RESEARCH FOR THE MANAGEMENT
OF THE FISHERIES ON LAKE TANGANYIKA

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REPORT ON LTR'S SECOND SCIENTIFIC SAMPLING PROGRAMME ASSESSMENT MEETING, KIGOMA, 11-12.04.1994

by
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FINNISH INTERNATIONAL DEVELOPMENT AGENCY

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

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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).

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

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1. INTRODUCTION

Last LTR's Scientific Sampling Program (SSP) Standardization/Coordination meeting took place in Kigoma on the 30th of August, 1993, about 2 months after the SSP start (July 93). The results of this meeting were summarized in the second SSP update (Coenen *et al.*, 1993). This update was also used as a basic for the preparation of the SSP presentation during the Second Joint Meeting of LTR's Coordination and International Scientific Committees in Lusaka, Zambia, on the 14th - 15th of October, 1993 (Hanek & Coenen, 1993).

After nine months of SSP execution, a second SSP assessment/coordination meeting with all International staff, plus two nationals from each riparian country, was organized in Kigoma from the 11th to the 13th of April, 1994 (see Annex 1 and 2 for the list of participants and Itinerary/ Agenda, respectively). The main goal was to assess the progress of SSP, including technical discussion in working groups for several subcomponents. First, station results were presented and compared, problems and proposals for improvement were discussed, closer involvement of Associate Professional Officers (APOs) and Nationals in data analysis/reporting was examined, etc.

During the introduction, all participants were urged to keep in mind that the ultimate goal of the SSP is to enable the elaboration of a management plan proposal for the fisheries on Lake Tanganyika and that therefore priorities (essential parameters) have to be selected regarding LTRís ongoing research. Participants were also informed to keep in mind LTR's budgetary constraints limiting the purchase of certain equipment and reducing the extent of certain activities. It was also stressed that the uncertain financial future of LTR (1996 funding not yet available) and the requested but not yet approved extensions of two Finnish APOs will also determine the future off LTRís SSP.

The working group results were presented during a plenary session and a terminal discussion was held by LTR's International staff on the final proposals/changes to adopt for the second year cycle of SSP and on various other matters.

The last day of the meeting, a training session theoretical course and practical demonstration) was organized for all participants by two Finnish consultants, Prof. Sarvala and Dr. Salonen, regarding the new carbon/energy budget subcomponent (primary production, respiration). During their stay, the consultants also tested practical field sampling procedures concerning the field work to be implemented for their subcomponent.

The Bujumbura participants used the next day to arrange administrative matters, to discuss several subcomponents technical aspects in more detail, to pay some courtesy calls to local authorities, to check the progress of decentralizing the fisheries statistics data entry for the Kigoma Region, to discuss the preparation of a fishing gear catalogue for the Lake, etc.

2. RESULTS OF THE SSP ASSESSMENT, BY SUBCOMPONENT

2.1 Limnology

After a presentation of the subcomponentís summary results, the limnology Coordinator proposed and distributed a form to write down the results of the accuracy checks to be carried out regularly (every 4 months) by each station. Preliminary accuracy checks results revealed that the old phosphor analysis method used underestimated measured concentrations with about 50%. Also, an Excel file (with automatic warning for ordering chemicals low in stock) to enter inventory data of chemicals will be distributed shortly to each station.

Regarding the limnological field sampling it was proposed to complete a full annual cycle with the present methodology and, as from August 1994, to cancel the weekly sampling at site A (depth > 100 m) and replace it by a vertical and horizontal sampling at site B (depth > 300 m), twice a month. The horizontal sampling will have to be done according to a transect from shore to the open water at distance of 100, 500, 1000 and 5000 meters from the shore (the latter distance can be more or less as it has to coincide with sampling point B). It was also proposed to cancel the measurements of nitrite (NO_2) and iodine (I_2). The six-weekly intensive samplings (24 hours cycle) at site B will remain but complete limnological sampling will only be done during the last sampling at 6.00 a. m. Because of high distance, logistical reasons and the thin epilimnion in the northern basin of the Lake, it was suggested that Bujumbura station could select a new site B (closer to Bujumbura) with a depth of 150 m. The number of analyses to be done during the new sampling scheme will decrease considerably. Detailed instructions for the new scheme will be proved shortly by the subcomponent Coordinator.

Concerning satellite limnology, it was proposed that surface temperature measurements could be obtained from the two fixed measuring buoys with thermistors chains installed in Tanzania and Zambia waters of the Lake. Secchi disk (transparency) and Chlorophyll *a* measurements could be done during satellite passes over the Lake (5 measurements each). It was proposed to do Secchi disk measurements during the weekly current measurements. The remote sensing units in Kuopio and Rome (respectively through LTR’s Scientific Coordinator and the Subject Matter Officer) should be contacted as soon as possible to obtain detailed satellite overflight schedules.

Data analysis and the use of Excel graphics, databases, etc. were discussed. Quick graphical presentations of lab measurements could improve detection of strange measurement results so that some tests could be repeated before throwing away the samples. Data analysis and graphical presentations of station results should be done in a standardized way for which guidelines should be proved by the subcomponent Coordinator. Stations wishing to do additional data analyses (according to special interests) can do so but should inform the subcomponent Coordinator. After 1 year of sampling (end of July 1994),

station reports and an overall report on one year data have to be prepared and finalized before the next Joint Meeting of LTRís Coordination and International Scientific Committees.

Equipments needs (chemicals, spectrophotometer, STD probe, etc.) were discussed and it was proposed to circulate the STD probe amongst the Stations.

2.2 Hydrodynamics

Concerning the current of flow measurements, the methodology was discussed in detail. A standardized method was finally agreed upon. It was proposed that as from August 1994, the now linked A and B sub-lines of each hydrodynamic line will be split: The A subline remains inshore but the B subline will be moved to more offshore waters. The subcomponentís field Coordinator explained that he already prepared computerized map and data files in order to enable standard analyses of current measurement data. These files will be distributed shortly.

Concerning the automatic Telog water level stations, it was proposed that each station should unload every three months their Telog data recorder when the STD and its portable computer for unloading the data are available.

Regarding the recordings of the automatic wind stations and lake buoys, it was agreed, after lengthy discussions on how to be able to work with real data (apart from the hydrodynamic modeling work done in Finland) that Mr. P. Verburg (Mpulungu) will prepare clear instructions for each station on how to handle data from these automatic recorders. These instructions will especially deal with the import of ASCII data files into Excel so that each station will be able to produce its own Excel real data measurement files. The overall lake wide compilation of these data will be done by the subcomponentís field Coordinator, Mr. P. Kotilainen.

It was observed that the available automatic wind station should be installed in Kalemie (Zaïre) as soon as possible.

Finally, it was proposed that all station Coordinators for the hydrodynamics subcomponent can meet in the near future to check and discuss all available data before starting the final reports.

2.3 Fish biology

The fish biology working group firstly discussed the changes for the fish biology sampling which were introduced in March 1994 (Mannini, Office Memorandum of the 7th of March, 1994). It was observed that some stations will had problems in carrying out these changes properly.

Next, all available data and especially the length frequency data collected by all stations from lift nets, beach seines and purse seiners were compared. It was noted that there was a constant difference between Bujumbura and Uvira data,

Uvira having bigger specimens. This was the case for *Stolothrissa tanganicae* and *Limnothrissa miodon*, the latter also not having any modal progression in Uvira. Therefore, it was proposed to check if there is a difference in sampling methodology, if maybe the meshes of liftnet units in Zaïre and Burundi differ (although no indication for this was apparent from already collected mesh size data), or any other reason which might explain this constant shift to the right of Uvira length frequencies as compared to the Bujumbura ones.

For *Lates stappersii*, it was observed that in Bujumbura almost only juveniles are found as compared to the other stations. Does this mean that the northern part of Lake Tanganyika constitutes a nursery area for *Lates stappersii*? Therefore, it is urgent and indispensable that Bujumbura station could sample purse seiners or at least try to obtain catch records from these units to see if adults of Lates stappersii are being caught in the northern basin.

Proposals from Mpulungu and Bujumbura station for improving the sampling and the need of selectivity correction factors (to correct growth estimates obtained from the sampled populations) were discussed. It was also observed that the study of daily growth rings on otoliths is an essential part of the fish biology subcomponent. Requests to several laboratories in Africa and Europe are underway to see if one of them has an interesting and affordable proposal for analyzing about 2000 still to be collected *Stolothrissa* and *Limnothrissa* otoliths (10 per 5 mm length group).

Concerning fish biology data analysis, it was observed that, although interested station researchers can find good and clear introductions on how to analyze length-frequency data in Sparre and Venema (1992a, Rev. 1; 1992b, Rev. 1) and Gulland and Rosenberg (1992), the lake wide length-frequency data analysis and interpretations should be done by a researcher with great experience in this matter, in casu the fish biology field Coordinator Mr. P. Mannini. It was therefore suggested that the stations should mainly concentrate on the data analysis of all other fish biology parameters measured (length-weight relationship, condition factor, sexual maturity, length at first maturity, stomach contents, index of relative abundance, fisheries statistics, etc. and possible correlations between these parameters). It was however observed that to do these analyses in a standardized way, the field Coordinator should prepare some precise guidelines on how to analyze the data for all these parameters.

Concerning reporting, it was noted that station reports as well as a lake wide report on fish biology should be made, preferably on a six monthly basis. The draft reports should circulate among the stations for comments and revisions before final publication.

2.4 Zooplankton

The zooplankton working group first discussed the preliminary results of the zooplankton samples determinations and counts. As it was observed that small zooplankton specimens are probably passing through the 100 µm net meshes, it was proposed to test: the difference in counts between samples taken by the 100 µm net only and samples taken by the same net but mounted in the newly proposed torpedo; the difference in counts between samples taken by the 100 µm torpedo mounted net and samples taken by the torpedo with the 100 µm and 50 µm nets mounted (50 µm net behind the 100 um net). It was also suggested that the weekly zooplankton sample, instead of one haul from 100 m depth, should be constituted by the combined sample of 3 hauls.

In order to increase the number of samples to obtain more reliable data, it was proposed that until the changing program in August 1994, each station should try to collect extra zooplankton samples from site A when passing closely to this site during the weekly hydrodynamic measurements.

Due to the proposed changes for limnology as from August 1994, reducing the number of zooplankton samples, which are taken during the limnology sampling at site B, to 2 per month, it was observed that 2 extra zooplankton sampling trips will have to be made to allow the continuation of obtaining weekly zooplankton samples.

It was observed that regularly a number of unknown zooplankton specimens are found in the samples. Therefore, it was suggested that each station should make precise drawings of these unknown specimens, and preserve these specimens for sending them to specialists for exact determinations.

In order to compare the determination and counts of zooplankton in the different stations, it was proposed to send several samples from stations to analyze the same sample. The results of the same counts/determinations done in different stations could then be compared to assess the bias of the zooplankton counts carried out by different stations/researchers.

Finally, the rearing of zooplankton in aquaria for growth studies was discussed. When it was observed that this was a difficult and specialized job, the working group suggested to contact Prof. Sarvala to ask him about the possibility of sending somebody from Finland to carry out this study.

3. MANAGEMENT OF THE FISHERIES ON LAKE TANGANYIKA

During the SSP assessment meeting, it was stressed that the ultimate goal of LTR's research is the elaboration of a management proposal for the fisheries of Lake Tanganyika. This management plan should include a long-term research program proposal for monitoring purposes, a frame-work for the riparian countriesí co-management, as well as an estimate of the means

needed for its implementation (Office Memorandum Kato-Hanek of the 28th of March 1994 refers).

It was agreed that a document on this topic will be prepared by the LTR Coordinator by the end of September 1994 and presented, for introductory discussion, at the Third Joint Meeting of LTR's Coordination and International Scientific Committees. It will outline the principles of fisheries management plans per se, their standards, requirements and implanting mechanisms. Further, and considering the fact that the Sixth Session of the CIFA Sub-Committee for Lake Tanganyika proposed the establishment of the Lake Tanganyika Fisheries Commission, a brief section will be included outlining the steps required to propose a draft convention on the establishment of such a commission and, particularly, its possible role as implementing mechanism for the eventual fisheries management plan.

4. CONCLUSIONS AND RECOMMENDATIONS

During the final meeting of LTR's FAO staff, the following conclusions and recommendations were adopted:

4.1 Hydrodynamics

- because of the multi-disciplinary aspect of this subcomponent, data analysis work for each discipline (current measurements, meteo data,thermistor chain data, etc) will be distributed amongst staff at the different LTR Stations. The subcomponent field Coordinator is responsible for the overall report;
- the STD probe and computer will be circulated to the other stations as follows: May 94 to Mpulungu, June 94 to Kigoma and July 94 back to Bujumbura;
- because of the planned high involvement of the present hydrodynamics field Coordinator in hydro-acoustic surveys (by the end of 1994), it was decided to appoint Mr. P. Verburg as the new field Coordinator for hydrodynamics whenever the hydro-acoustic work with the research vessel will start;
- the scientific Coordinator for hydrodynamics, Mr. T. Huttula, has to be contacted soonest to request for the reports on hydrodynamic modeling and on the results of the third hydrodynamics cruise (2 - 3. 94) on the Lake Tanganyika.

4.2 Fish biology

- fish biology data files have to be sent on a monthly basis to the subcomponent field Coordinator;
- the field Coordinator will prepare soonest a memo with clear instructions for the standardized analysis of the various fish biology result items (L-W relationship, Condition factor, Gonado-somatic index ,etc.);
- the need of purchasing micro-metric eyepieces for the stereo-microscopes was stressed;
- concerning otolith studies, the replies of various institutes (contacted by the fish biology Coordinator E. Aro), capable of carrying out this studies are awaited impatiently. Based

on these replies and the budget required, an institute will be selected for the analysis of daily growth rings on sampled otoliths;
- shrimp identification sheets for the stomach analyses are urgently needed. It was proposed to check with the Uvira research center in Uvira (Mr. S. Kimbadi) and with the Belgium/CEPGEL CRHHA project in Bujumbura.
- The proposal for fish larvae sampling by Mpulungu, Kigoma and Bujumbura/Uvira stations should be finalized as soon as possible for distribution; one extra Bongo fish larvae sampling net has to be ordered as soon as possible.

4.3 Limnology

- the limnology field Coordinator will prepare soonest a new field manual with detailed instructions on the new methodology and procedures for the limnological subcomponent to be implemented as from August 1994;
- he will also avail the French version of his first manual (FM/07) to LTR Headquarters in Bujumbura for publication purposes;
- he will also send an updated Excel stock file to all stations for improving the regular checking of the available stock of chemicals in each station. Because a next order for chemicals has to be issued soon, Dr. P-D. Plisnier; Mr. V. Langenberg; and Mrs. H. Kurki and Mr. Chitamweba were designated to follow up on this matter soonest in the stations of Mpulungu, Bujumbura and Kigoma, respectectively;
- in view of the new sampling scheme, Bujumbura station has to select a new sampling site B (depth 150 m) for the horizontal/ vertical sampling twice a month; Kigoma station has to select a new sampling site with a depth of 160 m and Mpulungu station has to select a new site, closer to Mpulungu, for which the depth still has to be determined.

4.4 Zooplankton

- the zooplankton field Coordinator will prepare a clear memo or manual detailing the changed sampling procedures to be implemented as from August 1994;
- Bujumbura station will test soonest (for about a month) the difference in sampling with the plankton net only or with the net mounted in a torpedo; also trials will be made to mount the 50 µm zooplankton net below the 100 µm net to see if some small zooplankton specimens are passing through the 100 µ net meshes and to compare 100 + 50 µm sample counts with 100 µm sample counts; test results should be communicated as soon as possible;
- as the zooplankton subcomponent needs weekly samples, two extra trips per month will have to be made to collect these samples (the other 2 are made during limnological sampling); during these extra sampling trips, a Bongo net will be towed (exact procedures still to be determined) to collect pelagic fish larvae;
- stations will exchange zooplankton samples and the taxonomic species determinations and counts of the same sample by researchers of different stations will be compared;

- unidentified zooplankton specimens should be preserved to be sent to zooplankton specialist for exact determinations and making of type slides; at the stations, drawings should be made of unidentified zooplankton specimens for reference and circulation amongst stations;
- concerning the rearing of zooplankton in aquaria for growth studies, Prof. Sarvala will be contacted to find out if one of his students could come to Kigoma for one month to carry out this research.

4.5 Fisheries statistics

- LTR will finance one Catch Assessment Survey (CAS) and one Frame Survey (FS) for the Zambian coastline of Late Tanganyika; the combined CAS and FS surveys have to be carried out by LTR Mpulungu around mid-94;
- Mpulungu station should start organizing a continuous CAS monitoring at 2 landing sites, one around Mpulungu and the other one in Nsumbu;
- LTR will look into the possibility of doing an extra aerial FS late 1994 and/or an aerial night flight with infrared cameras to determine the location and extent of night fishing activities;
- a simultaneous lake wide aerial and ground approach FS is scheduled to be carried out in February 1995;
- standardized FS and CAS result outputs per country, for 1993, have to enable the compilation of overall Lake Tanganyika fisheries statistics;
- The analysis and compilation of FS, CAS and CPUE data, per country and for the whole of Lake Tanganyika, has to continue;
- Wherever possible, assistance should be given to the riparian countriesís statistical units;
- Catch and gear data, collected during the fish biology sampling have to be compiled as soon as possible;

4.6 Genetics

- Ms. L. Kuusipalo, who submitted earlier a draft report on some preliminary results, has to finalize the genetic studies on the two lots of specimens sent in 1993; a detailed report with final results is awaited not later than late September 1994 to enable timely distribution to the members of LTR's International Scientific Committee.

4.7. R/V Tanganyika Explorer and cruise plan

- Mr. P. Kotilainen has to continue checking and reporting (every two weeks) to Mr. J. Turner (FAO, Rome) on the progress of the construction of the above research vessel;
- A consultant will be hired to conceive and supervise the interrelated installation (hopefully finished by the end of September 1994) of all the electronic equipment of the vessel;
- Yearly insurance costs for the R/V amount to 25000 US $ and monthly operating costs are estimated at around 12000 US$; a

copy of the charter conditions will be sent to Dr. P.-D. Plisnier in Mpulungu;

- One lake wide multipurpose research cruise is scheduled for 1994 and 3 to 4 in 1995; in order to allow proper cruise planning, all subcomponent Coordinators have to submit soonest their views on the proposed multipurpose cruises (wet and dry lab equipment needs, number of scientific staff needed, proposed transects, duration, sampling stops, etc.); preliminary transect developments will be carried out in LTR Bujumbura;
- Mr. R. Varayannis will follow a training course in up to date navigation techniques and mid-water trawling in Greece in May 1994 and will have to do a test before being hired as the captain of the R/V;
- Two mid-water trawl suppliers, one in Finland and one in Denmark, are to be considered; it is recommended to hire the services of the trawling expert working on Lake Malawi to have his advice of which one of the two proposed trawls to order for Lake Tanganyika; Mr. P. Mannini should check on this during his upcoming mission to Lake Malawi;

4.8 Meteo data

- Because the availability of meteo data was considered to be very important for the interpretation of several subcomponentsís data, it was decided to send copies of the meteo data from LTR's automatic meteo station in Bujumbura to the other stations; similarly, all meteo data available in Kigoma and Mpulungu stations have to be copied to the other stations; also, copies of the monthly Drought Monitoring Bulletin, obtained from the Regional Office for Africa of the World Meteorological Organization in Bujumbura, will be sent to the other stations;
- The following persons were made responsible for the follow up of the above decisions: Ms. P. Paffen (Bujumbura), Mr. P. Mannini (Kigoma) and Mr. P. Verburg (Mpulungu);
- The need for a meteo station in Zambia was stressed; Zambia will install such a station but it is not known when.

4.9 Satellite limnology

- It was decided that the flight schedule for 1994-5 of the NOAA- 11 Satellite over Lake Tanganyika has to be provided as soon as possible by LTR's Subject Matter Officer, Dr. J. Kapetsky;
- The latter should also provide the list of NOAA-11 overflights corresponding to the dates of the Mpulungu station calibration measurements during the period 8.93 - 3.94; therefore, Dr. J. Kapetsky has to be provided soonest with all necessary information;
- Temperature calibrations can be obtained from the two thermistor strings; because the strings measure the temperature at 10 minutes intervals at a depth of 1 m, tests should be run by the stations to find out the temperature differences at 0 and 1 m;
- Secchi disk measurements and the collection of water samples for turbidity and chlorophyll *a* measurements are to be taken

at each buoy during the hydrodynamic current measurements (5 measurements; exact position and timing of each measurement of water sample taken has to be noted).

4.10 Miscellaneous

- All personnel was urgent to respect better the times of radio contacts between stations;
- Because of the fact that in recent past several LTR envelopes, sent to the other stations by the Lake ferries Liemba and Mwongozo, and containing project mail, got lost, it was recommended that, in order to be able to keep track of which mail was lost, each station should keep an inventory book of each envelope or box which is shipped to the other stations; it was also recommended to preferably use the services of the Mwongozo;
- For the preparation of the six monthly project progress reports, the field Coordinator of each subcomponent should send twice a year a brief summary (2 paragraphs) of his subcomponent progress/achievements, preferably in the form of data that can be quantified; these summaries are expected to arrive at LTR's Headquarters in Bujumbura by mid-June and mid-November;
- In order to allow station and field Coordinators of each subcomponent to Finnish their reports on one year of SSP data collection, it has been decided to hold LTR's Third Joint Meeting of the Coordination and International Scientific Committees in Kigoma, Tanzania from the 29th of November to the 1st of December, 1994; therefore, each subcomponent's station Coordinator should finalize his station report by the end of August 94 for circulation to the other stations; each subcomponentís field Coordinator should prepare his draft overall subcomponent's report on one year of SSP data by the end of September 94 for circulation around the Lake stations; the final report for each subcomponent should be finalized by the end of October 94 to allow timely transmission to the members of LTR's International Scientific Committee;
- Bujumbura station has to check on the availability in Bujumbura of a Liquid Scintillation Counter for measuring C of the planned primary production studies (carbon/energy subcomponent);
- The preliminary equipment list with needed budget estimates (see Annex 3) has to be finalized soonest (based on still awaited equipment specifications to be provided by Profs. Sarvala and Salonen and Hach chemicals stationís stock inventories) before issuing new Field Purchase Orders; a new LTR 1994 Budget revision is required allowing for extra funds on the non-expendable equipment line;
- It was observed that the backstopping by Kuopio University, by the Finnish consultants and by Kuopio University, by the Finnish consultants and by the technical units in FAO Headquarters should improve considerably;
- Mr. V. Langenberg (Bujumbura station) will check on the possibility of phytoplankton counts;
- Concerning LTR's international staffing, it was observed that Kigoma station urgently needs one more APO to be able to cope with the always increasing SSP workload and that a third

year's extension for the two Finnish APO's (one in Bujumbura and one in Kigoma) has to be secured as soon as possible;

- Concerning the project's budget, it was observed that LTR's budget for 1996 should also be secured soonest;
- Due to communication problems with Finland and Italy, it was decided to look into the possibility of obtaining E-mail for the project;
- It was decided to prepare a discussion document for the Third Joint Meeting of LTR's Coordination and International Scientific Committees (November 1994) on fisheries management for the Lake Tanganyika and on the possible role of the proposed Lake Tanganyika Fisheries Commission as the implementing body of fisheries management measures.

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ANNEX 1: LIST OF SSP ASSESSMENT MEETING PARTICIPANTS

Bujumbura, Burundi

Dr. G. Hanek, LTR, Bujumbura
Mr. E. Coenen, LTR, Bujumbura
Mr. P. Kotilainen, LTR, Bujumbura
Mr. V. Langenberg, LTR, Bujumbura
Mr. P. Paffen, LTR, Bujumbura
Mr. E. Nikomeze, Fisheries Department, Bujumbura
Mr. L. Kabandana, Fisheries Department, Bujumbura

Kigoma, Tanzania

Mr. P. Mannini, LTR, Kigoma
Mrs. H. Kurki, LTR, Kigoma
Mr. K. I. Katonda, TAFIRI, Kigoma
Mr. D. Chitamweba, TAFIRI, Kigoma
Mr. N.M. Kalangali, TAFIRI, Kigoma
Mr. M. B. S. Kissaka, TAFIRI, Kigoma
Mr. A.D.B. Kihakwe, TAFIRI, Kigoma

Mpulungu, Zambia

Dr. P.-D. Plisnier, LTR, Mpulungu
Ms. E. Bosma, LTR, Mpulungu
Mr. P. Verburg, LTR, Mplungu
Mr. L.M. Mwape, Fisheries Departement, Mpulungu
Mr. G. Milindi, Fisheries Department, Mpulungu

Uvira, Zaïre

Mr. D. Bwebwa, CRSN, Uvira
Mr. K. Tshibangu, CRSN, Uvira

Observers

Prof. J. Sarvala, Tuku University, Finland
Dr. K. Salonen, Lammi Biological Station, Helsinki University, Finland

ANNEX 2: ITINERARY AND AGENDA

08.04.94

Arrival to Kigoma by boat of Uvira participants

10.04.94

Arrival to Kigoma by chartered plane of LTR Bujumbura International and National participants and of consultants Sarvala/Salonen.

Arrival to Kigoma by M/V Liemba of LTR Mpulungu International and National participants.

11.04.94

MORNING:
- administrative matters;
- opening and introductory briefing;
- working group Limnology;
- working group Hydrodynamics.

AFTERNOON:
- working group Fish Biology;
- working group Zooplankton.

12.04.94

MORNING:
- finalization working group sessions;
- general meeting: presentation of working group conclusions and proposals.

AFTERNOON:
- final meeting of LTR International staff to finalize/ adopt working group proposals and discuss any other matters.

13.04.94

MORNING:
- theoretical training course by Consultants Sarvala/ Salonen on carbon/energy subcomponent sampling program;
- practical demonstration of sampling procedures (*).

AFTERNOON:
- departure of Mpulungu participants by M/V/ Liemba.

(*) from the 10th to the 14th of April 1994: testing of carbon/energy subcomponent's field sampling procedures by Consultants Sarvala/Salonen.

14.04.94

- admininstrative matters;
- courtesy call to the Regional Commissioner, Kigoma;
- visit to the regional and district fisheries statistics office to check on the progress of implementation of the TANFISH statistical procedures;
- discussions on fish biology procedures by Bujumbura team with Kigoma based field Coordinator;
- meeting with LTR/TAFIRI Kigoma team on preparation of fishing gear catalogue for Lake Tanganyika and on LTR's Third Joint Meeting of Coordination and International Scientific Committees, Kigoma (November 1994).

15.04.94

MORNING:

- Departure of Bujumbura/ Uvira participants by chartered plane to Bujumbura.

ANNEX 3: EQUIPMENT LIST AND NEEDED BUDGET ESTIMATES

ANALYSIS

- Spectrophotometer Spectronic 301 Milton Roy (33-54-47) with cuvette carrier (33-51-12)*: **148,000 BF**
- Cuvette Lovibond W110 SG 50 mm: **2,105 BF**

Total 1 unit: **150,105 BF**

Or (:36) **4,170 US$**

FOR 3 STATIONS : 12,509 US$

* Specifications of spectrophotometer still subject to possible changes to also include UV-range

VEL (Accessories for Chl a measurements)

Description	Qty	UP	TP
- Whatman GF/F 47 mm (100) filter with 0.7 um pores (7036025)	5	2,022	10,110
- Whatman GF/F 25 mm (100) filter with 0.7 um pores (7036010)	5	1,200	6,000
- Gelman nylon filter 47 mm (100) with 0.45 um pores (3066608)	5	1,872	9,360
- Whatman filter carrier for GF/F 25 mm plus stopper (7039040)	3	3,289	9,867
- Spare perforated carrying disk 25 mm (7039060)	3	629	1,887
- Vacuum pump (3013156)	3	27,288	81,864
- Kartell anti-return valve for 8-10 mm tubes (7280418)	3	240	720
- Kartell connecting pieces (10) for 8-10 mm tube (7280436)	3	240	720
- Ethanol (2.5 l) (4119613)	8	1,677	13,416
- HCl 1 N (ampoules)	4	485	1,940
- Parafilm (5958800)	3	1,479	4,437
- Double spatule (7823330)	3	200	600
TOTAL:			**140,921 BF**
Or (per 36):			**3,915 US$**

!!! Please note that only a limited number of filters was estimated for, because it is needed for each station to test if there is a difference in measuring Chl a when using the 0.7 or 0.45 um filters (Cyanobacteries might pass through the 0.7 um pores when filtering). Therefore, depending on the test results, extra filters will have to be bought for about one year Chl a tests (an extra 50 x 100 filters) or an estimated 2,000 x 50 = 100,000 BF, or

2,780 US$

MILLIPORE (accessories for Chl a measurements)

Description	Qty	UP	TP
- Filter carrier Millipore Pyrex 47 mm (1004730)	3	8,538	25,614
- Vacuum recipient 1 liter (1004705)	3	2,366	7,098
- Vacuum tube (2504755)	6	395	2,370
	TOTAL:		**35,982 BF**
	Or:		**975 US$**

NAVARC (For Chl a measurements with research vessel)

- Ship weather station: **171,000 FIM** or (per 5.5):31,090 US$
- Digital fluorometer 10-AU-005 Turner design:
69,400 FIM or (per 5.5):12,618 US$

TOTAL: 240,400 FIM
Or 43,709 US$

TOTAL BUDGET NEEDED FOR ABOVE EQUIPMENT:

63,888 US$ + 20% Insurance/freight (12,778 US$)

76,665 US$

Plus FPOs (on FINNIDA and AGFUND budget) already done in 1994:

- Peter Justesen (First Aid Kits, etc.):	539 $
- Vel (Laboratory equipment):	2,885 $
- Novatronics (Sonar ESR- 150):	15,340 $
- Hach (Chemicals/lab equipment):	5,900 $
- Simrad (Transducer ES120-7F):	9,200 $
- Thyboron (Trawl sonde):	23,000 $
- Lake weather station/buoys (PR 93):	31,000 $
- Land Cruiser Zaïre:	20,500 $
Sub-total :	**108,364 $**

Available budget 94 : 210,000 $

FPO/PRs done :	-108,400 $
Known FPOs to do :	- 76,700 $
Available budget:	**24,900 $**

Still to order with above budget: Trawl (30,000 $), 2 Zodiacs and outboards (5,500 $), R/V lab equipment, equipment carbon/energy subcomponent, Hach chemicals, replacement car for Kigoma, one Bongo fish larvae sampling net, etc.