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REPORT ON THE MEETING OF PROJECT MANAGERS FOR THE COORDINATION OF STOCK ASSESSMENT WORK ON EAST AFRICAN LAKES

by

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FOOD AND AGRICULTURE ORGANIZATION
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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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[Bujumbura, Burundi - 30 November, 1992]

OPENING OF THE MEETING

1. The Meeting of Project Managers for the Coordination of Stock Assessment Work on East African Lakes was held on 30 November 1992 in Bujumbura, Burundi.

2. The Meeting was attended by project managers or representatives from seven projects operating at regional or sub-regional levels, and being directly involved in stock assessment work and related investigations. The list of participants is given in Appendix 3 of this report.

3. The Meeting was opened by Dr. D. Gréboval, coordinator of the UNDP/FAO Regional Project for Inland Fisheries Planning, Development and Management in Eastern-CentralSouthern Africa [IFIP].

4. Dr. Gréboval emphasized the importance of regional collaboration for the management of East African Lakes and of their shared fisheries resources in particular. It was pointed out that their extremely important contribution to food security, to employment and income generation in rural areas, and to bio-diversity is now at risk following years of unchecked expansion of fishing effort and the overexploitation of most inshore stocks. For many Lakes, this phenomenon is leading to increased attention being paid by the industry and the fisheries authorities to the exploitation of offshore pelagic resources and other stocks of lower commercial value.

5. It is in this context that many of the countries concerned have recently put emphasis on joint fisheries research and on regional stock assessment projects in particular. It was stressed that large scale stock assessment work was last undertaken in the region in the late 196OFs-early 1970's, and that this provided key information for development planning over the last two decades. Very much required, an up-dated assessment would not only allow for the planning of further development of some under-exploited stocks, but also provide the basis for a more effective management of fisheries resources.

6. Against this background, it was highlighted that no effort has been made so far to coordinate this major effort nor to ensure at least some level of collaboration between related sub-regional projects. This motivated the joint initiative of the IFIP project and the FINNIDA/FAO Lake Tanganyika

Research (LTR) project to convene this meeting with the aim of assessing ways and means to strengthen such collaboration for greater efficiency.

7. Dr. G. Hanek, manager of the LTR project, welcomed the participants to the Headquarters of this project, a newly built facility where the Meeting was hosted. He further stressed the importance of close collaboration among projects which conduct research on the same lake, as in the case of lake Tanganyika, but also among projects which are working essentially on the same species or on similar topics, using related techniques and scientific methods.

8. Dr. Hanek introduced the agenda of the Meeting as presented in Appendix 1, and invited the participants to present their projects. A summary of the presentations is given in Appendix 2. Questions and answers followed each presentation.

OBSERVATIONS ON PROJECT PRESENTATIONS

9. Dr. C. Machena presented the Norad/Danida/SADCC Lake Kariba Fisheries Project. The project originated from the need to co-manage the pelagic fishery which is based on the exploitation of *Limnothrissa miodon* (introduced from L. Tanganyika] and has become the main fishery of the Lake. It also addresses issues related to the development and management of inshore artisanal fisheries. In this connection, emphasis is now being given to increased community participation and territorial rights as management tools. This is an area which is of interest to other projects. High reliance on the Logical Framework Approach to project management was also discussed and judged relevant to other projects. The Meeting was informed that a joint fisheries management mechanism may soon be set up between the two countries concerned. The work done for Lake Victoria recently with the assistance of FAO could be used as a basis for the elaboration of such cooperation mechanism.

10. Mr. P. van Zwieten and Ms B. Aarnink presented the Mweru-Luapula Fisheries Research Prject. This project is operated with limited funding from the Netherlands Development Organisation and other contributions (IFAD). Stock assessment work is a major component of the project and is also being conducted under a similar framework on L. Bangwelu. Focus is being put on the relatively new pelagic (chisense) fishery for which very little is known. The project also has an important extension component which interestingly is focusing on conservation and fisheries management. This was considered by the Meeting to be quite innovative and complementary to scientific research. The project expressed interest in active cooperation with other projects pointing out that smaller scale projects had limited means to access information and

qualified expertise. Backstopping is now provided by the University of Wageningen for limnological research.

11. Dr. T. Thompson presented the UK/SADCC Lake Malawi-Nyasa Fisheries Project just prior to the Meeting, in the context of the Symposium on Biology, Stock Assessment and Exploitation of Small Pelagic Fish Species in the African Great Lakes Region. The project expressed interest in broader regional collaboration in areas such as ageing, acoustic surveys and teledetection. The Meeting noted that the research vessel used by the project, a catamaran, was purposely built for eventual transfer to other lakes. The project is to end in about 14 months, but ODA may consider financing a second phase.

12. Mr. F. Roest provided up dated information on the pipeline EC project for fisheries research on Lake Victoria. It was pointed out that a preliminary project has led to the rehabilitation of research facilities in all three countries concerned, including research vessels and the provision of equipment. This phase is basically completed. Funds were made available during this preliminary phase to reactivate the African Journal of Hydrobiology, but these were not sufficient. The Meeting expressed interest in this Journal which could serve the crucial role of disseminating scientific information throughout the region. The Meeting was also informed that the new project is being considered for financing under Lomé IV. A draft research proposal has been submitted by participating countries which need to be assessed based on a prioritization of various research components. An evaluation-formulation mission is to be fielded in January-February 1993. It is likely that stock assessment would be a key component of this project, with focus on open waters and limnological research related to the deoxygenation issue. IFIP reported on the result on a recent meeting organized by this project in Dar es Salaam and which agreed at technical level on a draft convention for a Lake Victoria Fisheries Commission. The Meeting expressed interest in this development as many countries are now contemplating stronger cooperation mechanisms for sub-regional fisheries management.

13. Dr. L. Risch presented a new Belgium/CEPGL project: Regional Center for Applied Research in Hydrobiology (CRRHA). Unlike other projects, CRRHA is focusing on the inshore stocks and ecology, as well as on several lakes (Northern Tanganyika, Kivu, Bugasera complex). Concerns were expressed by the Meeting concerning the research facilities which were part of the fisheries centre built by the FAO Lake Kivu project in Gisenyi, as this centre may soon be privatized. Various questions arose regarding research coordination on L. Tanganyika, especially viz research on water quality and pollution. It was stressed that regular contacts are taking place to ensure complementarity and cooperation, and that overlap would be

avoided. Sub-contracting of specific work among project is being considered. The Meeting was informed that Japan sponsored research conducted from Uvira, Zaïre is focused on fish behavior and preliminary results show an influence of pelagic abundance on inshore stocks. The present phase of the project has a duration of four years, with a budget of about 53 million BFr.

14. Dr. D. Gréboval presented the IFIP Project and its achievements over the last 3 1/2 years in support of regional and sub-regional collaboration, planning for fisheries development and management, and training. It was stressed that the project originally focused on lake-wide technical collaboration and basic socio-economic research for improved planning capabilities. Lately, the project has given added emphasis to broader regional cooperation, networking, and institution building. The Meeting was informed that funding of the next phase of the project after April 1993 was not yet guaranteed, but that the possibility of co-financing by several donors was being explored. The Advisory Committee of the project is scheduled to meet during the first week of March next year, and donors will be invited to attend. The Meeting expressed concern about the future of this project in view of its past achievements and of its key role in enhancing regional collaboration at this particular time when so much related work is being undertaken in the region without any coordination.

15. Dr. G. Hanek provided information on the LTR Project; its main objective is the assessment of the pelagic stocks of Lake Tanganyika. The project has been operating for 10 month, and work has so far been focused on infrastructure and vessel rehabilitation, equipment of the main research facility and sub-stations, data collection and analysis. The project is now fully operational, but the acquisition of the main research vessel has unfortunately been delayed. With regards to basic historical data, the Meeting noted that the present effort undertaken by LTR to gather and compile this information should be done quite systematically for other lakes as well. The project is coordinated by a project coordination committee and an international scientific committee which met in May this year and adopted a research programme.

16. The Meeting was also informed about the UNDP-World BankUnesco Global Environment Facility [GEF] programme. Projects are now being finalized in this context in relation to the protection of biodiversity in L. Malawi [World Bank) and L. Tanganyika [UNDP]. Details were provided on the latter: a 5 years, US$ 10 million project for Pollution Control and Other Means of Protecting the Biodiversity of Lake Tanganyika, to be implemented by FAO early 1993. It was stressed that close cooperation and coordination with existing projects is required, especially

with respect to research on water quality, fisheries, water circulation, and remote sensing. Little information was available on the L. Malawi project, although its focus was believed to be similar to the L. Tanganyika project. The Meeting was also informed that a GEF project [World Bank] was also considered for L. Victoria which may focus on ecological research (in relation to land use and pollution) and the control of the water hyacinth *Eichornia crassipes.*

CONCLUSIONS AND RECOMMENDATIONS

17. The Meeting stressed the need for strengthened collaboration on all matters related to fisheries research and management for the Great African lakes, especially in view of the complementarity of research being presently undertaken through various sub-regional projects, and in recognition of the commonality of species found in the lakes. In this respect, the Meeting expressed its satisfaction at the initiative taken by IFIP and LTR to organize the first regional symposium on small pelagics, which provide an opportunity to share research result and assess techniques and methods.

18. Information sharing among projects and associated research organizations was identified by the Meeting as essential. The Meeting examined ways and means to promote the systematic sharing of information. It was noted that some projects do publish newsletters and that other newsletters may be used to transmit information [e.g. EC Fisheries Bulletin). The SIL African Great Lake Group is also considering publishing a newsletter. The Meeting recommended that regional project do publish whenever possible a newsletter or an information bulletin for the purpose of disseminating information. It also recommended that regional fisheries project systematically transmit technical documents and progress reports to related projects in the region.

19. The Meeting further considered networking as an ideal mean to gathering and disseminating information but stressed that this would require some cooperation and coordination mechanism. The Meeting expressed the opinion that the IFIP project was ideally suited to play this role and recommended continued financing by UNDP and other donors for this purpose in particular, and for complementary planning activities in general.

20. The idea of elaborating directories of fisheries institutions and companies as well as of related personnel was discussed. The Meeting was informed that the FAO Regional Bureau for Africa had prepared such directory for West Africa in the past and was in the process of compiling an up-dated one for the whole of Africa. Similarly, PTA has recently compiled information on fish trading

companies. LTR is also preparing such directory for L. Tanganyika. The Meeting supported such initiative and expressed the opinion that similar work could be done for each major lake.

21. Regarding project preparation, the Meeting expressed concern about the fact that insufficient knowledge of work being undertaken on African Great Lakes has led to overlapping programmes and lack of ex ante harmonization of projects. The Meeting noted that this was contrary to the recommendations of SIFR, and that a mechanism was required for appropriate coordination of projects at conceptual level as well as during implementation.

22. Concerning the GEF programme, the Meeting expressed concern about the interaction of biodiversity projects and related stock assessment-ecology projects, while recognizing the importance of these project and the specificity of their objective. Close cooperation and coordination was judged essential both on a lake basis and on a regional basis. Here again the Meeting felt that IFIP could play a role in this process.

23. The Meeting expressed interest in developing some kind of cooperation among projects in the exchange of expertise, and the sharing of highly specialized consultancy services (e.g. acoustics) . The main constraints to such exchanges were identified as being the lack of information and binding procedures applicable to various projects. Another area of possible cooperation is the exchange of local expertise from project to project. The Meeting recommended that project prepare a rooster of qualified professional who could be made available for short consultancies in other related projects.

24 .The cost of organizing specialized workshops was identified at a major constraint to appropriate complementary training of local researcher involved in sub-regional project. The Meeting expressed the view that significant economies of scale could be realized by closer cooperation among projects in this area. The example was given of a very successful training workshop on stock assessment coorganized by IFIP in Kariba in collaboration with various other projects. Similarly, a number of project contributed to the success of the Symposium on small pelagics coorganized by IFIP and LTR. It was pointed out that in the absence of a coordinating mechanism, the organization of such workshops or training courses was difficult.

25. The Meeting identified the following as being priority areas for short term complementary training: on experimental fishing and sampling techniques and on fish ageing techniques. It was recommended that effort be deployed to organize these meetings in a regional framework.

26. Cooperation in the area of satellite imaging and remote sensing was identified by the Meeting as another area where considerable economies of scale could be made through effective regional collaboration. It was agreed that various projects share information on this issue through Mr J. Kapetsky.

27. The Meeting expressed concern about the various delays which have affected the revival of the African Journal of Hydrobiology, noting that no alternative existed so far for the systematic publication of findings from fisheries research in the region. The meeting urged donors to give priority attention to this issue.

28. The Meeting concluded its deliberation by urging donors to pay more attention to the need for regional cooperation, and for collaboration among projects. In addition to a regional framework, the Meeting recommended that projects include special provisions to facilitate such cooperation.

29. The Meeting was closed by the organizers and was followed by a visit of research facilities available in the Fisheries Department of Burundi and in Burundi-based regional projects.

APPENDIX I

MEETING OF PROJECT MANAGERS
FOR THE COORDINATION OF STOCK ASSESSMENT WORK ON
EAST AFRICAN LAKES

(BUJUMBURA, 30 NOVEMBER 1992)

AGENDA AND TIMETABLE

Monday 30.11.1992

09.00 - 09.15	Opening Ceremony
09.15 - 10.30	Projects presentation
10.30 - 11.00	Break
11.00 - 12.00	Projects presentation
12.00 - 14.00	Lunch
14.00 - 16.00	General discussion
16.00 - 16.30	Conclusions and recommendations
17.00 - 18.30	Cocktails

Chairmen/Discussion leaders: G. Hanek and D. Gréboval

APPENDIX II

The Zambia/Zimbabwe SADCC Fisheries Project (Lake Kariba)

1. INTRODUCTION

The Lake Kariba Fisheries Research Institute was set up in 1963 with funding from UNDP and technical assistance from FAO as a joint project between Zambia and Zimbabwe. The overall mandate of the Institute was to foster fisheries development (in broad terms). The project provided a platform for collaborative research between the 2 countries.

Following political problems, UNDP, FAO and Zambia withdrew from the Institute in 1966, and for a long time research was conducted separately between the two countries. This has not been a healthy state of affairs.

The Zambia/Zimbabwe Fisheries Project which commenced in 1988 is again providing a platform for collaborative research between the 2 countries. This project is funded by NORAD and DANIDA.

2. OBJECTIVES

2.1 To manage the Kapenta fishery effectively to ensure optimum production on a sustained basis.

2.2 To increase the productivity of the inshore fishery.

3. OUTPUTS

There are 8 outputs which cover the following areas:

3.1 Training: training of staff at all levels to increase their productivity. Progress here is good. Five researchers and one technician at LKFRI have been trained to MSc levels. Four have been trained in the Department of Fisheries (Zambia).

3.2 Infrastructure development: this area primarily covers the rehabilitation of the Sinazongwe Fisheries Training Centre in Zambia. Work is being commissioned. An office block and a laboratory have been set up at LKFRI.

3.3 Lake shore development and planning: This is an important output in the re-organisation of the inshore fisheries in both countries.

Activities in this output are designed to lead to the development of a master plan for both shores. Appropriate authority will be given to fishing communities and this will hopefully benefit the communities through resource rights and economic security.

3.4 Data base management: This has been set up for both Zambia and Zimbabwe.

3.5 Socio-economic studies: This output which is executed by the Centre for Applied Social Sciences in Zimbabwe is designed to derive information on fishing communities which is important in Lake shore planning.

3.6 Biological studies: The activities of this output are designed to assess stock parameters of both inshore and pelagic fisheries.

3.7 Joint management of the fisheries resource: The activities here are designed to review present management strategies and recommend necessary changes. There should be a joint management programme of the pelagic resource between the 2 countries,

3.8 Project Management: This output outlines the role of Project managers in the execution of the project.

4. GENERAL REMARKS

The project is working well. There is good collaboration between the 2 countries. We are now getting results from the biological research programmes. We are actually now using these results in reviewing management strategies. Here its important to note that training programmes have in fact increased competence in the biologists.

For Zimbabwe, a lake shore planning study is scheduled for February 1993. This is the first crucial stage in assessing the best way to give appropriate authority to fishing communities. This aspect is exciting and challenging, and will perhaps be the most important output of this project.

Because there are 2 countries involved there is a Co-ordinator in the Project who is expected to enhance liaison. Administratively, each country has a Project Co-Manager. These managers are responsible for the day to day execution of the Project.

Mweru-Luapula Fisheries Research Program

CONTENTS

Prepared by C.K. Kapasa, P.A.M. van Zwieten and B.H.M. Aarnink for the Fisheries Research Program Consultation to be held on 30.11.92 in Bujumbura.

1. **GENERAL CONTEXT MWERU - LUAPULA FISHERIES**

Lake Mweru is a relatively small lake (about 4,580 km^2) bordering on Zambia and Zaïre. About 60% of the lake and the swamps belong to Zambia and harbors a fairly large fishery of about 9,500 fishers[1]. The total population around the lake and swamps is about 200,000 people, 70% of whom are in some way dependent on the fishery, be it for subsistence or commercial fishing and trading[2] . There are two commercially important fisheries on the lake:

a. gill-net fishery on a variety of fish but mainly Tilapiine ("bream") species and
b. a pelagic fishery on a sardine like group of species ("chisense").

The total (recorded) fish yield of the gill net fishery has remained relatively stable over the past decade between 7,500 and 1 0,000 tonnes per year. Not recorded trading with Zaïre is estimated as another 2,000 to 5,000 tonnes per year. The chisense fishery takes up 4,500 - 7,000 tonnes. The totals of these figures hover around the maximum sustainable yield (MSY) of the Lake which has been estimated to be around 15,000 tonnes per year. If this already indicates that the lake is probably structurally overfished, it becomes even more apparent when considering the fishing effort (CPUE =Catch Per Unit Effort), which has decreased from 10 kg/net/night to 2-4 kg/net/night in the past fifteen years. Presently many complaints from fishers and traders about low catches are heard, and there is a strong urge from the different parts of the fishing community towards the Department of Fisheries to do something about the situation. Recently a seminar on Mweru-Luapula Fishery management was held and attended by five traditional rulers and 43 fishers' representatives from the major fishing villages. The seminar resulted in firm resolutions on the management of the fisheries which were sent to the Ministry of Agriculture, Food and Fisheries.

2. PRESENT STATUS AND PROBLEMS OF MWERU - LUAPULA FISHERIES

The present status of Mweru-Luapula Fishery can be called alarming due to the following problems: decline in catches, increasing use of destructive and illegal fishing methods and gear and rampant thefts of nets. Conservation management and enforcement of the Department of Fisheries is hampered by lack of clarity on present and future regulations and lack of funds and inadequate staffing.

Present ecological and socioeconomic problems of the Mweru-Luapula Fishery,

[1]A fisher is defined as boat and/or gear owner.

[2]Fisheries and agriculture within the area around the lake are in many ways closely intertwined: many fishers farm during the rainy season, farmers depend on fish as their basic source of protein obtained through barter or purchase, fibh-traders, at the same time farmers, barter cassava for fish, groundnuts are smuggled to Zaïre as barter for nets etc.

expressed by the fishers through their complaints, actions and suggestions[3] should persuade the Department of Fisheries to redirect its focus towards a sound fish conservation and management strategy. In order to restore and keep Mweru Luapula Fishery up to its standards a Conservation and Management Action Plan (CAMAP) is proposed, in which both fisheries biological and socioeconomic concerns are incorporated. Such a CAMAP can only be successful when the resource is jointly managed between Zaïre and Zambia.

3. OBJECTIVES AND ACTIVITIES OF THE DEPARTMENT OF FISHERIES

The objective of the Department of Fisheries (DOF) is to promote sustained fish production - and consequently food availability and employment - around lake Mweru based on sound exploitation, management and conservation of fish stocks. The role of the research division of the Department in attaining this objective is continuous monitoring of the lake and its fishery, through:

a. research on fish stock dynamics and fish biology of the commercially important fish species both through experimental fishing (gill net surveys, chisense surveys) and monitoring of the fishery (catch assessment and frame surveys)
b. collection of background data for more specific studies of the fishery i.e. physical, chemical and limnological characteristics of the lake.

Such data are a prerequisite for fisheries management from an ecological point of view. Most of the commercial species are overexploited, although to what extent is not clear. Other causes like the low rainfall during the past years may play a role in the decline of the fish stocks as reproductive success of commercially important species are dependent on the inundation of large areas in the swamp regions of the lake.

4. SNV/NDO PROJECT BACKGROUND

4.1 Stock Assessment Program

In 1990 SNV/NDO was requested for financial and technical assistance in the regular research activities (stock assessment, fisheries related biological and limnological research) conducted by the Department of Fisheries in Nchelenge. Project proposals to that effect were accepted by IFAD. Funding on research materials (nets, laboratory materials) thus were secured. Following the granting of the technical (through SNV/NDO) and financial (through IFAD) assistance for the duration of three years for the research

[3]In: "Our children will suf f er", prebent status and problems of Mweru Luapula Fisheries by Aarnink, Kapasa and Van Zwieten, Department of Fisheries Nchelenge, October 1992.

[4]C.K. Kapasa and P.A.M van Zwieten, Project Brief and Work Plan for Lake Mweru Fisheries Research Activities 1991 - 1994, Nchelenge, January 1992, DOF, PO Box 740005, Nchelenge, Luapula Province, Zambia

activities, a workplan was written[4] . Because the IFAD project budget contains no funding for running costs (fuel, allowances) of the Stock Assessment Program funds were applied for through SNV/NDO. Furthermore a limnologist funded through the University of Wageningen in the Netherlands will do limnological work in 1993.

Due to delays in the procurement of research materials the Stock Assessment program could not start at the proposed time. Instead a Frame Survey was prepared during the second quarter of 1992 and conducted during the period of June - August 1992.

The present Stock Assessment Program aims at describing the present status of the stocks taking the fisheries activities and ecological constraints into account.

4.2 Extension and Training Program

The Stock Assessment Program needs to be seen in conjunction with the work done in the Extension Research and Training Program. Following the granting for the technical and financial assistance (through SNV/NDO) workplans are in preparation[5] . The Training Program aims to provide for an out-reach training program concerning boatbuilding, net making and marine mechanics.

The overall objective of the Stock Assessment and Extension Program is to come to a Conservation and Management Action Plan (see section 6). Any solution to the present over-exploitation of the lake towards a sustainable fishery will call for a reduction in fishing effort. This points to finding ways for a diversification of production. In the current circumstances agricultural production and trade seem to be the most important alternatives to fishing.

Backstooping is provided for through the Fisheries Department of the International Agricultural Centre (IAC) in Wageningen, The Netherlands.

5. STOCK ASSESSMENT PROGRAM

5.1 Objectives

Complete Stock Assessment Surveys have taken place in the past about every ten years, i.e. in the early seventies and early eighties. Although such surveys should have been a continuous activity of the DOF in the intermediate years this has not been the case during the past decade. The current SNV Stock Assessment Program therefore must be seen as a closed activity following up on the earlier 10 year rounds of Stock Assessments.

[5]B.H.M. Aarnink and C.K. Kapasa, Plan of Operations Fisheries Extension Reserach Program 1992 - 1995 (in preparation).

A major objective for the coming years will be to secure additional regular funding to ensure continuation of research and surveying activities after the involvement of SNV and IFAD in direct research activities has stopped. Following the general objective of the Fisheries Research Division stated in the introduction the ensuing intermediate objectives for the three year period of the project are:

1. analysis of historical data and literature (a.o. frame surveys, catch assessment surveys and gill net surveys)

2. set up and conduct frame surveys and catch assessment surveys in cooperation with the fisheries extension division

3. research on commercially important species and *chisense* fishery

4. rehabilitation of the fisheries office, laboratory and research vessel

5. institution building and training

5.2 Research

1) Pelagic Fishery: There is hardly any knowledge on the biology, ecology and size of the stocks of the chisense complex. A survey on Chisense stocks is needed to be able to answer the questions on whether and how this fishery needs to be regulated. Samples of "ch.isense" have been sent for taxonomic studies to the Royal Museum of Central Africa in Belgium. The sampling program - the basis of further studies - consists of experimental fishing out of Nchelenge station on a bimonthly base.

(2) Gill net surveys have to be conducted to obtain objective data on the size, the structure and movements of various commercially important fish stocks, predominantly the Tilapiine species. This survey is a continuation of the surveys done in the early seventies and eighties. The old data from the frame surveys and catch assessment surveys and data from the present survey will give a fairly complete picture on the level of (over)exploitation of the fish stocks of the Lake.

(3) A pilot study on spawning sites and timing of spawning of commercially important fish species will be done in later stages of the program to assess the possibilities of a research program on this subject. The importance of this study lies in an assessment of the present regulations pertaining to the fish breeding areas in the lake which are now closed for fishing and further establishment and regulation of additional breeding grounds.

(4) Limnological research: background data on the chemical composition of the lake and primary productivity are a prerequisite for an assessment of the potential fish production of the lake. An analysis of the water levels is needed to assess the effects of relatively low rainfall in the area on the reproductive success of commercially important species. Chemical analysis of water samples will be a minor activity of the Research Unit. Samples will be sent for analysis to the University of Zambia.

In conjunction with the Department of Nature Conservation of the Agricultural University of Wageningen (AUW) funds have been secured through the AUW to employ a limnologist for nine months. His task will be to do research on primary productivity and related topics, to set up a regular sampling program to be executed over the next decade within the limits and constraints of the Department and to train a fisheries assistant in the execution of this program.

5.3 Rehabilitation

The main input to the research program will be a complete furnishing of the research lab and other research materials (nets, lamps etc.) funded through IFAD ($US 70,000.00).
A proposal for funding for rehabilitation of a classroom and completion of a laboratory has been sent to the Microprojects Unit (MPU) of the National Commission for Development Planning (EEC/Worldbank funds). A provision is made in this proposal to upgrade workspace for the various research activities in the present building awaiting the completion of the laboratory. After completion the space will be used by the fisheries personell who at present have no working space.

5.4 Institution building and training

Because of the importance of the work done, the Department of Fisheries needs stronger Government support. The general infrastructure for a good fisheries research program in terms of buildings, manpower and research programs is adequate, but continuity is severely hampered by a general lack of funds. The low input - programs of SNV may act as a leverage to improve present governmental inputs. The present proposal will be used in the already started discussions on the personnel and financial obligations of the Department.

As a result of the IFIP/FAO activities a project proposal on Stock Assessment of Lake Mweru has been drawn up by the FAO, for which funding is sought[6]. The proposal is highly technical in scope but will address some of the infrastructural problems the Department now faces. A discussion on the proposal and a start to investigate possibilities of future cooperation has been initiated.

[6]Obscure Waters: The Fisheries of the Mweru/Luapula Complex, Zambia,, by J.E. Reynolds, P. Manini and D.F. Gréboval. Report of an IFIP Review Mission. UNDP/FAO Regional Project for Inland FisherieB Planning (IFIP) , 1991.

Fisheries assistants are trained in basic computer handling due to the enormous amount of data (old and new) that need to be managed. Training in data collection in fisheries, plankton and limnological research will be done on the spot. Further training for the fisheries biologist is a prerequisite for the future continuation of the Stock Assessment Program. Therefore more training funds are required.

6. CONSERVATION AND MANAGEMENT ACTION PLAN (CAMAP)

Present ecological and socioeconomic problems of the Mweru-Luapula Fisheries, expressed by the fishers through their complaints, actions and suggestions should persuade the Department of Fisheries to redirect its focus towards a sound fish conservation and rational fisheries management. In order to restore and keep Mweru Luapula Fishery up to its standards a Conservation and Management Action Plan (CAMAP) will be developed, in which both a fisheries biological and socioeconomic dimension will be incorporated. What is needed for such a CAMAP in terms of contents and conditions?

Contents of CAMAP

To make sure CAMAP will receive sufficient support from the fishers themselves it should be based on and reflect the variations among fishers in terms of their specific fishery and dependency on fish, environmental aspects, agro-ecological opportunities, organisatio-nal and cooperative potentials and fishers' aspirations and preferences in both the harvest and post-harvest sector. This consequently calls for a differentiated Action Plan.

More in-depth studies on the existing Fishermen Associations, the emerging *chisense and leleke*[7] fishery, motives of fishers resorting to illegal fishing, the magnitude of and reasons behind net-thefts, motives of fishers turning to farming, opportunities for alternative sources of income etc. are needed. These studies will provide us with important keys for the formulation of the CAMAP. The existing and seemingly well-organised Fishermen Associations will be the first organisational level to consult and to cooperate with. Their role in future conservation and co-management plans might be indispensable.

The authors believe that the execution of a CAMAP with the above described characteristics, in the long term will lead to a greater protection of the resource, an increase in catches and consequently more benefits for the fishing community and the future generation.

Commonly held notions are 'Fish is the backbone of the Luapula economy' and 'Fish is the main source of animal protein in people's diet'. However, present developments in the area

[7]Leleke fishers stay overnight with their nets on a permanently anchored large vessel *(chombo).* Presently these larger type (10+ meters) boats are being built at several places along the northern part of the lake and on the islands.

might cause the fisheries to unfold itself in becoming far from sufficient to meet future economic and nutritional demands. Demographic (growing population) and migratory developments (influx of retired people and Zaïrians) call for more employment opportunities, food and income. Yet, alarming malnutrition figures are collected in the area. For example in the Luapula valley it is found that more than 60% of the children under the age of 6 years show signs of long term malnutrition attributed to inadequate intake of energy

foods'. Therefore fishery management and fish conservation must be viewed in a larger framework of provincial or district development planning. A sound Conservation and Management Plan is a prerequisite for a sustainable development policy for Luapula Province as a whole and the Mweru-Luapula Fisheries in particular.

Conditions for CAMAP

However, it will take time and many more data to formulate such a plan. Not only are the presently available data insufficient but also other conditions for implementing and monitoring the CAMAP are not yet met. The Department is confronted with a severe lack of staffing, funding and equipment. Presently the department is technically and financially assisted by SNV/NDO and IFAD but this is not adequate at all. The Action Plan can be successful only if it gets full support from the government in terms of funding, staffing and promotion opportunities. There are reasons to believe that the lack of personnel will not be solved as no fisheries officers and far too little Fisheries Assistants are being trained at this moment. Furthermore an (attractive) promotion ladder for the employed fisheries personnel is lacking. Only when these conditions are met the policy of the government aiming towards a small but efficient and highly motivated work force can be successful.

But maybe what is needed most and first of all is governmental support in terms of clear-cut fisheries laws and regulations which are broadcasted in time to allow the Department to make plans and work accordingly and to allow the fishing community (fishers, fish processors and traders) to prepare themselves and look for (seasonal) alternative sources of income and food.Harmonization of fisheries regulations with Zaïrian government.

[8]From total sample of 5000 children under the age of 6 years from 110 different villages in three districts in the Luapula valley: Nchelenge, Kawambwa and Mwense (In: End of Assignment Report of the Vitamin A Deficiency Project by D. Mwandu, Luapula Valley, Zambia, 1992).

UK/SADCC Lake Malawi/Niassa pelagic fisheries project

Under the auspices of the Southern African Development Coordination Conference (SADCC) personnel from Malawi Mozambique, Tanzania, and UK are undertaking an intensive investigation into pelagic fish production in Lake Malawi/Niassa in order to assess the potential for the development of fisheries in the exploited off-shore area of the lake. Specific objectives are:

a) To asses the abundance, composition and potential yield of the pelagic fish resources in Lake Malawi/Niassa together with their spatial and temporal variability.

b) To evaluate the pelagic fish productivity in relation to the secondary production of the lake including that of the lake fly Chabourus relate this to the principal limnological features of the lake.

c) Based on the results of a) and b) to produce a feasibility plan for the development of a fishery based on pelagic stocks.

The project, financed by the Overseas Development Administration, UK at a cost of £3.23m provides for 27 month field work starting in September **1991**. The team comprises 12 senior scientists and technicians, 10 junior technicians plus support staff, all of whom are located at the project base in Senga Bay, Malawi which provides housing, laboratory and office facilities.

The project has a purpose built 15 catamaran research vessel with berths for 11 scientists and crew. The boat is equipped for stern trawling and the deployment of hydrographic instruments and has small wet and dry laboratories.A minimum of 6 lake cruises are made per year interspersed with more intensive sampling in target areas. Fish abundance is estimated by echo integration techniques and insitu target strength measurement . Sampling of the main target species Engraulicypris sardella and other pelagic fish is by means of midwater trawls and gill nets. Fish eggs and larvae and crustacean zooplankiton is sampled principally by means of a Gulf III high speed plakton net, supplemented by other nets. Phytoplanklon is collected with standard water sampling bottles together with water for nutrient analysis etc. An internally recorded probe package is deployed for the in-situ measurement of depth, temperature, chlorophyll, conductivity and light.

In addition it is hoped that synoptic surface temperatures over the whole lake will be obtained through a complementary project which will develop a PC based satellite data receiving station. This project is being run by the Natural Resources Institute of the ODA and will be based at Senga Bay.

REGIONAL FISHERIES RESEARCH ON LAKE VICTORIA

1 Rehabilitation of research stations on Lake Victoria

EC Project: provision of equipment, vehicies, rehabilitation of buildings, refurbishing of vessels(lbis,18m, Uganda, 2 vessels Kenya, building of new vessels tanzania). This project includes funds for the revival of the Africa Journal of Tropical Hydrobiology and Fisheries.

This project took long time to prepare, partly because of the need to rewrite its document several times according to changes in country participation. At present, this project is largely complete. Some elements however remain unfinished (Journal, some research vessels ...).

EC will now proceed to a detailed evaluation of this project before considering further assistance. A three-man mission will visit the three riparian countries in early 1993.

2 Renional Fisheries Research Project on Lake Victoria

A Project with approximately this title is incorporated in a recent list of projects to be financed from Lomé IV funds. It will be a separate project and should not be seen a following phase of the Rehabilitation Project. It will have its regional headquarters at Jinja, which is the traditional site for lakewide research.

This project will be based on a research proposal submitted jointly to EC by the three countries after a number of regional consultations of national biologists and research directors.

As the research proposal covers a wide range of subjects, a planning meeting to draw priorities is anticipated in East Africa in early 1993. In addition to Africa Scientists and research Directors, it will be attended by a limited number of expatriates Scientists .

An important element of the Project will be the regional survey of open waters of Lake Victoria Using R/V Ibis.

COOPERATION BELGO-C.E.P.G.L.I.R.A.Z. - K.U.L.

CENTRE REGIONAL DE RECHERCHES EN HYDROBIOLOGIE APPLIQUEE

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1. INTRODUCTION

Lors de la Première Réunion Régionale sur les Recherches en Hydrobiologie appliquée dans les lacs Tanganyika, Kivu, Mobutu et ceux de la dépression du Bugesera à Bukavu en 1987, les pays membres de la Communauté Economique des Pays des Grands Lacs (C.E.P.G.L.: Zaïre, Rwanda, Burundi) décidèrent de doter les pays de la C.E.P.G.L. d'un centre de contrôle de la production biologique et de 1'environnement chimique des lacs. La Belgique acceptait de financer une première phase de quatre ans de ce centre (62.856.518 FBe) et l'accord particulier fut signé à Bujumbura en décembre 1991. Le projet sera exécuté conjointement par l'Institut de Recherches Agronomiques et Zootechniques du C.E.P.G.L. (I.R.A.Z.) et par l'Université Catholique de Leuven (K.U.L).

Dans la première phase, le projet prévoit le recrutement de trois cadres beiges et trois cadres de l'IRAZ et les recherches hydrobiologiques seront coordonnées dans le nord du lac Tanganyika, dans le lac Kivu et dans ceux de la depression du Bugesera en collaboration avec les instituts scientifiques nationaux des pays membres de la C.E.P.G.L. Dans le cadre de ce programme régional, le projet propose d'installer un centre régional pour les recherches en ichtyologie et en hydrobiologie appliquée pour la zone lacustre. Ce Centre Régional de Recherches en Hydrobiologie Appliquée (CRRHA) fut inauguré le 21 août 1992 en présence de différents représentants du C.E.P.G.L., Burundi, Rwanda, Zaïre et de la Belgique.

2. LES OBJECTIFS DU CRRHA

Les objectifs principaux du CRRHA durant la première phase sont la promotion de la recherche halieutique et la formation de cadres de recherches.

- création d'un centre régional d'hydrobiologie appliquée
- études de la biologie des différentes espèces
- études des paramètres physico-chimiques des eaux
- études des pollutions agricoles, industrielles, urbaines
- études écologiques (chaines trophiques)
- formation des cadres et stagiaires universitaires
- création d'un centre d'information et informatique

3. LE PLAN DES RECHERCHES DU CRRHA

Comme prévu dans le document technique, le CRRHA a débuté ces activités à Bujumbura en collaboration avec le Département des Eaux, Pêches et Pisciculture, avec l'Université du Burundi et avec les autres projets de pêche. Des premiers contacts avec le CNRS-Uvira, l'Université de Butare et le centre de recherche de Gisenyi ont été pris.

La recherche comprend un volet biologique et un volet chimique:

3.l. La recherche biologigue.

3.1.1. Etudes autécologiques des différentes espèces.

Jusqu'à présent 276 espèces de poissons (CLOFFA, 1986-1991; Coulter, 1991) ont été identifiées dans le bassin du Lac Tanganyika, mais uniquement une vingtaine sont bien connues, spécialement les six espèces pélagiques. Des autres espèces on ne connaît que quelques données dispersées, souvent dans des revues d'aquariophilie. Pour les autres groupes d'organismes, tels que les macroinvertébrés ou le plancton, 1'état des connaissances est encore pire. Des Caridea (Crustaceae, qui jouent un rôle important dans le régime alimentaire de certains poissons) il y a moins de 10 publications connues, la plupart datant des années 1910-1930. Pour la plupart des autres lacs, la situation est semblable.

Pour mieux comprendre la biodiversité des lacs, qui en plus est caractérisée par une grande endémicité, il est nécessaire de pouvoir identifier les différents organismes et d'en connaître leur régime alimentaire, leur croissance, leur reproduction, leur niche et migrations.

3.1.2. Etudes synécologiques.

Avec les données autécologiques mentionnées ci-haut et en y ajoutant les données de la recherche chimique, il sera possible de décrire les interactions interspécifiques et environnementales et d'établir les chaînes trophiques afin de pouvoir comprendre les mécanismes qui supportent la vie dans les lacs et de prévoir 1'effet de différentes méthodes de pêche sur un ou plusieurs niveaux de la hiérarchie écologique.

3.2. La recherche chimique.

3.2.1. Etudes des paramètres physico-chimiques de 1'eau.

Des échantillons d'eau de différents endroits (aussi bien des lacs que des effluents) seront régulièrement analysés afin de connaître mieux les cycles des nutrients. Ces données seront

intégrées dans 1'étude autécologique et synécologique afin de pouvoir déterminer les milieux des différents organismes.

3.2.2.Etudes de la pollution des eaux.

Chaque système fermé comme les lacs Tanganyika, Kivu et plusieurs dans le bassin de la dépression du Bugesera est caractérisé par une accumulation de matières exogènes produites par l'activité humaine (déchets des villes, de l'agriculture, des industries). L'inventaire des sources de pollution (identification, qualité et quantité), leur effet sur la vie et les mécanismes de transport de ces polluants dans les chaînes trophiques font partie de cette recherche. Des recommendations sur le traitement des eaux et sur normes des concentrations maximales admissibles font aussi partie des résultats de cette étude.

3.2.3. Etudes bromatologiques.

La composition nutritionnelles (protéines, profil des acides aminés, lipides, minéraux) des principaux produits de pêche pourrait donner des indications supplémentaires sur la condition des différentes espèces et des variations saisonnières. Dans certains cas, l'accumulation de produits exogènes (pesticides, métaux lourds) pourra être analysée.

3.3. La formation.

3.3.l. Stages et cours.

Le Centre est ouvert à tout chercheur qui voudra se spécialiser dans un sujet hydrobiologique. Si le sujet entre dans le plan général du centre, et après approbation du comité scientifique, le centre donnera un appui logistique au chercheur et mettra le matériel nécessaire à sa disposition.

Des cours de formation dans des sujets spécialisés seront organisés dès que le centre principal sera fonctionnel. La forme sous laquelle les cours postuniversitaires seront présentés, ainsi que leur durée et leur fréquence dépendront de la situation.

Le projet supervisera, en collaboration avec les promoteurs et les instituts hôtes des stagiaires, des mémoires de fin d'étude et de doctorat sur des sujets ayant une relation directe avec les objectifs du Centre.

3.3.2.La bibliothbque et le centre de documentation.

Il est évident qu'un centre de recherche appliqu6e ne peut fonctionner qu'avec une documentation mise à jour. Le CRRHA met à la disposition des chercheurs des ouvrages généraux concernant la biologies la vie dans les lacs, les analyses physico-chimiques, la pollution, le traitement des eaux. En

plus, il y a des ouvrages spécialisés concernant les lacs de la CEPGL, et plus particulièrement de chaque organisms y vivant. Le centre est abonné à ASFA I, II, III qui donne mensuellement les abstraits de chaque publication halieutique récente.

Le centre établira aussi une cartothèque et une médiathèque, comprenant les cartes anciennes et récentes de la région et des dessins et des photographies des espèces rencontrées durant les recherches. Ceux-ci pourront être utilisés par les chercheurs intéressés.

3.3.3.Collection de référence.

La determination correcte des différents organismes est la base de chaque étude écologique. Beaucoup d'espèces sont mal connues, parce que le matériel de comparaison manque. Le centre veut donc établir un collection de référence avec des spécimens qui seront comparés avec les spécimens-types, afin d'avoir une collection standardisée.

Le Centre met aussi à la disposition des chercheurs des aquaria avec les organismes vivants, aussi bien pour la démonstration de la biodiversité que pour des recherches spécifiques.

4. ETAT D'AVANCEMENT DES RECHERCHES DU CRRHA

4.1. Plan de recherche 1992-1993.

4.1.1. Recherche du CRRHA sur le Lac Tanganyika.

Le CRRHA veut exécuter une recherche continue sur cinq plages sableuses dans le nord du Lac Tanganyika (Nyanza Lac, Rumonge, Bujumbura, Uvira, Baraka) pour étudier la diversité entre les différents points. Les organismes de fonds, les organismes pélagiques et l'eau seront analysés sur chaque plage mensuellement. Cette recherche débutera dès que les appareils de mesure à grande profondeur et les bateaux seront opérationnels. En effet, deux bateaux en bois de 11 m sont en construction près de Bujumbura. Cette recherche se fera en étroite collaboration avec le CNRS-Uvira.

4.1.2. Autres recherches.

Plusieurs thèmes de recherches concernant le Lac Tanganyika et ses effluents et les lacs Cohoha et Rweru ont commencé, en collaboration avec l'Universit6 du Burundi et l'Université Catholique de Louvain (KUL):

(1)Dr A.Vandelannoote (CRRHA), Mile B.Theunissen (K.U.L.), Mr F.Vyumvuhore (U.B.) et Mr P.Nyungeko (U.B.):
Etude de la rivière Ntahangwa: hydrochimie, macro-invertébrés, pollution.
La rivière Ntahangwa coule à travers le quartier industrial de Bujumbura et se jette dans le Lac Tanganyika près de la

brasserie. Les effets des égouts et de la pollution industrielle sur la composition des eaux et sur la distribution des macroinvertébrés sont évalués, ainsi que l'effet de cette rivière sur le lac.

(2) Dr. L.De Vos (CRRHA), Dr. L.Taverne (U.B.), Dr. L.Seegers (Allemagne): **Etude de la faune ichtyologique de la Malagarasi.** La rivière Malagarasi fut un affluent du bassin du Zaïre avant la création du Lac Tanganyika. Bien que dans son histoire le lac a connu d'infiltrations du bassin nilotique, il est évident que plusieurs espèces du lac trouveront leurs ancêtres dans la rivière Malagarasi. Line étude approfondie des espèces de cette rivière peu connue nous donnera plus d'informations sur les origines de la biodiversité du lac.

(3) Dr. L.Risch (CRRHA) et Mr. A.Nsabyumva (U.B.): **Etude de la biologie de *Chrysichthys sianenna.***
L'umuneke *(C.sianenna)* est une espèce littorale abondante très connue par les pêcheurs. C'est une espèce facilement reconnaissable dont la littérature ne mentionne que quelques généralités. L'autécologie de cette espèce devant la côte burundaise est étudiée.

(4) Dr. L.De Vos (CRRHA) et Mile. K.Gevers **(K.U.L.): Etude des poissons cichlidae *(Haplochromis)* des Lacs Cohoha et Rweru.** Les lacs de la dépression du Bugesera ont une ichtyofaune caractéristique, malgré l'introduction de plusieurs espèces (Tilapia, *Haplochromis burtoni).* Dans la littérature, le lac Cohoha est connu comme un lac 'pauvre' et le lac Rweru comme un lac 'plus riche'. Line étude comparative des haplochromines des deux lacs pourra démontrer si, pour ce groupe de poissons, il y a des différences importantes.

(5) Dr. A.Vandelannoote (CRRHA), Dr. L.De Vos (CRRHA), Dr. G.Ntakimazi (U.B.), Dr. L.Risch (CRRHA) et Mile. Bitetere Kananura **(U.B.): Etude physico-chimique et ichtyologique de la rivière Rusizi.** La rivière Rusizi donne l'apport volumétriquement le plus important au Lac Tanganyika. Dans le nord du lac, la composition chimique du lac est donc largement déterminée par la Rusizi. Mais cette rivière est très particulière. Elle trouve son origine dans le déversement du lac Kivu, et est donc caractérisée par une dureté en magnésium exceptionnelle. L'effet de cette rivière sur le lac, sur les migrations des poissons du lac et les effets saisonniers seront étudiés, aussi bien sur le plan chimique que sur le plan physique.

4.2. Les infrastructures.

Les laboratoires du CRRHA, ainsi que la bibliothèque et la salle de référence, sont en construction. La plupart du matériel commands est arrivée et opérationnel. L'inscription des livres dans la bibliothéque continue toujours. il y a déjà plus de 1000 références scientifiques. Les premiers aquaria

sont installées avec des poissons des lacs Tanganyika, Cohoha et Rweru et des rivières Rusizi et Malagarasi.

4.3. Formation.

Neuf étudiants (sept de l'UB et deux du KUL) font leurs mémoires de fin d'étude en collaboration avec le CRRHA, dont six de façon permanents.

UNDP/FAO REGIONAL PROJECT FOR INLAND FISHERIES PLANNING, DEVELOPMENT AND MANAGEMENT IN EASTERN-CENTRAL-SOUTHERN AFRICA (IFIP)

1. Introduction

The potential of the main inland fisheries of eastern, central and southern Africa has been estimated at around 1.7 million tonnes representing over 50% of the total inland potential of Africa. Estimates of total catch in this area, however, are only about half this figure, indicating the presence of an important resource which, if exploited rationally, could be utilized to improve the standard of living and the quality of life for the fishing communities within the area.

The majority of this resource comes from the great lakes of the Rift Valley: Lakes Albert, Edward, Kivu, Victoria, Tanganyika, Mweru, Malawi-Nyasa and Kariba. It is mainly exploited by small scale fishing communities, although significant semi-industrial fisheries have been developed on Lakes Kariba, Tanganyika and Malawi.

Achieving increased production, however, is not simply a matter of increasing fishing effort. Indeed, although many stocks remain largely underexploited [small pelagics and Haplochromines in particular], some of the more accessible stocks are already subjected to excessive fishing pressure, if not overly over-exploited. Furthermore, the majority of the resources are shared between two or more countries. This situation requires that development measures be undertaken within a sound comprehensive framework, with close consultation and active cooperation between the countries concerned.

The IFIP Project was initiated in this context to promote effective regional collaboration and cooperation among riparian States, with main objective of promoting a more effective and rational exploitation of inland fisheries resources in the region. The IFIP Project started in January 1989, for a first phase of four years. The project is executed by FAO and funded by UNDP. Under the Associate Professional Officer [APO] programme, the project also benefited so far from indirect support from Belgium, The Netherlands, Italy, and Denmark.

Participating countries and IGOs are: Burundi [the host country], Ethiopia, Kenya, Malawi, Mozambique, Uganda, Rwanda, Tanzania, Zambia, Zaïre, Zimbabwe, as well as CEPGL, PTA, and SADCC.

2. Objectives

The present phase of the project has four immediate objectives:

Regional Collaboration: Through establishing effective operational mechanisms on a sub-regional basis and through regular technical consultations, issues such as the management of fish stocks in shared lakes and the adoption of common approaches to inland fisheries monitoring, research and management are being addressed. This recently involved, for example, the organization of an important meeting for the Management of Lake Victoria and the Creation of a Lake Victoria Fisheries Commission. The creation of this independent Commission will be a step forward in enhancing regional cooperation on matters related to the management of important shared water bodies.

Development Planning: This objective is being addressed through the formulation and provision of advice to assist in the implementation of rational fisheries development and management, especially with respect to shared lakes. Development and management plans as well as numerous project proposals have been prepared in this context. As a basis for proper planning, socioeconomic information on key fisheries or lakes is also being strengthened through specific research, surveys, and case studies.

Training: In relation to the objective of strengthening technical capabilities in fisheries management and development planning, the project is organizing regular training activities such as training courses, workshops, and study tours. Of late, added emphasis has been given to on-the-job training activities.

Regional Information: This objective refers to the establishment of a regional information base on fisheries matters. In this context, a global review of CEPGL fisheries was prepared in 1991, and the project is now finalising an overall statistical review of the fisheries of the region, by country and by lake. Such work is severely constrained by the lack of reliable fisheries statistics in many of the countries concerned and will need to be carefully reviewed and up-dated during the second phase of the project.

3. Priorities and Strategy for the Second Phase:

Achievements to date are reflected in the list of publication appended to this short presentation. These refers to a large number of sub-regional technical meetings, workshops, and training courses organized by the project; to advisory missions, studies and surveys conducted by project staff and counterparts; and to specific investigations sponsored by the project.

Following recommendations made by the Advisory Committee of the project
and by a tripartite evaluation mission, added emphasis has been put over the last 18 months on: on-the-job training through maximum involvement of national researchers in survey and research work, as well as on networking between staff of related research institutions. One example is an IFIP-sponsored research on *Rastrineobola argentea* now being undertaken simultaneously in Kenya, Tanzania, and Uganda through a network of researchers from KMFRI, TAFIRI, and UFFRO respectively.

Concerning the future of the project, both its Advisory Committee and the Evaluation Mission recommended that a second phase of at least 4 years be considered by the donor as to achieve the long term objective of the project. They emphasized the need for further support to enhance regional collaboration and cooperation in the area of fisheries management; to strengthen planning capabilities along with related socioeconomic research and statistics;, and to contribute to increasing capabilities in these areas through training.

As far as the approach is concerned, it was recommended that stronger linkages be established with representative IGOS, and that a certain level of decentralisation be achieved. High reliance on expertise from the region has been a priority for project since the beginning and should remain so, with added emphasis on networking.

Continued financial support for the IFIP Project after April 1993 is not yet guaranteed, and unfortunately there are indications that UNDP may not be in a position to finance this second phase due to the severe financial constraints which the UNDP Regional Programme is facing at the beginning of this new cycle. Efforts are being deployed by FAO to find a solution to this problem, and contacts have been made with the Netherlands and Japan for eventual co-financing.

The IFIP project has been quite successful in promoting a new approach to regional support for fisheries development and management. Indeed, it is so far the only project of this kind which main thrust was put on socio-economics rather than on biological sciences or technology. As such, it has raised a considerable amount of interest from the part of participating countries, and allowed for increased recognition of the importance of multi-disciplinarity in fisheries management and development planning. At a time when many countries of the region are paying increased attention to these factors, it would be quite regrettable for participating countries not to be able to benefit from continued support from this project.

4. LIST OF IFIP REPORTS

A. TECHNICAL DOCUMENTS

Gréboval D., A. Bonzon, M. Giudicelli and E. Chondoma, Baseline
1989 Survey report (1987) on inland fisheries planning, development and management in Eastern/Central/Southern Africa. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). **RAF/87/099-TD/01/89** (En): 104p.

Gréboval D., A. Bonzon, M. Giudicelli et E. Chondoma, Rapport
1989 de 1'étude de base (1987) sur la planification, le développement et l'aménagement des pêches continentales en Afrique Orientale/Centrale/Australe. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-**TD/01/89 (Fr): 11Op.**

Gréboval D., and B. Horemans (eds), Selected Papers presented
1989 at the SADCC/FAO Training Workshop on Fisheries Planning, Victoria Falls, Zimbabwe, 15-24 Novembre 1988. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). RAF/87/099-TD/02/89 **(En):** 138p.

Horemans B., et Maes M. (6ds), Rapport de la Consultation
1989 technique sur les lacs Cohoha et Rweru partagés entre le Burundi et le Rwanda (Bujumbura, 13 et 14 Décembre 1989). Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-**TD/03/89 (Fr): 94p.**

Gréboval D., Management of the New Fisheries of Lake Victoria:
1989 Major socioeconomic issues. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**TD/04/89 (En): 25p.**

Gréboval D. (ed), Principles of fisheries management and
1992 legislation of elevance to the Great Lakes of East Africa: Introduction and case studies. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**TD/05/90 (En): 41 p.**

Report of the IFIP/SWIOP Workshop on Economic Aspects of
1990 Fisheries Development Fisheries Development and Management. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-T**D/07/90 (En): 22p.**

Corsi F., Evaluation des pêcheries zaïroises des lacs Idi
1990 Amin/Edouard et Mobutu Sese Seko. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-**TD/08/90 (Fr): 64p.**

Corsi F., Evaluation of the Zairian Fisheries of Lakes Edward
1990 and Mobutu. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**TD/08/90 (En): 60p .**

Rapport de la premi&re réunion du Comité consultatif du projet
1992 régional pour 1992 la planification des pitches continentales. Projet Régional PNUD/FAO pour la Planification des P6ches Continentales (PPEC). RAF/87/099-**TD/09/90 (Fr): 24p.**

Report of the First Meeting of the Advisory Committee of the
1990 Regional Project 1990 Regional Project for Inland Fisheries Planning. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**TD/09/90 (En): 22p.**

Report of the Symposium on Socio-economic aspects of Lake
1990 Victoria Fisheries. A Symposium organized by the IFIP Project under the framework of the CIFA Sub-comittee for Lake Victoria, 24-27 April, Kisumu, Kenya, UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**TD/10/90 (En): 24p.**

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FAO/FINNIDA RESEARCH FOR THE MANAGEMENT OF THE FISHERIES OF LAKE TANGANYIKA (LTR)

1. Introduction

GCP/RAF/271 /FIN - Research for the Management of the Fisheries on Lake Tanganyika (LTR) is a regional project, **funded by** the Finnish International Development Agency **(FINNIDA) and** the Arab Gulf Programme for United Nations Development Organizations **(AGFUND) and executed by FAO.** The participating countries are: **Burundi, Tanzania, Zaïre and Zambia.** LTR became fully operational in January 1992. The project is scheduled to last five years and to be executed in two phases: the first a preparatory phase of 18 months followed by a second operational phase of 3.5 years duration.

2. Organization

LTR Headquarters is based in **Bujumbura,** Burundi; other LTR Centres are located in Tanzania Fisheries Research Institute Centre in **Kigoma,** in Zambia Department of Fisheries facilities in **Mpulungu,** in **Kalemie** and in C.R.S.N. in **Uvira.**

International personnel includes **Project Coordinator,** Biostatistician, Civil Engineer and APO - Fisheries Biologist (all based in Bujumbura), Limnologist (based in Mpulungu) and Fisheries Biologist and APO - Fisheries Biologist, both based in Kigoma. Important role is played by **Project Scientific Coordinator** and his deputy, both based in Kuopio, Finland, and a large number of consultants. Further, two committees have been established: (1) Project Coordination **Committee,** which has an advisory and liaison function and represents the interests of the countries collaborating in the project, and (2) **International Scientific Committee,** which reports to the Project Coordination Committee and generally assists with the planning and evaluation of the scientific work, plans scientific training courses and supports scientific liaison and coordination with other fisheries or related projects. A large number of **national scientists and technicians** of all four participating countries work closely with LTR. **Support staff** includes both administrative and technical personnel. Lastly, **LTR is backstopped,** both technically and operationally, **by FAO HQ** in Rome, Italy.

3. Objectives

LTR objectives are:

3.1 to develop understanding of the basis of biological production in Lake Tanganyika:

- through building a hydrological model with special emphasis on upwelling/downwelling phenomena;

- through basic limnological measurements of the primary and secondary production, with special account of the dissolved organic matter (DOM) and, partly, of bacteria[activity, in the lake, and their contribution to overall lake productivity; and

- by remote sensing technology to monitor lake events;

3.2 to develop understanding of the basis of fish production in the lake, i.e. how matter and energy are channelled through the food web to fish:

- through stock assessment of pelagic fish;

- through studies on predator-prey relationships between fish and plankton, with special emphasis on daily/lunar vertical movement of the ecosystem components;

- through studies of life cycles of plankton and fish, and relating them to place and time/lunar cycles/seasons.

3.3 to develop understanding of the fish stock functions that could contribute to the development of a coherent, lake-wide fisheries management policy for the four riparian countries so that the full potential of the biological/fish production can be utilized on a sustainable basis:

- in addition to the studies above, e.g. by genetic population studies indicating the degree of discreetness (in time and place) of the pelagic fish stocks in different parts of the lake;

- by collating and processing the existing fisheries statistics and relating that experience to lake events and fisheries structure and harmonizing their future collection as important prerequisitive for formulation and monitoring the success of management policies.

3.4 to contribute to the harmonization of the fisheries and environmental laws and regulations that support and maintain such policies; and

3.5 to strengthen the scientific and monitoring capabilities and capacities of the four riparian countries so that they are able to sustain an adequate amount of monitoring/research of their fishery resources after termination of the project.

4. LTR Scientific Programme

There are **six subcomponets of LTR scientific programme.** These are as follows:

4.1 SUBCOMPONENT 1:HYDRODYNAMIC MODELLING OF LAKE TANGANYIKA

AIMS:

1) Understanding the lake's hydrodynamic and thermodynamic regimes.

2) Understanding the basis upwelling/downwelling phenomena and their relationships with the lake's primary/secondary production.

3) Predictive model for upwelling and its effects on lake's primary and secondary production as a possible tool for long-term fisheries management.

METHODS:

1) Land-based and water-based meteorological measurements

2) CTD(O) profiles for the lake (especially at both ends)

3) Observe changes in lake levels and find records of in- and out-flows of water

4) Water current measurements during cruises, where appropriate and feasible

5) Complement and verify lake events by remote sensing

6) Computer model (alternative models) for lake's hydrodynamic behaviour; predictions for field and remote sensing; reformulate the model if necessary

ACTIVITIES:

1) Establish measuring stations
   - on land: meteorological stations
   - in lake: thermistors anchored current meters
   - aboard the research vessel

2) Through the cruises and coordinated synoptic observations of lake hydrodynamics, obtain database for formulation of the hydrodynamic model;

3) Use remote sensing to observe and verify lake-wide events, particularly temperature and water colour;

4) Obtain sufficient computer capacity for both the model building and remote sensing operations

4.2 SUBCOMPONENT 2: REMOTE SENSING

4.3 SUBCOMPONENT 3: FISH POPULATION AND PLANKTON BIOLOGY

AIMS:

Short-term

1) The seasonal and spatial growth pattern of S. tancianicae and L. miodon

2) Reproduction biology (fecundity larvae) of pelagic species

3) Zooplankton (= fish food) production and interaction with fish predation

4) Food selection by planktivorous fish

5) Vertical migration of crustacean zooplankton.

Long-term :

1) Understanding of spatial and seasonal dynamics of pelagic production; channelling the primary production towards fish

2) Practical monitoring programme for pelagic fish stocks with emphasis on fish-environment and fish-fishing relationships

METHODS:
1) Fish growth rates

2) Bioenergetics model of fish and their prey

3) Fish fecundity

4) Surveys of larval fish

5) Zooplankton life-cycles and migration

ACTIVITIES :
1) Sampling of fish and zooplankton

2) Fish population analysis

3) Surveys of larval fish

4) Intensive zooplankton studies

5) Development of monitoring strategy

4.4 SUBCOMPONENT 4:GENETIC STRUCTURE OF PELAGIC FISH POPULATIONS

AIMS

Short-term

Genetic differentiation between local populations of pelagic fish species

- S. tanganicae
- L..miodon
- Lates spp. (4)

Long-term :

Part of management

METHODS

Sampling in subareas
Electrophoretical study
RAPD-DNA method

ACTIVITIES:

Fish sampling and identification

4.5 SUBCOMPONENT 5: LIMNOLOGY AND CARBON/ENERGY BUDGET

AIMS:

Understanding the components of primary and secondary production and energy sources of pelagic food chains in different parts of the lake, with a special focus on the fishery effects on ecosystem structure and functions.

METHODS:

1) Determination of primary, microbial and microheterotrophic production in the lake.

2) Determination of the microbial communities and their contribution to energy production.

3) Determination of the dissolved organic matter (DOM).

4) Determination of the sinking loss of organic matter from the ecosystem (water column).

ACTIVITIES:

1) Do the above measurements of primary, bacterial, (and secondary) production, especially in relation to the hydrodynamic events in the lake (cf. the hydrodynamic model).

2) Formulation of a comprehensive and dynamic carbon/energy budget model for the lake that incorporates the effects of fishery in the different parts of the lake.

4.6 SUBCOMPONENT 6: FISHERIES STATISTICS

AIMS:

Contribute to the understanding of lake events and fish stock functions (see others subcomponents), in order to be able to formulate and monitor successful management strategies for Lake Tanganyika and to establish an economic basis for future, optimum resource conservation, exploitation and management.

METHODS

1. Compilation of past and present data concerning fisheries statistics in project databank/documentation centre;

2. Quality checks of past and present fisheries statistics;

3. Improvement and standardization of existing statistical data collection, processing and analysis methodologies;

4. Upgrading of local staff skills in fisheries statistics;

5. Precise estimates of local and lake-wide catch/effort and CPUE figures;

6. Integration of above estimates with scientific results from other subcomponents.

ACTIVITIES

1. Oversee the collection, collation and evaluation of fisheries statistics data arising out of all previous studies;

2. Estimate present local and lake-wide landings of fish together with regular census on the numbers of fishermen, boats, etc. (nominal fishing effort);

3. Assessment of training needs; organization of training activities for national staff involved in the collection and analysis of fisheries statistics;

4. Organize the collection of precise catch-per-unit-effort (CPUE) data from selected locations (fishing mortality or effective fishing effort);

5. Coordination/standardizationof methodologies in fisheries statistics data collection, analysis and presentation; organize a Workshop on Statistical Coordination and Standardization;

6. Reporting on above activities.

5. Status of Progress

The following outlines LTR progress during the first 1 1 months of preparatory phase:

5.1 Infrastructures

In Bujumbura - LTR headquarters was constructed in 4 months, a record time; it is a 360 M2 facility which includes a reception area, laboratory, Documentation Centre/meeting room and 5 large offices. In addition, 56 M2 storage/depot facilities were arranged and a 1 0 car parking was constructed.

In Kigoma - at the same time, an extensive rehabilitation of TAFIRI/Kigoma facilities was carried out. A number of offices, two laboratories, guest-house and house for project's expert have been completely rehabilitated and the entire property fenced.

In Mpulungu - rehabilitation of Department of Fisheries facilities has started in early October. In addition, one housing unit and office/laboratory are being constructed. Despite numerous problems i.e. remoteness, continuously rising costs of building material, problems with labour, etc. it is hoped that all rehabilitation/construction works will be completed by end January 1993.

In Uvira and Kalemie - C.R.S.N. in Uvira is housed in a large building which has been neglected for number of years; these facilities were inspected by several contractors/civil engineers and, upon their advice, no rehabilitation was attempted since available budget could not possibly do the required job (needs estimated at $300.000). After two visits to Kalemie it was decided that, due to existing situation in Kalemie, it is not possible or cost-effective to establish LTR Centre there. Nevertheless, and as a temporary measure, all necessary arrangements were made to both establish communication link with Kalemie and to ensure regular (=daily) statistical coverage of Kalemie based industrial fisheries fleet.

5.2 Research vessel and auxiliary vessels

Main research vessel - international tender has been prepared and placed; 12 shipyards were approached and four responded. It would seem that all offers received considerably exceed project's budgetary allocation for this item. Final decision on this matter should be taken this week.

R/V Echo - has been brought to Bujumbura and completely refitted. It will be taken back to its home port in Kigoma by mid-December.

R/V Silver Shoal - has also been brought to Bujumbura for complete refit which should be completed by the end of January 1993.

5.3 Communication system

Seven high frequency radios were purchased. Four of them were already installed in Bujumbura, Kalemie, Mpulungu and Chilanga. Since permissions were now obtained for Tanzania, two more radios will be installed within the next two weeks in Kigoma and Kunduchi, while the last radio will be installed on the main research vessel.

5.4 Equigment

Computers, printers and basic office equipment has been purchased early; all software was installed and tested in Bujumbura. Up to now we have computers installed in LTR HQ, in Uvira and in Mpulungu. Two computers and other office equipment will be moved to Kigoma within the next two weeks.

All necessary decisions regarding scientific equipment were made and a large number of purchase orders was placed. It is now arriving almost continuously. This equipment will be distributed and transported to our Centres shortly.

5.5 Documentation Centre

Considerable efforts were made to establish LTR Documentation Centre. To date, more than 1.400 references were put on project's computer. At the same time the collection, collation and analysis of the so called 'historical data' continues. Many of our colleagues in all four riparian countries take part in this important task.

5.6 Other activities

Many other activities have taken place. The important ones are the following:

Project Coordination Committee has been established and so was the International Scientific Committee. The First Joint Meeting of LTR Coordination and International Scientific Committees was subsequently organized; it was held from 20 to 22 May in Bujumbura.

In order to keep all parties informed LTR is publishing its Newsletter; first issue was published in June, the second in September and the third is now in printers.

First ever Aerial Frame Survey of Lake Tanganyika fisheries was carried out, successfully, from 29 September to 3 October;

the Lake's entire shoreline has been video-taped. Results will be published early next year.

With cooperation of many colleagues around the Lake LTR is preparing the Lake Tanaanyika Fisheries Directory ; it too will be published early next year.

Lastly and in association with our colleagues from IFIP LTR has organized the Symposium on Biology, Stock Assessment and Exploitation of Small Pelagic Species in the African Great Lakes Region (Bujumbura, 25 to 28 November 1992) as well as this meeting i.e. Meeting of Project Managers involved in Stock Assessment Projects of East African Lakes (Bujumbura, 30 November 1992).

5.6 Personnel

Recruitment of **international staff** has been affected as follows:

* George Hanek, Project Coordinator, joined on 03.01.1992;

* Eric Coenen, Biostatistician, joined on 14.05.1992;

* Pierre-Denis Plisnier, Limnologist, joined on 1 1. 1 0. 1 992;

* Pekka Kotilainen, APO-Fisheries Biologist, joined on 24.10.1992; and

* all necessary clearance were obtained for Piero Mannini, Fisheries Biologist and Heini Kurki, APO-Fisheries Biologist.

In addition, the following consultancies took place:

* Alvaro de Oliveira, Naval Architect, from 19.03. to 10.04.1992;

* R.M. Mitson, Acoustics Expert, from 17.08. to 16.09.1992;

* Franco Mancini, Administration, from 20 to 27.10.1992; and

* 1 m/m was used to ensure two visits to project of Prof. O.V.
Lindqvist, Project Scientific Coordinator.

Recruitment of **national staff** was affected as follows:

* only T. Varayannis, Civil Engineer, has been employed under SSA-National, starting 01.02.1992; and

* all others, i.e. drivers, secretaries, etc. have been on probation and the FAO contracts will be offered to the best ones, starting in January 1993.

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APPENDIX III

MEETING OF PROJECT MANAGERS
FOR THE COORDINATION OF STOCK ASSESSMENT WORK ON EAST AFRICAN LAKES

(BUJUMBURA, 30 NOVEMBER 1992)

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