOT.ACT.U. =**								
(1 unit = 1 beach seine	Unit 1								
	Unit 2								
	Unit 3								
	Unit 4								
RF = ...	Unit 5								
	Unit 6								
	Unit 7								
	Unit 8								
	Tot.Samp.U.=								
	TOT. CATCH								
	Catch/ U.								
Gill net	**TOT.ACT.U. =**								
(1 unit = 1 gill net)	Unit 1								
	Unit 2								
	Unit 3								
	Unit 4								
RF = ...	Unit 5								
	Unit 6								
	Unit 7								
	Unit 8								
	Tot.Samp.U.=								
	TOT. CATCH								
	Catch/ U.								
Longline	**TOT.ACT.U. =**								
(1 unit = 100 hooks)	Unit 1								
	Gear 2								
	Gear 3								
	Gear 4								
RF = ...	Gear 5								
	Gear 6								
	Gear 7								
	Tot.Samp.U.=								
	TOT. CATCH								
	Catch/ U.								
Lift net	**TOT.ACT.U. =**								
(1 unit = 1 lift net)	Unit 1								
	Unit 2								
	Unit 3								
	Unit 4								
RF = ...	Unit 5								
	Unit 6								
	Unit 7								
	Tot.Samp.U. =								
	TOT. CATCH								
	Catch/ U.								
Trap	**TOT.ACT.U. =**								
(1 unit = 1 trap)	Unit 1								
	Unit 2								
RF = ...	Unit 3								
	Tot.Samp.U.=								
	TOT. CATCH								
	Catch/ U.								
Other:									
	TOT.ACT.U. =								
(to specify)	Unit 1								
	Unit 2								
RF = ...	Unit 3								
	Tot.Samp.U. =								
	TOT. CATCH								
	Catch/ U.								
	DAILY TOTAL								

1. "TOT.ACT.U."= total number of active units using this gear on that beach that day.
2. RF = raising factor = Tot. number of active units/Tot. number of sampled units.
3. TOT. catch is calculated as RF x kg of each species recorded.

GCP/RAF/271/FIN/TRAM/54

Report of Travel to Kipili and Kirando (Tanzania) and Mpulungu and Nsumbu (Zambia) (06.08—22.08. 1994)

by

Kihakwi A.D. and N.A. Challe.

GCP/RAF/271/FIN.10

cc: Kato/Doeff/Blessich ,FIDI
Kapetsky, FIRI
Everett, FIPP
Kambona/Ssentongo, FIPL
Maembe/Bwathondi, Tanzania
FAOR/Tanzania
All LTR Stations
Chrono
Trams
Diary: Hanek

1. INTRODUCTION

1.1 Objectives

Following Dr. George Hanek's visit to Kigoma during the inauguration of the new Scientific Sampling Program (SSP) an agreement was reached between him, on behalf of the project, and N.A. Challe and A.D. Kihakwi to prepare a modern and up to date fishing gear catalogue for Lake Tanganyika. This agreement was the result of another work done earlier by the two authors who prepared a fishing gear catalogue for the Kigoma and Rukwa regions of Lake Tanganyika (Tanzanian part). Unlike the earlier work this new assignment will involve fishing gears used all around the lake by the four riparian states, i.e. Burundi, Tanzania, Zaïre and Zambia. To accomplish this work the two authors have to travel to various fishing sites and camps around the lake in order to observe and draw plans of the fishing gears in use together with the associated vessels. It is for this reason that Challe and Kihakwi had to travel to Mpulungu Zambia with a stop over in Kirando/Kipili (Rukwa region).

For convenience, four sampling sites have been chosen in Tanzania, they include Kirando and Kipili (in Rukwa region), Kalya/Sibwesa and areas around Kigoma town (in Kigoma district). The first two have already been covered during the trip to Mpulungu. In Zambia the authors wished and managed to carry out the observation in Mpulungu and adjacent areas and the famous Nsumbu area. The team will also visit Kalemie and Uvira in Zaïre, and finally it will wind up in Bujumbura.

1.2 Itinerary

	Arrival	Departure
Kigoma		06.08.94
Kirando	07.08.94	11.08.94
Mpulungu	12.08.94	20.08.94
Nsumbu	17.08.94	18.08.97
Mpulungu	18.08.94	20.08.94
Kigoma	22.08.94	

1.3 Persons met

Mr. Alen Nzota	LTR representative in Kipili
Dr. Pierre—Denis Plisnier	Limnologist, LTR Mpulungu
Mr. Peter Verburg	APO Biologist, LTR Mpulungu
Ms. Els Bosma	APO Biologist, LTR Mpulungu
Mr. Milindi	Research Officer, DOF Mpulungu
Mr. Kabakwe	Fisheries Officer, DOF Mpulungu
Mr. Makasa	Fisheries Assistant, DOF Mpulungu
Mr. Chipulu	Fisheries Assistant, DOF Mpulungu
Mr. Zulu	Fisheries Assistant, DOF Mpulungu
Mr. Lukwesa	Fisheries Assistant, DOF Mpulungu
Mr. Chomba	Fisheries Assistant, DOF Mpulungu
Mr. Syapila	Fisheries Assistant, DOF Mpulungu

2. RESULTS

The observation on fishing gears and vessels was done as planned. The team took measurements of the fishing gears and vessels at every station visited. Also sketch drawings were made at the site. The survey shows that the Kirando / Kipili area is dominated by the beach seine fishery both for clupeids (small fish), which is operated during the day, and for table fish which is normally done at night. The area has very few catamarans, but a good number of hooks and lines as well as gill nets. Kasadeo or Kachinga (unbaited hook and line for *Lates stappersii*) falls second in importance after the beach seine.

The Kirando/Kipili area looks similar to Mpulungu and Nsumbu both ecologically and in terms of gears they use. Like Kirando, Mpulungu and Nsumbu areas are dominated by shallow sandy beaches which are ideal for beach seining. In Zambia beach seine is an important fishery and contributes over 50% of the total catches. Equally important is the industrial fisheries which consists of seven fisheries companies in operation. Gill nets and hook and lines were found almost in every fishing camp but they formed a smaller proportion compared to those seen in the Rukwa region. As well as Kirando and Kipili few catamarans were found in Mpulungu area.

Some differences were observed however between the gears found in the two countries. The most notable ones are those seen in the beach seine nets and the catamarans. Briefly, the Zambian beach seine nets are very big but very poorly constructed. There is no tapering at the wings such that the whole thing appears as a sheet of uniform dimensions from one end to another. In addition to this, the central part of the net is covered with a light clothing material in order to trap even the smallest Kapenta. This second aspect was also observed in lift nets where the cod ends were totally covered with light clothing materials. More worse is that some lift nets were made up of the mosquito netting materials! On the contrary the Kirando / Kipili beach seine nets and lift nets are nicely constructed and there is not any addition to the netting materials.

Operationwise there are no major differences except that in Zambia lamps for beach seine fishery are carried on floaters instead of being tied on the boat. These floaters are just six inches high from the water surface, therefore the effect of light on water is very strong. This is considered as an advancement. Also of interest in Zambia is the presence of the mm – purse seiners, which have never been practiced in the Tanzanian side; four units were found, one in Mpulungu and three in Nsumbu.

3. CONCLUSION AND FOLLOW UP

The mission was successful in that the schedule was properly adhered to and the needed data were gathered. The differences observed in fishing gears between Kirando / Kipili in Tanzania and Mpulungu and Nsumbu in Zambia cannot be overlooked. At this time when the catalogue is not yet out, the project could use its News Letter to educate fishermen through their respective fisheries officers to give away the dangerous fishing gears. This is particularly important for those who use mosquito nets to harvest the resources. And here comes the relevance of the modern fishing gear catalogue.

The authors propose to visit other sampling places as follows:

1. Kalemie – second week of November 1994.
   (Action : P. Mannini, N.A. Challe and A. Kihakwi).

2. Kalya / Sibwesa – first week of December 1994.
   (Action : P. Mannini, N. Challe and A. Kihakwi).

3. Bujumbura and Uvira
   (Action : G. Hanek).

GCP/RAF/271/FIN/TRAM/55

Report of Travel
to
Dar—es—Salaam and Kunduchi, Tanzania
(16—23.10.1994)

by

George Hanek
LTR Coordinator

GCP/RAF/271/FIN.10

cc: Kato/Doeff/Blessich, FIDI
Kapetsky, FIRI
Everett, FIPP
Kambona/Ssentongo, FIPL
Fitzpatrick/Turner, FIIT
Maembe/Bwathondi, Tanzania
FAOR/Tanzania
All LTR Stations
Chrono
Diary: Hanek

1. INTRODUCTION

1.1 Objectives

The objectives of this duty travel were: (1) to brief the Tanzanian authorities as well as FAOR and Finnish Ambassador on LTRs progress and particularly on the forthcoming 3rd Joint Meeting of LTR Committees; and (2) to deal with other matters.

1.2 Itinerary

	Arrival	Departure
Bujumbura		16. 10.94
Dar es Salaam	16.10.94	23.10.94
Bujumbura	23.10.94	

1.3 Persons met

Mr. T.W. Maembe	Director of Fisheries
Mr. E.K. Mugurusi	Director of Environment
Mr. G.L. Kamukala	Director General National Environment Management Council
Prof. P. Bwathondi	Director General, TAFIRI
Mrs. E. Lyimo	Senior Fisheries Officer I/C Statistics
Mr. R.W. Fuller	FAO Representative
Mr. J. Yonazi	FAO Programme Assistant
Ms. J. Backhouse	FAO Administrative Assistant
Mr. W.A. Rodgers	CTA, UNO/RAF/006/GEF
Mr. J.G. Salehe	National Project Officer UNO/RAF/006/GEF
Mr. J. Victor da Silva Angelo	RR/UNDP
Mr. Ilari Rantakari	Ambassador of Finland to Tanzania
Mr. M. Van der Knaap	Coordinator, EEC Lake Victoria project

2. RESULTS

2.1 Meetings

During all meetings a full briefing on LTR was given and invitations to attend the 3rd Joint Meeting of LTR Committees extended. Additional matters were treated as follows:

* with Ambassador Rantakari – will attend and, if so instructed, is prepared to represent FINNIDA;

* with FAO Representative - likely to visit Kigoma few days before our meeting is due to start. Nevertheless, Mr. Fuller kindly offered to confirm Amb. Rantakari's itinerary by mid-November;

* with RR/UNDP - will not be able to attend as our meeting coincides with a large meeting of RRs/UNDP in Arusha (note: Mrs. Bazile-Finley, RR/UNDP-BDI, will also attend it). The possibilities of cooperating with GEF/UNDP project for Lake Tanganyika were outlined;

* with Director of Fisheries - itinerary was agreed, including that for CIFAs Harare meeting. He also kindly approved Mrs. Lyimo's short visit to LTR/Bujumbura in December 1994;

* with Director General of TAFIRI - his itinerary was also finalized, including his visit to LTR/Mpulungu. It should be noted that Prof. Bwathondi assigned yet another person (= Mr. Longinus Tegulirwa) to LTR/Kigoma as well as provided a car for TAFIRI/Kigoma;

* with Director of Environment. Director General of NEMC and CTA of UNO/RAF/006/GEF - all these were arranged by FAO Representation and all were first ever contacts. As the first two are likely to be associated with the GEF/UNDP Lake Tanganyika project, the modalities of possible cooperation were explained while an exchange of documentation was agreed on with CTA of UNO/RAF/006/GEF. Their schedule does not allow to take part in our meeting.

2.2 Other matters

Other matters were treated as follows:

* new car for LTR/Kigoma – documentation for this car, purchased under GCP/RAF/221/AGF, was just received by FAO Representation and should thus be available shortly;

* Mr. Japheth Kayungi - is now assigned to URT/90/005 in Bukoba; two telephone conversations were held with him as well as with Mr. Rod Beare in order to determine Mr. Kayungi's suitability/interest for the post of skipper for R/V Tanganyika Explorer. Overall impression is very good since everybody (= DOF, TAFIRI and FAO Representation) was quite positive. Consequently, he was invited to Kigoma for 28–30.11.1994 in order to see the vessel and discuss and hopefully conclude contract with LTR's Project Operations Officer and Coordinator;

* University of Dar es Salaam - LTR established contact with Prof. Nikundiwe, Department of Zoology, some time ago. He is now the Dean of Sciences. Dean Nikundiwe was not in during my visit to the University; LTR documentations was left with his secretary; and

* need for APO's – was discussed with Mr. M. Van der Knaap, who assisted with the selection of our four APO's. He was informed that all four Dutch APO's are doing very well. In addition, the urgent need for at least one APO for LTR/Kigoma was explained.

3. CONCLUSIONS AND FOLLOW-UP

3.1 Finalize itinerary for Tanzanian participants and forward it to P00. (Action: LTR Coordinator)

3.2 Inform DDF that Amb. Rantakari is willing to represent FINNIDA at 3rd Joint Meeting, if so instructed. (Action: P00 and DDF)

3.3 Prepare short duty travel to Kigoma, Tanzania in order to finalize all arrangements for the 3rd Joint Meeting. (Action: LTR Coordinator and Messrs. Katonda and Mannini)

3.4 Telex invitation to visit LTR/Bujumbura to Mrs. Lyimo, DOF/Dar. (Action: LTR Biostatistician)

3.5 Prepare TOR for skipper's post and fax it to Mr. Kayungi in Bukova. (Action: Turner, FIIT)

3.6 Pouch to FIDO-ROME FAOR/Tanzania approved SSA-Local Consultants Fee Negotiating Ranges. (Action: LTR Coordinator)

3.7 Provide Mr. Van der Knaap with TOR for APO. (Action: LTR Coordinator)

3.8 Maintain contact with Tanzanian 'environmental authorities as well as with UNO/RAF/006/GEF. (Action: LTR Coordinator)

GCP/RAF/271/FIN/TRAM/56

Report of Travel

to

Rome (Italy)

and

Bujumbura (Burundi)

(18.10. – 07.11. 1994)

by

Matti Savinainen
Electronics engineer

GCP/RAF/271/FIN.10
cc. Kato, FIO
Kapetsky, FIRI
Blessich, FIO
Fitzpatrick/Turner, FIIT
Lindqvist/Mölsä, Kuopio
FD-41
Chrono
TRAM

1. INTRODUCTION

1.1 Objectives

The objectives of the travel were: (1) to be briefed in Rome for the installations of electronic equipment of R/V Tanganyika Explorer, (2) to install, interface and test all electronic equipment in R/V Tanganyika Explorer.

1.2 Itinerary

	Arrival	Departure
Joensuu		18.10.94
Helsinki	18.10.94	18.10.94
Frankfort	18.10.94	18.10.94
Rome	18.10.94	21.10.94
Brussels	21.10.94	21.10.94
Bujumbura	22.10.94	06.11.94
Brussels	06.11.94	06.11.94
Helsinki	06.11.94	07.11.94
Joensuu	07.11.94	

1.3 Persons met

in Rome

Mr. J. Turner, Senior Officer, FIIT
Mr. J. Fitzpatrick, Chief, FIIT
Ms. A. Ingretolli,
Ms. D. Blessich, Personnel Officer
Ms. U. Schulz,

in Bujumbura

Dr. G. Hanek, Project Coordinator, GCP/RAF/271/FIN
Mr. P. Kotilainen, APO-Fisheries Biologist, GCP/RAF/271/FIN
Mr. E. Coenen, Biologist, GCP/RAF/271/FIN
+ The other LTR/Bujumbura personnel
Mr. C. Philippou, Owner of the vessel
Mr. E. " 2. Greek ", Owner of the vessel
Mr. K. Jensen, Technician, Tekmatronics Aps
Mr. B. Kristensen, Electrician, Tekmatronics Aps

2. RESULTS

2.1 Installation of the electronic equipment in vessel

The work in the vessel were started on 24.10.94, firstly by checking the cabling for electronic equipment in vessel made by Danish team. Mounting holes for equipment in console of steering room and mounting joints for cameras etc. in vessel's steel body were made according to my instructions by CNT personnel supervised by the owners. Staff for routine work in vessel was available enough. Excitement of the CNT personnel was in high level. The quality of this work was not always good and the work took quite a lot of time.

The following equipment were installed on the vessel:

CCTV Panasonic

Cameras were installed in engine room and in upper back deck. Monitor was installed on the console port side of the steering room. System was tested and cameras were adjusted.

Trawl sonde Furuno FE—881

Equipment was installed on the wall of the dry lab. Equipment was tested, only sonde above the water.

Autopilot Robertson AP 45

Control unit was console mounted starboard side in steering room, close to the steering wheel. Junction unit of autopilot was installed under the console in steering room. Rudder feedback unit was mounted and calibrated to rudder room according mounting instructions. Manual of the autopilot was not for this model, therefor all settings for autopilot were not able to do. System was not tested completely, only the function of the solenoids in steering system, because hydraulic system of the vessel was not completed. Steering lever was mounted port side in steering room close to the steering wheel.

Radar Furuno 1941

Display unit of the equipment was installed port side in steering room. Was tested.

Depth sounder Koden CVS-822

Display unit of the equipment was installed starboard side in steering room, close to the sonar. Was tested.

Sonar Koden ESR-150

Display unit of the sonar was installed starboard side in steering room. Sonar was not able to be tested because the retraction tank of the transducer was closed with a flange and couldn’t be lowered.

Magnetic compass with course detector

Compass was mounted without installation instructions. It was located in the middle of the console in steering room and course detector was connected to the autopilot. Mirror for the compass was not installed, because paneling work of the ceiling of the steering room was not completed.

GPS Raystar 390

Equipment was installed starboard side in the steering room, close to the autopilot. Antenna was mounted on the top of the mast. GPS was not tested.

SSB ICOM

Radio and antenna tuner were not installed, because they were not available. Antenna of SSB was mounted port side on the roof and power supply unit of SSB (PS—66) was mounted close to the switchboard in steering room.

VHF Furuno

Radio was not installed. Antenna was mounted starboard side in the mast.

Intercom

Telephones were mounted in engine room, back deck, and in lower deck corridor.
Central unit of the system was console mounted port side in steering room.

Simrad EY 500

Equipment was not installed, because paneling work was not completed in dry lab. All connectors for the equipment were completed.

NMEA-Interface unit

Equipment was mounted under the console in steering room. All connections for equipment's were completed.

All cabling and interfacing of equipment above was completed.

3. CONCLUSIONS AND FOLLOW UP

3.1 Autopilot Robertson AP 45 has to be tested and the correct function of rudder has to be checked after completion of hydraulic system, by Mr. Kurt Jensen, if possible.

3.2 Sonar Koden ESR—150 has to be tested after removing the flange. Can be tested by Mr. P. Kotilainen.

3.3 VHF and SSB has to be mounted together in the wall close to the switchboard, above the power supply unit (P5-66). The power supply unit can supply both SSB and VHF. Mounting supplies for both radios are in locked cabin on vessel. Antenna tuner should be located inside the mast construction, near the antenna.

3.4 Simrad EY 500 has to be tested after completion of paneling work in dry lab, by Mr. P. Kotilainen.

3.5 All spare parts of the equipment (mainly the spare fuses) and the manuals of the equipment are in locked cabin in the vessel. Only the Danish team has the key of the cabin.

GCP/RAF/271/FIN/TRAM/57

Report of Travel

to

Lusaka, Chilanga and Mpulungu (Zambia)
and Kigoma (Tanzania)
(7—20.2.1995)

by

George Hanek
LTR Coordinator

GCP/RAF/271/FIN.10

cc: Doeff/Blessich, FIDO
Kapetsky, FIRI
Everett, FIPP
Kambona/Ssentongo, FIPL
Fitzpatrick/Turner, FIIT
Mudenda/Mubamba, Zambia
Maembe/Bwathondi, Tanzania
FAOR/Zambia
FAOR/Tanzania
All LTR Stations
Chrono
Diary: Hanek

1. INTRODUCTION

1.1 Objectives

The objectives of this duty travel were: (1) to brief the Zambian authorities as well as FAOR and Finnish Ambassador on LTR's progress and (2) to visit LTR stations in Mpulungu and Kigoma.

1.2 Itinerary

	Arrival	Departure
Bujumbura		7.2.95
Nairobi (on AL)	7.2.95	11.2.95
Lusaka	11.2.95	15.2.95
Mpulungu	15.2.95	17.2.95
Kigoma	19.2.95	20.2.95
Bujumbura	20.2.95	

1.3 Persons met

in Zambia

Dr. R. Mubamba	Assistant Director of Fisheries
Ms. N. Springer	Programme Officer, FAO
Ms. V. Best	Admin. Officer, FAO
Mr. R. Houthuyzen	APO, ALCOM
Prof. M.N. Siamwiza	Secretary General, National Council for Scientific Research
Mr. J.J. Kanyembo	Director, Environmental Council of Zambia
Mr. D. Kunda	Data Manager, Environmental Council of Zambia
Dr. N. Mbata	Head, Dept. Biology, Univ. of Zambia
Mr. R. Harris	Remote Sensing Unit, Meteorology Dept.
Dr. P—D. Plisnier	LTR/Mpulungu
Mr. L. Mwape	OIC, DOF/ Mpulungu
+ staff of DOF/Mpulungu	
Mr. B.T. Mghamba	Capt. of *M/V Liemba*
Mr. E. Ossinga	Regional Fisheries Officer, RAFR
Mr. U. Tietze	Fishery Industry Officer, FIIT
Mr. H. Ikonen	Charge d'Affaires e.p. of Finland

in Tanzania

Mr. P. Mannini	LTR/Kigoma
Mr. D. Chitamwebwa	OIC, TAFIRI/Kigoma
+ staff of TAFIRI/Kigoma	

2. RESULTS

2.1 Meetings in Chilanga and Lusaka

with DOF/Chilanga – many items were treated as follows: (1) 4th Joint **Meeting of LTR Committees and 7th Session of CIFA Sub-Committee for Lake Tanganyika** – initial steps were taken to secure invitation of the Govt of Zambia to host these meetings in November 1995; (2) **Workshop on Management of Lake Tanganyika Pelagic Stocks** - Mr. Mudenda already named Mr. Katundu to coordinate the preparation of Zambia's position paper. Further, since artisanal fisheries of Zambia on Lake Tanganyika is insignificant, DOF would prefer to have industrial fisheries representative to participate; (3) LTR **Evaluation Mission** – 'resource person' should be named shortly; (4) Gov't **clearance for Belgian student for LTR/Mpulungu** - DOF already initiated the required action; (5) **papers for meetings** – the preparation of several papers started; it was agreed that LTR will sponsor the participation of several national colleagues at either the 1st Pan African Fisheries Congress (Nairobi, 31.7–5.8.95) or at Kuopio Symposium (11–15.9.95); and (6) **Lake Tanganyika Fisheries Directory** – its 1995 version is now under preparation; it was agreed that Dr. Mubamba will prepare the update of 'Chilanga–Lusaka' sections while Messrs. Mwape and Makassa will update the rest.

with FAO's Lusaka office – Ms. Springer was briefed and admin. matters were treated with Ms. Best.

accompanied by Dr. Mubamba and Dr. Plisnier, I had several meetings with the following:

with the Secretary-General of National Council for Scientific Research -full briefing on LTR objectives and activities was given. Prof. Siamwiza indicated that Lake Tanganyika should be added to UNESCO's MAB list;

with the Director of Environmental Council of Zambia – initial contact was made, full briefing provided and recent Council's publications were obtained;

with the Head of The University of Zambia's Department of Biology – it was explained that several students from the University of Zambia could be offered the possibility, just like those from the University of Burundi, to work with LTR team and, eventually, prepare their theses using LTR data. Dr. Mbata indicated that a new M.Sc. (Biology) programme will start in September 1995 and thus our offer is timely and will be accepted in due course;

with Mr. Harris, NRI Remote Sensing Unit of Zambia's Meteorological Department – NOAA HRPT receiving and storing equipment was demonstrated. He further informed us that while NOAA 12 is 'down', images from NOAA 9 are being received and processed without problem. In addition, NOAA 14 should be operational shortly. Mr. Harris is interested to collaborate with Dr. Plisnier; and lastly

with the Charge d'Affaires. Embassy of Finland – full briefing on LTR was given. Mr. Ikonen was closely involved during the LTR's identification phase (Mikkola/Lindqvist mission). He will try to visit LTR/Mpulungu soon.

2.2 LTR/Mpulungu

Two full days were spent at LTR/Mpulungu. The station is extremely well organized and the morale of LTR and DOF staff is quite high. A very good job was done to rehabilitate the jetty. In addition, a new shed is under construction; it will be used to store the new Zodiac. Further reinforcement of lakeside infrastructure is required; as some 100 sacks of cement were kindly provided by DOF/Chilanga, this work already started.

Lastly, a staff meeting was held and a number of operational matters treated. It was noted that there continues to be a very significant difference between the official UN exchange rate and that paid by Zambian banks (UN rate: 1$ = 685K; bank rate: 1$ = 795K).

2.3 LTR/Kigoma

Because of political situation in Burundi, M*/V Liemba* did not proceed to Bujumbura. This allowed me to visit LTR/Kigoma, meet with all LTR and TAFIRI staff and deal with a number of operational matters. Mr. Chitamwebwa is the new OIC of TAFIRI/Kigoma.

3. CONCLUSIONS AND FOLLOW-UP

3.1 Secure 'back—up' invitation to host the 4th Joint Meeting of LTR Committees and the 7th Session of CIFA Sub—Committee for Lake Tanganyika. (Action: Mr. G. Mudenda)

3.2 Select the representatives of fishing communities for the Workshop on Management of Lake Tanganyika Pelagic Stocks, facilitate the preparation and ensure the official clearance of the country statement.
(Action: Mr. G. Mudenda (selection and clearance), Dr. Plisnier (logistics and support)

3.3 Select 'resource person' for LTR Evaluation Mission. (Action: Mr. G. Mudenda)

3.4 Coordinate the preparation of 'Zambian' papers for the 1st Pan African Fisheries Congress and for Kuopio Symposium.
(Action: Mr. Mwape and Dr. Plisnier)

3.5 Update 'Zambian' section of Lake Tanganyika Fisheries Directory.
(Action: Dr. Mubamba and Messrs. Mwape and Makassa)

3.6 Maintain contact with the National Council for Scientific Research, Environmental Council of Zambia, Univ. of Zambia's Department of Biology and Meteorological Department.
(Action: Dr. Mubamba, Dr. Plisnier, LTR Coordinator)

3.7 Organize the 3rd SSP Assessment Meeting in LTR/Kigoma. Objectives: facilitate transfer responsibilities (Coenen—Craig), prepare work programme and schedule for the 3rd year of SSP.
(Action: LTR Coordinator and Messrs. Coenen and Mannini)

3.8 Try to establish US$ A/c for LTR/Mpulungu. (Action: P00 and LTR Coordinator)

GCP/RAF/271/FIN/TRAM/58

Report of Travel

to

Bujumbura (Burundi)

and

Kigoma (Tanzania)

(02—09.12.1994)

by

Anu Peltonen
Consultant in hydrodynamics

GCP/RAF/271/FIN.10

cc. Doeff/Blessich, TCO4
Lindqvist/Mölsä, Kuopio
LTR, Bujumbura
LTR, Kigoma
LTR, Mpulungu
Trams

1. INTRODUCTION

1.1 Objectives

The objective of the trip was to train counterparts of all four countries to use new Aanderaa—software. This program has been programmed by Toomas Kadarpik from the National Board of Waters and the Environment, Finland and is used to unload the data from the Aanderaa instruments e.g. from weather stations and thermistor chains. The advantage of this new software in comparison with the old one is that it includes calculation (e.g. averages) and graphics. Two counterparts and one APO from Burundi and one counterpart from Zaïre and one counterpart and one APO from Tanzania and from Zambia took part in the training.

1.2 Itinerary

	Arrival	Departure
Bujumbura	02.12.94	08.12.94
Kigoma	08.12.94	11.12.94
Bujumbura	12.12.93	14.12.94

1.3 Persons met

in Bujumbura

Mr. Hanek, LTR, Bujumbura
Mr. Coenen, LTR, Bujumbura
Mr. Kotilainen, LTR, Bujumbura
Ms. Paffen, LTR, Bujumbura
Mr. Langenberg, LTR, Bujumbura
Mr. Nikomeze, Department of Fisheries, Bujumbura
Mr. Tumba, Department of Fisheries, Bujumbura
Mr. Kakogozo, CRSN, Station d'Uvira, Zaïre

in Kigoma

Mrs. Kurki, LTR, Kigoma
Mr. Kihakwi, TAFIRI, Kigoma
Mr. Mannini, LTR, Kigoma
Mr. Verburg, LTR, Mpulungu
Mr. Makasa, Department of Fisheries, Mpulungu, Zambia

2. RESULTS

2.1 Training in Bujumbura 02-06.12.94 and Kigoma 08.-12.94

Training started with the installation of the program to the project's computers. The counterparts and APOs were taught how to unload the data from the data storing units (DSU) and how to write all the information concerning the instrument to the databases. They also learnt how to calculate averages and make pictures of time series and distribution, components and vectors. The material used was from the Bujumbura weather station, Kigoma lake meteo station, Kigoma wind station, Mpulungu lake meteo station and Mpulungu wind station.

3. CONCLUSIONS AND FOLLOW-UP

Although the program is still in some parts incomplete it is still much more advanced and easy to use than the old software. Calculation and drawing can now be done with the same program. All of the participants were well motivated and cooperative. It may take some time until the functioning of the program is clear to them but after that they will have no difficulties using
it.

System requirements to run Aanderaa—program successfully are a personal computer with an 80386 or higher processor and at least 4 MB memory (6 or 8 MB memory is recommended). Since the hardware of all the stations is not equal there is a need in the future to get at least more memory to those computers which now have only 4 MB memory.

GCP/RAF/271/FIN/TRAM/59

Report of Travel

to

Kigoma (Tanzania)

and

Bujumbura (Burundi)

(14.01.1995 – 24.02.1995)

by

Piet Verburg, APO—Fishery Biologist

and

Els M. Bosma, APO-Fishery Biologist

GCP/RAF/271/FIN.10

cc: Doeff/Blessich, TCO4
Kapetsky, FIRI
FAOR, Tanzania
FAOR, Zambia
Mudenda/Mubamba, DOF/Zambia
Lindqvist/Mölsä, Kuopio
LTR/Bujumbura
LTR/Kigoma
LTR/Mpulungu
LTR/Uvira
Janus, APR to FAO/WFP, Rome
Chrono
Trams
Diary: Verburg/Bosma

1. INTRODUCTION

1.1 Objectives

The objectives of this duty travel were to discuss the taking over of the responsibility for the lake wide coordination of the research component hydrodynamics by P. Verburg, sampling results, the acquisition of additional data and reporting procedures of both P. Verburg and E.M. Bosma. Briefing in Rome and home leave in the Netherlands took place in between visits to Kigoma and Bujumbura.

1.2 Itinerary

	Arrival	Departure
Mpulungu		14.01.95
Kigoma	17.01.95	17.01.95
Bujumbura	17.01.95	18.01.95
Rome	19.01.95	21.01.95
Amsterdam	21.01.95	14.02.95
Bujumbura	15.02.95	20.02.95
Kigoma	20.02.95	22.02.95
Mpulungu	24.02.95	

1.3 Persons met

In Bujumbura

Dr. G. Hanek, LTR Coordinator
Mr. P. Kotilainen, APO-Fisheries Biologist, LTR
Mr. E. Coenen, Fishery Biostatistician, LTR
Ms. P. Paffen, APO—Fisheries Biologist, LTR
Mr. V. Langenberg, APO-Fisheries Biologist, LTR
Mr. I. Rantakari, Ambassador of Finland in Tanzania
Staff of Department of Fisheries/LTR

In Kigoma

Mr. P. Mannini, LTR Fisheries Biologist
Mrs. H. Kurki, APO-Fisheries Biologist, LTR
Mr. D. Kweka, District Fisheries Officer
Mr. Chitamwebwa, OIC TAFIRI
And other TAFIRI personnel

2. RESULTS

2.1 Bujumbura

With Mr. P. Kotilainen the taking over by P. Verburg of the responsibilities for the coordination of the hydrodynamics sampling component was discussed. Necessary information was supplied by Mr. P. Kotilainen. Also results concerning the windpattern over the lake were discussed.

Apart from sparse data for Nsumbu and Mpulungu (Zambia) at the moment no 'historical' data on the lake waterlevel after June 1991 (Kigoma) or November 1992 (Bujumbura) are available to the project. The project started measuring the lake waterlevel in March 1993, so there is a significant gap and a missing link. This fact was discussed with Langenberg, Coenen, Mannini and Chitamwebwa. All four would increase their effort to unearth these data, but doubt was expressed as to its existence. Possibly lake wide the effort in collecting meteorological/hydrological data by the responsible departments has slacked in recent years.
Also data on rainfall in Burundi is at the moment limited to data collected by and during the project. This is not the case for the Tanganyika catchment area in Tanzania and Zambia.

With Mr. E. Coenen the conflicting data received from the Department of Fisheries in Zambia, concerning historical Zambian industrial fishery statistics, were discussed. Those compiled by Mr. M. Pearce (1962 – 1992) appeared more realistic.

With Mr. V. Langenberg the limnology and zooplankton data were discussed, including the production of the counting chambers.

The zooplankton graphs were discussed with Mr. D. Bwebwa.

R/V Tanganyika Explorer was visited with E. Coenen, P. Paffen and I. Rantakari.

2.2 Kigoma

A meeting took place between Mr. P. Verburg and Mr. D.O.Z. Kweka, District Fisheries Officer in Kigoma. The latter promised to supply the project with historical data concerning fish catches in Tanzania, separated for clupeids and *Lates stappersii,* on monthly basis, and especially for the purse seine fishery. These data are not available in Dar es Salaam Fishery Headquarters (pers. comm. E. Coenen).

The selectivity of the beach seine gear as used in Zambia was decided to be assessed by P. Verburg.

Aspects of Fish Biology data processing were discussed with Mr. P. Mannini. The contents of two papers to be produced

jointly within the next few months were discussed. These papers should concern food contents of *Lates stappersii* and reproduction of the clupeids and *L. stappersii* respectively.

The software ECOPATH II was discussed with P. Mannini, and literature was exchanged. It was decided to look into the possibility of producing jointly a report based on data processed with the ECOPATH II software.

Differences in collecting and analysing of the zooplankton samples between Kigoma and Mpulungu were discussed with A. Kalangali and S. Muhoza. To simplify the analysing of the zooplankton samples (collected during the intensive sampling), the use of the concentration device was recommended for Kigoma station.

3. CONCLUSIONS AND FOLLOW-UP

3.1 In view of time consuming involvement in hydro—acoustics Mr. P. Kotilainen will transfer the responsibilities for the hydrodynamics component to Mr. P. Verburg.

3.2 File with graphs examples to be send to Mr. Bwebwa, Bujumbura. (Action: Bosma)

3.3 Statistical data of the Tanzanian fisheries are to be acquired and processed.
(Action: P. Verburg)

3.4 Missing historical data (especially water level, rainfall, and other interesting parameters) will be collected as soon as possible, and send to all LTR stations.
(Action: Langenberg, Kotilainen, Coenen, Kihakwi, Mannini and Verburg)

3.5 Papers on material collected within the fish biology component will be produced.
(Action: food contents: Verburg, Mannini, DOF/TAFIRI personnel; reproduction: Mannini, Verburg, Paffen, DOF/TAFIRI personnel)

3.6 The selectivity of the Beach seine gear as used in Zambia shall be assessed.
(Action: P. Verburg)

3.7 Papers based on ECOPATH II to be produced.
(Action: Bosma, Verburg, Mannini, LTR/DOF/TAFIRI staff)

GCP/RAF/271/FIN/TRAM/60

Report of Travel

to

Kalya and Sibwesa, Tanzania
(18—22.02.1995)

by

A.D. Kihakwi and N.A. Challe

GCP/RAF/271/FIN.10

cc: Blessich, TCO4
Kapetsky, FIRI
Fitzpatrick/Turner
FAOR Tanzania
Maembe/Bwathondi
All LTR stations
Tram
Chrono

1. INTRODUCTION

1.1 Objectives

The Kalya - Sibwesa trip by A.D.Kihakwi and N.A. Chale goes together with the earlier trip made in August 94 to Kirando - Kipili and Mpulungu (GCP/RAF/271/FIN/TRAM/54). In this short mission the two LTR staff had the intention of finishing up their assignment on the fishing gear catalogue preparation for Lake Tanganyika. Kalya and Sibwesa are among the fishing villages proposed as sampling areas on the Tanzanian part of Lake Tanganyika together with Kirando and Kipili which were covered in August 94.

During the four days mission the main concern was to trace fishing gears and vessels which diverge from the common trends so far observed in the visited areas. The Kalya – Sibwesa area was strategically chosen as a sampling station because there exists a special beach seine fishery which is peculiar for the whole lake, except in Kalilani, a small fishing village near The Mahale Mountains National Park.

1.2 Itinerary

	ARRIVAL	DEPARTURE
Kigoma		18.02.95
Sibwesa	19.02.95	21.02.95
Kashaguru	21.02.95	21.02.95
Kalya	21.02.95	21.02.95
Kigoma	22.02.95	

1.3 Persons met

Mr. Bakema Rashid	Fisheries Assistant – Kalya/Sibwesa
Mr. Adolf Daire	Fisherman – Sibwesa
Mr. Mariom Kiluba	Fisherman – Sibwesa
Mr. Sudi Abdallah	Fisherman - Sibwesa
Mr. Stephano Mbomba	Fisherman - Sibwesa
Mr. Sudi Ally	Fisherman – Kalya

2. RESULTS

The Kalya – Sibwesa area has a very productive littoral zone where a number of fish species habit. The beaches are shallow and sandy and therefore are ideal for beach seining activities.

During our visit, several units of beach seine both for sardines (mainly *Stolothrissa* tanganicae), and for table fish were observed. However the sardine fishery in this area is quite different from that of big fish as far as the operation is concerned. In this fishery, the fishing activity always starts at around 4.OO pm (1600 hrs). This is the time when the sardines migrate to the beach from deeper waters. This behaviour is peculiar to sardines inhabiting the Kalya - Sibwesa area together with the area around the Mahale Mountains National Park only (pers. obs.).

3. Conclusions

/-- PAGE MISSING FROM ORIGINAL DOCUMENT --

4. FOLLOW UP

The authors propose to visit other sampling places as follows:

1. Kalemie during the second half of March 95.
   (Action: P. Mannini, A. Kihakwi and N. Challe).

2. Bujumbura/Uvira at the beginning of April 1995. (Action: George Hanek)