
**Research and Fisheries
Management; the Uneasy
Relationship Review of the
Zambia - Zimbabwe SADC
Fisheries Project**

**Eyolf Jul-Larsen (ed.)
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R 1998: 1

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Summary

This report is an evaluation of the "Zambia-Zimbabwe SADC Fisheries Project". The project aims to establish effective fisheries management regimes for the various fisheries of Lake Kariba. The project has been funded by Norad and Danida since the end of the 1980s. The report argues that considerable achievements have been reached, particularly in a better understanding the ecology and the stock dynamics of Lake Kariba and in building biological competence. Achievements regarding the understanding of the dynamics of fishing communities and markets and in establishing effective management systems are more limited. The project was designed and has largely worked according to an assumption that good quality research in itself represents a sufficient means to establish effective management systems. The development around the lake demonstrates however, that management is about politics and also requires adequate political decisions. Recommendations are made in order to better integrate research results and policies.

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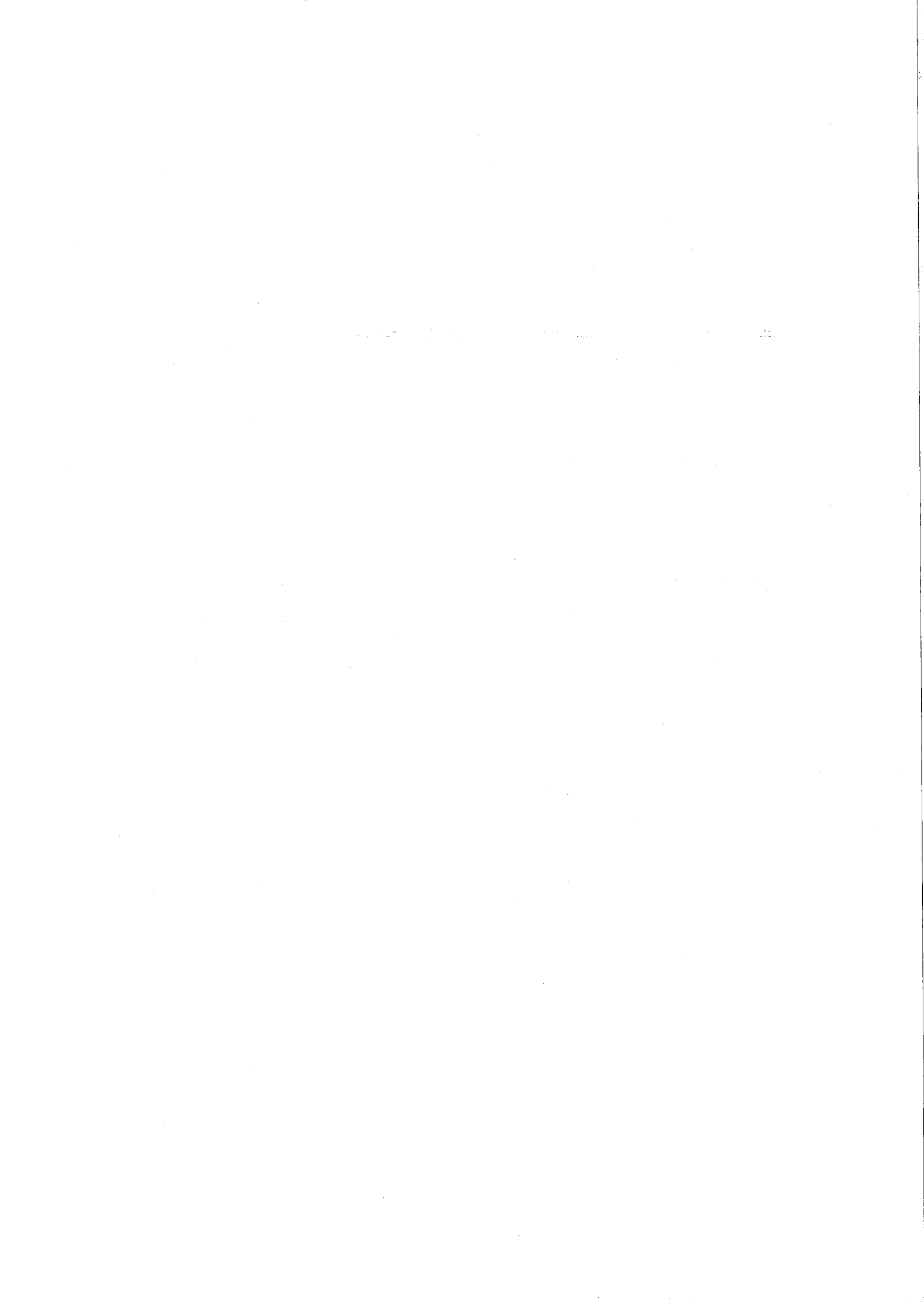
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LIST OF ACRONYMS

ASIP	Agricultural Sector Investment Programme, Zambia
CAMPFIRE	Communal Area Management Program for Indigenous Resources, Zimbabwe
CASS	Centre for Applied Social Science, University of Zimbabwe
CEDRS	Catch Effort Data Recording System
CPUE	Catch per Unit Effort
Danida	Danish International Development Agency
DNPWLM	Department of National Parks and Wildlife Management, Zimbabwe
DoF	Department of Fisheries, Zambia
EFZ	Exclusive Fishing Zones
GRZ	Government of the Republic of Zambia
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
KFA	Kapenta Fishermen Association, Zambia
LFA	Logical Framework Analysis
KPA	Kapenta Producers Association, Zimbabwe
LKFRI	Lake Kariba Fisheries Research Institute, Zimbabwe
LKRU	Lake Kariba Research Unit, University of Zimbabwe
MAFF	Ministry of Agriculture, Food and Fisheries, Zambia
MET	Ministry of Environment and Tourism, Zimbabwe
MSY	Maximum Sustainable Yield
NCDP	National Committee for Development and Planning, Zambia
NOK	Norwegian Kroner
NORAD	Norwegian Agency for Development Cooperation
OOPP	Objective oriented project planning
SADC	Southern African Development Community
SFTC	Sinazongwe Fisheries Training Centre, Zambia
ToR	Terms of Reference
VMC	Village Management Committee, Zambia
ZMC	Zonal Management Committee, Zambia
ZZSFP	Zambia-Zimbabwe SADC Fisheries Project



1. Introduction

Background

Seeing the first phase of the Zambia Zimbabwe SADC Fisheries Project (the project) coming to an end in 1997, the Steering Committee and NORAD agreed in 1996 to initiate a terminal review of the project. The above listed consultants (the team) - all well experienced with fisheries and fisheries management research in African inland waters - were contracted by NORAD (mainly at the expense of the project) to undertake the work. The team's terms of reference (ToR) appears as Appendix 1. After 2 weeks for interviews, data-collection and field preparations in Norway by the team leader and the biologist, the team met in Harare on 21 of April 1997. For three weeks the team has met with most of the relevant parties involved in the design and the implementation of the project. The team has also had the opportunity to meet and discuss with a number of people from the immediate and ultimate target groups as well as representatives of other stakeholders which could be affected by or affect project results. Itinerary and a list of persons met appear as Appendices 2 and 3 respectively.

After the field visits, the team spent one week in Harare for internal discussions about the structuring and the content of the report, report writing and debriefing. According to the ToR, a debriefing report was presented to the Steering Committee and the donors¹ in Harare on 15. May 1997. The debriefing report is a draft summary of the present report and it was read and approved by all team members. The preparation of the final report has been done by the team leader after his return to Norway. The content of the final report is a reflection of the content of 6 documents prepared by the team in Harare. The documents appear as Annexes A-F. It is also in line with the debriefing report although it takes account of many of the comments which were presented by the participants in the debriefing meeting. The final report is therefore to be considered as a joint product of the team. Due to time constraints it has unfortunately not been possible to edit all annexes to the extent which was intended.

The project reviewed is financially important with a donor contribution of approximately 55 million NOK and it has soon been operating for 9 years if the pre-phase project of approximately 3 years is included. It is a complex project in that it includes the authorities and fishers in two countries as well as different fisheries with different stakeholders and target groups. It also includes research from very different scientific disciplines. The heavy research component of the project has led to unusually big amounts of written documentation and reports. In addition to the documentation on project planning, administration and progress, the team has had more than 70 reports - most of them direct project outputs - at its disposal. The great majority of the reports is either research or research based. Lists of consulted documents is presented in Appendices 4 and 5.

¹ The project has been funded jointly by NORAD and Danida. NORAD has served as administrative coordinator on the part of the donors throughout the planning and implementation period. Due to time constraints on the side of Danida and the fact that Danida has already indicated that it will not consider extended funding to the project, the team has not met with any Danida representative.

Given the time frames of the review, it is obvious that the team may have missed important information or misunderstood some of the observations it has made. Besides, the team has been forced to make some priorities. Two aspects which proved difficult to deal with should be highlighted already from the beginning. One activity area has been dealt with rather superficially and concerns the infrastructural support. The team felt it had limited expertise in this field and has chosen only to deal with this activity where it was reported that it had created or could create problems for the implementation of other activities.

Furthermore, a thorough assessment of project results with respect to *efficiency* - i.e. an assessment of the relationship between inputs and outputs - also proved difficult to undertake. One major reason for this is that it would be extremely time consuming to get a sufficiently detailed picture of how much funds have been spent on different activities. Project accounts are kept separately in the two countries and are divided between local currency and foreign exchange accounts. In addition some inputs (like expatriates, international consultants and cars) are accounted for directly by the donors. Finally and as must be expected, the accounts are not organised primarily to reflect the costs of various activity areas. A thorough review of efficiency would therefore have required more resources and better internal preparations. When the report refers to the issue of efficiency from time to time, it is most often done on basis of some ideas rather than on systematically collected data.

Some reflections on the review exercise

The team has in its work received a lot of indispensable and valuable help from a range of persons attached or formerly attached to the design, implementation, backstopping and funding of the project. However, the organisation of the team's programme while in Zambia and Zimbabwe has not always been the best and has to some extent reduced the efficiency of the team's work. The most serious problems were met at the level of LKFRI and project personnel in Kariba. It must be noted that the team was not able to discuss project performance and future plans with the project co-manager in Zimbabwe despite of having spent more than a week in Kariba. Due to this the Zimbabwean institutions' ideas and suggestion for the future were only obtained by the team at the debriefing meeting of the project. Some of the ideas have been integrated in the recommendations of this report.

However, the most unfortunate factor affecting the efficiency and the relevance of the review is considered to have been the lack of internal preparations from all parties involved despite of the fact that the review has been planned for more than a year. Except for a paper concerned with defining minimal levels of activities written upon request from NORAD in early 1996, no written documentation containing self evaluations, strategies for the future and further needs for funding were presented to the team. The general impressions from our discussions are also that little effort was invested in trying to identify how to make as good use of the review as possible.

The team has no problem in recognising the time constraints under which the relevant institutions and personnel are operating, but lack of time regarding review preparations often reflects similar constraints regarding the capacity to use its results. If this should prove to be the case, we somewhat question the wisdom of having launched the review in the first place. We sincerely hope we are mistaken in this assumption, given that the cost probably exceeds 0.5 million NOK which would represent 1% of the total donor contribution to the project. To some extent we think that the lack of concern may reflect a common tendency among recipient institutions to regard evaluations and reviews as a kind of 'donor instigated thing', with limited value for themselves. If this is the case, we believe the donor could have played a more pro-active role in securing adequate preparations, and the team leader also recognises that he should have made reference to internal preparations while discussing the programme with the parties, even if that probably would have been too late.

The team is of the opinion that more thorough preparations and better organisation of the field visits could have increased the relevance of this report for the users. One could have avoided a certain number of conclusions which in the debriefing were characterised as obvious and almost redundant to some of the members of the Steering Committee. Disagreements on extremely complicated management issues which were revealed during the same meeting could have been dealt with more in depth and may be found their solutions. As reviewers we are uncomfortable when we feel that important information did not reach us or when we are unable to address important issues in a manner which is considered relevant to the users. We have tried as best and as unbiased as we can to address the issues raised in the ToR in a manner which to us seems relevant and fair.

The structure of the report

The history and the content of the project is considered known to most readers, but for unfamiliar readers we have included a very brief summary as section 2. For a more thorough and detailed description of project planning and implementation it is referred to D.S.C. Lewis 1995: *A review of project progress 1988-1995*, ZZSFP, Kariba. Sections 3-9 constitute the assessment and analysis of the results within 7 fields of activities. Each section contains a review part which includes a description of achieved (and unachieved) outputs and visible effects. It also includes an assessment of the achieved results with respect to their quality, rationale, relevance, sustainability and potential impact on the target groups. They also contain a part highlighting the issues which the team has identified as the main explanatory factors to explain the achieved, or lack of achieved results. Except for section 6, the sections 3-9 are related to one of the annexes which generally are structured the same way as the sections and which enter more in the details. Section 10 highlights what the team considers *the* most important lesson to be drawn from the project and which also is reflected in the title of the report: *The uneasy relationship between research and fisheries management*. Finally, the recommendations to the various parties involved in the project are presented in section 11. Detailed recommendations are also found in the annexes.

2. Brief description of project history, objectives and organisation.

It is not the task of this review to provide an authoritative historical presentation of the project. The following is simply a brief 'contextualizer' for unfamiliar readers about its origin and its development. A joint fisheries project for Lake Kariba was proposed by Zambia and Zimbabwe the first time at a SADC (then SADCC) donor conference in 1983. By 1984 both Danida and NORAD had shown interest in funding such a project and a mission from the two donors presented a revised project proposal in 1985. It was felt, however, that the relevant authorities in the two countries needed to get far more directly involved in the planning and the design of a joint project and in 1988 a so-called 'pre-phase' project was established with the nomination of one Project Co-manager in each country and the contracting of an expatriate Project Coordinator. Some biological and sociological research was undertaken during the pre-phase project, but most efforts were invested in planning and preparation. It was realised that the biological and sociological particularities of Lake Kariba made it necessary to organise the project in two sub-projects, one concerning the Kapenta fisheries and the other the inshore artisanal fisheries. Since the beginning of the pre-phase, the Logical Framework Approach (LFA) has systematically been used for planning and monitoring of project activities.

In 1990 extensive Objective Oriented Planning Workshops for both sub-projects were organised and a revised project proposal was submitted to the donors. The project document was agreed and signed by the parties in December 1990. The first phase of the project started in January 1991 and in the first Annual Project Review Workshop held in September, the organisation of outputs was slightly modified compared to the project document. Based on the documents of this process, objectives and intended outputs were the following:

For the Kapenta fishery sub-project:

Development objective:

"Yield of Kapenta from Lake Kariba is ecologically sustainable and economically optimised"

Immediate objective:

"A strategy for joint sustainable management of the Kapenta fishery is in operation"

Intended outputs:

- Biological studies on Kapenta carried out
- A joint fisheries management plan put into effect
- A joint Zambia-Zimbabwe management committee established
- Dialogue with Kapenta operators established and in operation

For the Artisanal fishery sub-project:

Development objective:

“Exploitation of the resources of Lake Kariba is at MSY”

Immediate objective:

“A strategy for development and sustainable management of inshore stocks is in operation”

Intended outputs

Biological studies conducted

Establishment of inshore fisheries management systems in both countries

Socio-economic studies conducted

In addition to the specific outputs in the two sub-projects, the need for a number of joint outputs were also identified. These are:

Establishment of a unified catch and effort data recording system

Training of personnel from Department of Fisheries in Zambia (DoF) and from Lake Kariba Fisheries Research Institute in Zimbabwe (LKFRI).

Establishment of long term lakeshore development plans.

Development and upgrading of the infrastructural conditions

The implementing agencies are DoF under the Ministry of Agriculture, Food and Fisheries (MAFF) in Zambia and LKFRI under the Department of National Parks and Wildlife Management in Zimbabwe. Each institution appoints a Project Co-manager with the responsibility of the day to day management. To support them a Project Coordinator (expatriate) was recruited and paid for by the project until 1995. No new coordinator was recruited after that.

The overall responsibility for the yearly budgets and work plans as well as the monitoring and reporting of activities and finances is with a joint Steering Committee () which normally meets twice a year and with representatives from DoF, LKFRI and DNPWLM. The chair of the Steering Committee alternates between the two countries, and NORAD and SADC² meet as observers.

The Steering Committee and NORAD meet annually in an Annual Meeting to review progress and plans and to approve budgets, accounts and work plans. SADC is invited as observant.

In 1993 the project was reviewed by an independent team (mid-term review). The main conclusion and recommendation from the review was to switch from what the review calls a research phase, into a phase where the management issues were given more priority. The project was initially supposed to terminate end of 1995. Due to considerable under spendings and delays related to some of the intended outputs, it was agreed among the parties to extend the project until the end of 1997.

² SADC is represented by its secretariat on inland fisheries which is located to the Department of Fisheries in Malawi.

3. Results related to biological research

(see Annex A)

Review of results

Outputs from the biological research may conveniently be classified the way it was originally done: a) research on Kapenta, b) research on inshore stocks in the two countries and c) catch and effort data recording.

RESEARCH ON KAPENTA

8 scientific reports including work from two joint workshops have been produced which to a large extent have led to a dramatic revision of views among researchers and managers concerning the biological needs for management of this stock. In addition, 2 MSc/M.Phil. and 1 Ph.D. theses has come as a result of the training activities. Dissemination of the results to producers seem to have been weak. Two newsletters have been produced by the project and distributed. It was tried to establish a permanent dialogue with Kapenta fishermen during the first years, but this has mainly failed (see section 9). It has therefore not been possible to include existing data in the hands of Kapenta operators in the research.

The research is generally found to be of good quality. Very generally the results clearly indicate that the conventional management models based on the identification of an MSY is of little relevance and that the availability of the fish more depends on ecological variables connected to the water level and availability of nutrients in the lake. The research also indicates that increased effort at the present level does not significantly influence the catch/unit effort (CPUE) which in layman's terms could be expressed by "the more you fish the less will die of natural reasons". The validity of this effect which we would suggest to call the '*Zarepta's jar effect*', is more uncertain and there seems to exist a certain 'resistance' among the researchers to accept the indications as valid. Its implications concerning the economic needs for managing Kapenta are considerable.

The relevance of the research and the workshops is obvious. One could have wished for more follow up related to the trends in catch/unit effort, but given the time and the financial constraints, this could probably not be expected. The work from the two workshops are of high quality and has lead to sharing of data and collaboration between researchers in the two countries. Through considerable investments in training, the quality of the researchers is found to be good but with some lack of experience in the identification of relevant research projects. They can easily continue the monitoring as well as launching of new and further needed research projects.

In Zimbabwe, a serious personnel crisis at the level of LKFRI seem to exist and may seriously endanger the sustainability of all the biological research (including that of inshore stocks and the data collection). At present there are only two qualified biologists at the institute (one on Kapenta and one on inshore stocks). However, DNPWLM maintains that this is an incidental and very temporary problem and that measures have

already been taken to solve it. It is certainly true that several initiatives have been taken, but it is difficult for the team to assess whether they will be successful.

The sustainability would have improved further if better dissemination/discussion channels had been established with the producers. Sustainability will also depend on the possibility for continued research collaboration between the two countries.

RESEARCH ON INSHORE STOCKS

6 scientific reports including work from joint workshops have been produced. In addition 4 M.Sc./ M.Phil. theses have come from the training activity and 1 Ph.D. thesis and an internationally published article may be considered as an effect of the project. Like for the research on Kapenta, dissemination of the results to producers seem to be weak. Fishermen are therefore not in a position to react to the results on basis of their own experience.

The work from workshop is found to be of high quality. Other research is also generally of good quality, but there is a tendency with some researchers to 'prove' the validity of existing regulations or policies. Examples of this may be the 'proof' of differences in fished and unfished areas and the notion of overfishing of the tigerfish *Hydrocynus vittatus*. Moreover, stock assessment of a number of important species showed that present effort levels seem to be still below MSY and that there is no danger of biological overfishing. It has been possible to relate observed changes in stocks in experimental fishing to ecological variables more than to changes in fishing effort.

The research is generally found to be of relevance, although somewhat unfocused with regard to both management of the inshore stocks or the development of fisheries. However, the results - especially on the analysis of historical gillnet data - have possibly given rise to a general framework in which subsequent research on and monitoring of inshore stocks can take place. Although the relevance is there, the research does not seem to have led to specific recommendations towards management or development. As will be discussed in sections 7 and 8, there are few examples where research results are reflected in the established management plans.

The experimental gillnetting programme which has been set up in Zambia has increased the sustainability of the research in that it will provide useful long term data series at low costs. Better dialogue with fishermen (at least in Zambia) could probably increase both the relevance and the sustainability of the research. As for the Kapenta research, the sustainability in Zimbabwe is at stake unless the present personnel problems at LKFRI is not resolved. The link LKFRI has to former project personnel now working at the university research unit (LKRU) is to some extent counteracting this danger.

THE CATCH AND EFFORT DATA RECORDING SYSTEM (CEDRS).

9 reports including work from joint workshops, an MSc study on efficiency of Kapenta rigs have been produced and a unified collection system for the two countries has been put in place. Frame surveys are undertaken regularly. Dissemination of results in both

countries is weak. Much of the research has been made in direct link to the data collection system and the frame surveys, and has thereby contributed to a better understanding of the fishery.

The inclusion of length frequency data for the species caught in the inshore fisheries is considered to be important in that it reflects the catches of different groups of fishers who use different kinds and sizes of nets and for the study of local effects on effort. Nevertheless, the system is considered to have many qualitative weaknesses. Some questions may be raised in relation to the quality of the catch/effort data in the Kapenta fishery (measuring effort, disregarding thefts etc.) and especially effort data in the inshore fishery, both leading to underestimation of catch and effort. Critical examination of data from both frame surveys and CEDRS enumeration is sometimes lacking.

The unified system of catch and effort data collection is highly relevant as an aid to management and in the assessment of the widely different management policies in the two countries. With regard to the latter aspect a study of the effects of the different management systems is highly relevant for other fisheries in the region. The unified system is an important step forwards to enable such comparisons. The unification of the catch and effort data and the willingness of professional staff on both sides of the lake to cooperate on this and share data can be regarded as one of the great achievements of the project, but further improvement of the system, especially with regard to the data collection and data handling is needed to make full use of its potential.

It is a pity to observe that the system is far less used for analysis than what is its potential. Strangely enough, this lack of use may turn to become a challenge for the sustainability of the system. A system which is both time and fund consuming and which people do not see results from, becomes a natural target if reductions in activities are required. However, the main challenge for the sustainability of the system is probably inappropriate means to store and handle the data. The number of personnel qualified to store data is limited and the computer facilities for data storage are not really adapted to the amount of data available.

Issues explaining the results

The overall impression of the team is that the biological research component in the project has achieved substantial results, that quality and relevance is relatively good and that the sustainability of the activities - except for some identified problems - is high. However, the project has largely failed in its objective to disseminate the results and in establishing a permanent link of dialogue between fishermen and researchers. The team considers the following issues the most important in order to explain this situation.

OVERALL

Thorough research planning done by qualified personnel

The time, effort and money invested in the planning of the project and the frequency of joint workshops held is considered to have had substantial positive effects. Furthermore, the fact that many of those participating in the planning, either were well qualified

biologists or has later got adequate training, just adds to the same effect. Strong objective orientation introduced in the planning process probably accounts for much of the positive effects regarding both the relevance of the research to management as well as of the sustainability of the research.

Extensive utilisation of scientific workshops and experienced research facilitators

The scientific workshops seem not only to have increased the quality of much of the individual research in terms of extracting scientifically valid conclusions, it is also the impression of the team that all researchers involved in the biological research now are well informed about the research results in general and that they have a well developed and common understanding of the stocks and the ecology of the lake. The same applies for the identification of further research needs. At several occasions researchers and other project personnel referred to the quality of some of the facilitators to explain the success of the scientific workshops.

Lack of sensitivity among researchers concerning the role of producers in applied research

There are arguably many reasons for why the project has failed in its attempts to disseminate results and establish better links of dialogue with fishermen. Concerning the Kapenta fisheries, it is obvious that the very tense situation which today exists between operators and authorities in Zimbabwe, as described in section 9, explains a lot. Furthermore, the lack of adequate institutions among inshore fishermen also sometimes complicates the task.

However, the team is of the opinion that lack of dissemination also is intimately connected to the idea that dissemination of results is a 'one-way road' of communication and that there are few if any incentives for researchers (as opposed to managers) to spend time and effort on this. With few exceptions, researcher's sensitivity as to how information from fishermen may serve to improve the direction and relevance of applied research is found to be weakly developed. The team is not arguing that fishermen generally know the best or that they should define the research agendas, but simply that knowledge, experience and observations in fishing communities have proved to be very useful and effective for researchers in defining and performing their work. Unless researchers are continuously made aware that research actually may be improved through dialogue with fishermen, dissemination will probably always remain weak.

CATCH AND EFFORT DATA RECORDING

Lack of objective-oriented approaches.

The weaknesses in the data recording system is considered to a large extent to be an effect of too little concern about the purpose of the system and what it may be used for. This is a complicated issue because the researchers who are supposed to use the system do generally not gather the data themselves. They are often not made aware of the practical weaknesses and difficulties. On the other hand, the people who gather the data (enumerators etc.) are generally not aware of the purposes of the activities. They

therefore do not always see the need to report difficulties in data collection or changes taking place in the fisheries which may have important consequences for the interpretation of the data. They tend to find their own solutions to the problem and the result is often that enumerators define categories differently and use different methods in their collection. The fact that the data collection system is being used far below its potential, naturally reduces the awareness and the concern of the researchers regarding the quality of the data. More systematic use in analysis may therefore improve its quality. Ease of access to the data through computerisations has to a large extent been achieved by the project, but could still be improved considerably. Accessibility of these large databases will improve usage and prove its potential for management.

4. Results related to sociological and economic research

(see Annex B)

Review of results

Standard economic research was not envisaged in the project document. Nevertheless, some economic research was initiated and undertaken in relation to the Kapenta fisheries. Socio-economic research on the other hand was initially seen to constitute an important input but only with regard to the inshore fisheries sub-project.

THE ECONOMICS OF THE KAPENTA

Two reports have been prepared by different external consultants. No workshops have been organised on the issue, although one on bio-economic modelling is supposed to take place next month. Dissemination of results seems not to have taken place and only Zambia seems to have invited a representative for the operators to participate in the planned workshop, despite the fact that operators have provided most of the data material.

The quality of the work is considered below expectations, particularly for not taking sufficient account to what seem to constitute the major issues in the sector. It does not provide substantial new knowledge compared to what was already there. The market study is quite acceptable related to ToR, but it is considered too restricted and thereby fails to take account of important variables influencing on issues like prices and marketing structures.

The relevance of the research is considered extremely relevant and important in a management perspective, especially the economic viability study of the Kapenta industry and the marketing study. The new insights concerning the biology of the Kapenta as well as improved general knowledge about marketing conditions imply that the traditional bio-economic approach selected for the coming workshop seems rather far-fetched.

Sustainability of the activity is doubtful given that too little expertise is available to carry on the research after the ending of the project.

THE SOCIO-ECONOMICS OF THE INSHORE FISHERIES

Already in the pre-phase it was decided to hire an external Zimbabwean consultant to undertake the socio-economic research (and training). The Centre for Applied Social Science (CASS) had participated in the pre-phase and undertook a thorough base-line study of the inshore fishing communities. It therefore seemed quite natural to extend this involvement. An expatriate consultant was hired by the project in 1991 in order to help in defining a research programme and adequate organisational links between the project and CASS. A three years contract was signed and put into effect as from 1992. According to the contract CASS was supposed to undertake new base-line studies in both countries, conduct in-depth studies in various fields, establish a computerised socio-economic data-base and a socio-economic monitoring system. It should also provide general advice in their field of competence to the project and advice how to secure the sustainability of socio-economic research in Zambia. The work was to be undertaken by a coordinator and four M.Phil. students to be recruited by CASS.

The first contract period (1992-95) was reviewed in 1995 and the report concluded that the consultant had failed to produce expected outputs on virtually all major tasks. No base-line studies were ready, no in-depth study reports had been presented. Some data files to be integrated in the project's data base had been received, but not analysed and no monitoring system had been established. General advice had been given, but were often found to be too general and difficult to use for practical management purposes and it had not been possible to find ways to secure socio-economic research in Zambia. The reasons for this sad state of affairs were found to be complex and only in part the responsibility of the consultant.

A new 2-years contract was established for 1995-97. It focused exclusively on producing 19 reports, including 4 M.Phil. theses. 7 of the reports were to be produced by the coordinator. By now, the consultant has produced 15 reports and 3 are said to be pending. Except for the theses, most of the reports constitute shorter papers produced by the students. Only 2 have been produced by the coordinator and 1 is said to be pending. Compared to the initial contract, 14 of the produced reports must be classified as in-depth studies and 1 as project advice. All the 4 students have submitted their theses and will probably graduate. One of them continues his studies at Ph.D. level in Zimbabwe but despite what was reported in the last Annual Meeting, the funding has not yet been secured.

On all of the other initially intended activities, no outputs seem to have been produced. The analysis of the data-files was finally done by a project biologist/ecologist, but the result of a simple frequency analysis of the data has led to rather strange and confused results which the team considers of virtually no value.

Dissemination of results have not taken place, and at project headquarters in Kariba the team was able to trace only 5 of the reports. Disagreement seems to exist as to whether the rest has been submitted. Knowledge about the content among project personnel is very weak, but seems to be somewhat better in Zambia than in Zimbabwe. One must

therefore conclude that one important objective of the project - to integrate socio-economic research with biological research for inshore management purposes - has failed.

The quality of the reports consulted by the team varies but must be said to fall below expectations. This is natural given that they are mainly prepared by the students. They are theoretically and methodologically weak and the empirical data they rest upon are limited. Analyses are often shallow and there is a strong tendency of falling into 'popularly correct explanations'³.

The themes of all the papers are of great relevance to the project and they also raise a lot of very interesting information which could serve as basis for continued research. The contract of the consultant has however, not been extended and the sustainability of the activities is therefore highly doubtful. This is to some extent counteracted by a one year contract as project sociologist given to one of the Zimbabwean students and the affiliation the two Zambian fellows have to MAFF.

Issues explaining the results

The reasons for the lack of results in economic and sociological research are many and complex. The following is what the team considers to be the most relevant explanations.

Lack of understanding during project planning regarding needs for capacity and institution building in the fields of economy and sociology.

The planning of the biological research revealed obvious needs in terms of training and professional strengthening of the research institutions. Expatriate biologists were therefore recruited and later the project was able to establish fruitful links of cooperation with researchers abroad. It is not clear why the planners seem to have thought that such support was not needed in the other fields. The experience shows that it probably was even more needed in these fields.

Mixing needs for advice and funding of training

The project realised the need for training of sociologists. But contrary to the thinking in biology, it thought it could combine its need for knowledge and advice with the funding of training. Students are primarily students which have to be taught how to produce knowledge and how to provide advice and their research generally relies on work from others. This implies that one professional alone would have to do the bulk of the research, advise the project and supervise the students. It was not only unrealistic, it was believing in Santa Claus.

³ One example: a recurrent 'explanation' of the great presence in Zambia of inshore fishermen from other parts of the country is the collapse in the fisheries in the north. Although, this tends to be repeated over and over again in different types of grey reports, it should be reminded that this collapse never really took place and that catch per effort unit in the northern waters in Zambia is reported to be considerably higher than what it is on Lake Kariba. The result of reiterating this type of myths is that one still lacks an adequate understanding of the mechanisms of the migration among the fishermen.

Inconsistency between intended tasks and allocation of funds

The total budget for CASS' input is reported to have been around 1.6 million Zimbabwe Dollars (800,000 + 800,000). Looking at the terms of reference this seems to have been as unrealistic as the issue above.

Lack of competence in designing the research

A lot of the weaknesses related to CASS' work is connected to the lack of competence, both by the coordinator who had never worked in relation to fisheries or fisheries management before, as well as within the project to design research agendas of this type.

Lack of experience for how to integrate various research disciplines

To integrate biological, economic and sociological research in order to draw implications for fisheries management is a newly identified and extremely complicated task where very few successes exist world wide. Success within the framework of the project would have required a very different approach and at least require the full-time participation and continuous presence in the project of all involved researchers.

5. Results related to training

(see Annex C)

Review of results

The training of professional staff has been strongly biased towards biological themes or related technological subjects. In Zambia, of the 14 training programmes on diploma or MSc/MPhil level, 4 were in economic and sociological subjects (two each). In Zimbabwe, of the 17 training programmes on diploma MSc/MPhil or PhD level, 3 were in administration and 2 in sociology. All other programmes have been in biology or biology related fields.⁴ Considerable amounts of training of relevance to the project have been organised through other means of funding,⁵ but were assisted by the project in field work. It has been of great importance in achieving research objectives and may be considered both as an output as well as an effect of the project. Two of the professional staffs have recently been approved to go for PhD level studies, but no action has yet been taken to effectuate the approval.

Many among the support staff at LKFRI have been trained but most of the Zambian support staff trained has been based at headquarters level in Chilanga, while the station in Sinazongwe has received less attention. Attempts at on the job training in marine mechanics seem to have been largely fruitless, due to staffing problems. In Zimbabwe the situation may improve with the intended return of an appointed mechanic, depending on the extension of the contract of the expatriate engineer. In Zambia it is more difficult to envisage such improvements. The move of the daily management of the project from Chilanga to Sinazongwe may have a positive influence but this is unsure. On the job training was also offered in relation to the set-up of a CEDRS database system. No

⁴ For details on the number of trainees, see table C-1 in Annex C.

⁵ E.g. through special NORAD training programmes.

output on the intended review of training and further training needs of staff seems to have been produced.

The training programmes in biology and sociology have at large been successful in producing qualified personnel with specialisation in a range of fields of relevance to the project. However, several parties expressed their concerns that the training had failed to produce the intended effect on institutional strengthening because it was claimed that a lot of the trained personnel had left the project.

The team has investigated this in some detail. The results show that of the 14 professionals trained in Zambia, 3 have left DoF while 1 person has moved to a higher post. The two sociologists based at MAFF already have, or eventually will return to their posts in the ministry. Of the 3 who have left, at least one of them remain working in the field of Lake Kariba fisheries. In Zimbabwe, of the 17 professionals trained 3 have left DNPWLM, 1 person is temporarily based elsewhere but will return to LKFRI. 2 persons have moved to higher posts. Of those who have left, at least one continues biological research on Lake Kariba. One of the sociologists is at present working as full time socio-economic advisor to the project (one-year contract).

In the view of the team, it could (or should) not have been the intention that all people trained were to continue to work for the project as such. Furthermore, the great majority of the LKFRI staff trained still work in fisheries research and/or management, both within the LKFRI and at the University research unit in Kariba (LKRU). Except for the two economists who left DoF, most of the trained professional staff in Zambia are working either in Sinazongwe or in Chilanga, while the two sociologists at MAFF are still at DoF's and the project's disposal. It can therefore not be correct to say that the training has failed due to high mobility of the trainees on their return.

There is however a serious personnel problem at LKFRI. Only two professionals (plus the sociologist) are at present working full time at the station. Other staff members have been seconded to DNPWLM headquarters in Harare. The reasons for the problem seem rather to lie in some structural government constraints and in general working conditions, incentives and policies in general. To the team it may seem as if LKFRI has lost much of its support and priority during the last years, but this is rejected by DNPWLM who strongly emphasised that the problems were of a temporary order and that measures already have been taken to rectify the situation. Anyway, LKFRI remains with two highly qualified researchers trained by the project and able to carry out their own research programmes.

Training to Masters level either through the project or with other funding is found to have had a positive impact related to the general level of knowledge about the lake, its fish stocks and the fisheries. The studies carried out as part of the training are highly relevant in explaining observed changes in fish stocks and in giving a better view on the potential impact of the fishery. Sinazongwe station has probably never had better qualified national personnel, able to carry out its own research programmes, and if it can continue to retain

intellectual and political support it should have the potential of becoming a strong institution.

Both stations remain extremely weak on sociological and economic issues related to fisheries management, and neither the project nor the institutions have addressed this issue properly as a response to the failures in the sociological research programme. If both DoF and LKFRI are to be sustainable on a broader basis of fisheries management as it was implied in the objectives of the project, high level skills within both fields of expertise are badly needed. The biological bias of the training programmes, and the felt lack of understanding of the need - other than on a temporary basis - for other skills and competence, may turn out to become a serious shortcoming in the future.

To say that the training programmes have produced good researchers does not automatically mean that they have produced good managers, even if one accepts that good research is an important element in good management. Although it was found that the researchers generally had little problems of relating their research to issues of practical management, there seems to exist a weakness and an uncertainty among them regarding how to combine various types of knowledge for analysis of different management models. Given the overall failure in the socio-economic research programme, the researchers are still very unclear about how this type of research effectively may be incorporated in their own activities. They are also found to be somewhat unclear about the general role of research in fisheries management. This issue will be dealt with in much more detail in sections 7-9.

The new local management structures in Zambia provides for an institutionally based dialogue and DoF is in an excellent position to find out about the problems and potentials of these structures at the lowest level and translate them into needed training services. In Zimbabwe the institutionalised dialogue with fishers on management of the stocks is very weak and the proposed management plan do not really address the role of the fishermen (neither artisanal nor Kapenta) in the decision making process from an institutional perspective. The efforts of the present sociologist in Zimbabwe to co-ordinate and extend existing training efforts of artisanal fishers is laudable, but has yet no continuation after his contract expires nor does it have a clear relation to the intended management of the fisheries.

Issues explaining the results

Overall, the team finds that the results of the training programmes have been good and that they belong to the 'success side' of the project. The main weaknesses are found to be their biological bias and also to some extent that they have not always been as management oriented as one could have hoped for. LKFRI seems to have had difficulties in making effective use of the programmes.

Some of the main explanatory reasons are found already to be covered under issues presented in the preceding sections. The *thorough planning by competent personnel* is certainly one of the main explanations for why the biological training has proved to be so

effective. The *lack of understanding regarding needs for capacity and institution building in the fields of economy and sociology* is obviously part of the reason for the biological bias of the programme. This had to be expected in a project designed, implemented and managed by institutions mainly staffed with biologists. Two other issues should also be mentioned.

Lack of options in management oriented training

The problem of too little management orientation in training is found to be a problem more or less intrinsic in the whole education system related to fisheries research. Fisheries management requires inputs from a range of disciplines and is therefore difficult to teach. It very much remains something one has to learn while doing. However, an increasing number of courses are now being offered (a.o. within the SADC system) and one could have expected that the project had made more use of these opportunities. For example, Table C-1 in Annex C indicates that no project personnel has attended the SADC course on fisheries management in Namibia.

Good training is seldom a problem, but governments' ways of making use of it often is.

Many have expressed scepticism about the use of higher level training in a project of this type, and this is also a frequently found opinion in many milieus related to development aid. But this scepticism may easily lead to wrong diagnoses. This review indicates that it is not higher level training or the attitudes of the trainees which constitute the main problem; on the contrary the training has generally proved to be both relevant and effectively utilised. To avoid higher level training programmes in this project would therefore in the opinion of the team have been a mistake. However, what is really found to cause problems is the low priority and little emphasis which government seems to give to the institutions and positions the personnel is intended to go into after their training has been fulfilled.

6. Results related to improving infrastructural conditions

Review of results

Improvement of infrastructural conditions has mainly followed the initial plans although some delays have been experienced on several occasions. The upgrading of SFTC has been done and 4 of 7 enumerator houses are still reported to be pending. The upgrading of LKFRI is terminated.

In Zimbabwe 3 boats have been bought by the project and 1 has been renovated. In Zambia 2 inboard engine vessels have been bought. Both countries have received a number of project vehicles as well as scientific equipment for the research stations and the vessels.

The assessment of the outputs has not been undertaken systematically, except where specific problems were identified. Despite considerable problems in implementation, the upgrading of the research stations seems after some delays to be successfully terminated.

The works shows no signs of excessive sophistication and the quality of the present facilities seems absolutely acceptable. Reported problems of water supply in Sinazongwe seems now to be attended to. Computers and research equipment functions satisfactorily and personnel is trained to make effective use of them. No provisions for adequate equipment to handle and store the data of the catch and effort recording system seem however to exist. Unless this problem is being adequately attended one risks that the system may experience serious problems in the future, and the active use of it in management analysis will probably be hampered or -in the worst case - will not take place.

The main problems are found to exist in relation to the sustainability of the vessels. Problems of maintenance and repairs have been reported to cause problems all along project implementation and have sometimes caused serious delays in the implementation of research activities. As already mentioned, the project employed an expatriate engineer to try to solve the situation, by training LKFRI and DoF personnel in engine repair/maintenance. This does not seem to have solved the problem, and in Zambia in particular, the sustainability of the vessels being operated from Sinazongwe may be seriously questioned. Even repair and maintenance of the outboard engines used by the enumerators may turn out to become a problem. Also in Kariba, there are problems of sustainability, but better infrastructure, facilities and competence outside the realm of the project may ease this, even if it is expected to be costly.

A possible lack of available vessels will have serious effects on the continuation of the research programmes, particularly in relation to national and joint Kapenta research. It may also hamper some of the inshore research which requires displacements and passing nights away from the stations. On the efforts related to management it is fortunately found to have less direct effects.

Issues explaining the results

The problem of maintenance and repairs of mechanical installations is a recurrent theme in all development aid and this project demonstrates how difficult it is to solve. With the exception of two 'jet-driven' vessels the chosen technology is as simple as the tasks of the project allow. The project has tried various types of training programmes and has employed an expatriate to do on the job-training. Once again one experiences that the use of expatriate staff for such purposes only has limited effects. Maintenance contracts with local workshops have been tried in Kariba, but have been abandoned due to costs. Presentation of 'easy solutions' from the team in this regard, is therefore considered fruitless. The only thing which may be noted is that unless some real improvements in internal maintenance/repair procedures are found relatively quick, the option of external contracts seem to be the most viable option. In Sinazongwe this is more complicated due to a general lack of infrastructural facilities. The only viable solution may be to establish contracts with Kapenta operators.

7. Related to establishing inshore and lakeshore management in Zimbabwe (see Annex D)

Review of results

The inshore fisheries sub-project in Zimbabwe had as one of its main objectives to establish a management system for this fishery and to support initiatives for better lakeshore management.

RESULTS IN INSHORE MANAGEMENT

In Zimbabwe 2 reports and a paper for an international workshop have been produced in this respect. One of the reports is a management plan. In addition to extending existing regulations (closed fishing areas, fishing licences, individual limitations on number of nets as well as mesh and gear regulations) the new elements in the management plan include the establishment of what is called 'exclusive fishing zones' (EFZ) for the about 40 fishing camps which exist in 7 concession areas along the lake, and more emphasis on the need to establish collaboration between fishermen and authorities (co-management). The plan has not been put into implementation yet, but field preparations have included discussions with fishermen and the establishment of some fishermen's associations under the umbrella of the CAMPFIRE organisational structure. Workshops with some of the concerned fishermen and with Nyaminyami and Binga district authorities have been organised. Since January 1997 the project sociologist has worked full time on this issue.

The fishermen's associations are still found to be very fragile and the only visible effects which the team has been able to observe related to these activities, is an increase in the expectations among fishermen for material support from government. In 'problem areas' it is furthermore reported that there is a certain resentment among many fishermen towards the principle of the exclusive zoning⁶.

Assessing the Zimbabwean management plan and the preparatory work is an extremely difficult task. First, it appears quite obvious that the plan - opposite to what was the initial intention - is not based upon the results of project research. There is little or nothing in the biological or sociological research which supports the various components of the plan; on the contrary it may be argued that the biological research only to a limited extent supports the biological rationale of much of the existing regulations as well as the zoning. In terms of economic or sociological research, results must be considered so weak or random that the team consider them inappropriate for any type of planning. Nor does the plan relate to such results.

It is the conviction of the team that this observation, in itself, can not serve as basis to disqualify the plan. Reading of the documents reveals that the rationale as well as the

⁶ It should be noted that the team, for reasons outside its control, was not able to visit any of the problem areas. It is therefore difficult to assess how strong is the reported resentment. The identification of what where the problem areas differed somewhat according to informants, but in general three areas are mentioned: The Gatchegatche communal land in addition to one camp in the Sengwa and one in the Binga area.

strategy of the plan is based partly on a general knowledge about the history and the functioning of the lake's fisheries and partly upon experiences from local resource management in other domains - particularly the CAMPFIRE programme in wildlife management. In addition the plan contains a lot of what can be classified as common sense. In establishing local management (or co-management) the team considers all three factors to be as important as any result from research. This means that assessing the quality and the relevance of the plan mainly must be based on whether the team thinks that available knowledge, experience and common sense have been used in a manner which addresses what can be said to represent what can be expected to represent the real problems in the fishing communities and in a manner which makes the proposed strategy a realistic option. The competence of the team in this field is of course limited and it may therefore be claimed that the value of the assessment must be questioned. The team however, has no other alternative but to try.

The team has identified 6 factors related to the biological and socio-economic conditions of the inshore fisheries in Zimbabwe which do not seem to have been much dealt with in the preparation of the plan and which constitute the main reasons why the team remains sceptical to much of its content and the way preparations have been performed.

Firstly, the team questions the assumption that there is a general need for an inshore fisheries management system for the Zimbabwean side of the lake. Except for the problem areas, the biological, economic and social conditions seem to indicate that fisheries, the way they are performed, can take place virtually without regulations and that they even could expand and be rendered more efficient. Hence, in most of the fishing areas, the need seems to be greater for a development plan (improvement of vessels, gear and market conditions) than a management plan. The fishermen also emphasise the need for material support and the team considers it to be extremely difficult to establish collaboration about a plan which almost exclusively focus on regulation and limiting the range of operation of the producers.

Secondly, one observes that in the more overall socio-political framework, the plan has a strong conservationist approach and favours a sort of *status quo* regarding access to fishing grounds. This is what the team suspects to constitute the main problem of the fishermen in the problem areas: too restricted fishing areas and continued expansion of the tourist industry. Only about 40 per cent of the lakeshore are at present open to fisheries, and the internal distribution of access is extremely uneven⁷. The result is too many fishermen in some restricted areas where catch per unit effort naturally becomes very low. It seems natural to relate the reported resentment in the problem areas towards exclusive zones to these questions.

The consequence of the previous points seem to be that if some management is needed in relation to inshore fisheries, it is a system which may increase the influence of the small

⁷ As an example concession C-1 which is far bigger than C-2, is attributed to less than 50 fishermen, while there in C-2 are approximately 150 fishermen in addition to a substantial number (sometimes estimated to 250) of 'illegal' fishermen.

scale fishermen in relation to the overall utilisation of and distribution of access to the lakeshore. It can not be denied - and it was confirmed in one fishing camp visited by the team - that formal gazetting of EFZ, in certain parts of the lake, may serve the interests of the inshore fishermen in their competition with other stakeholders. However, in the problem areas the gazetting of the proposed areas will probably be of limited value since fishermen already are far too many to share a limited access, and it may even complicate reallocations or redistribution of grounds which in the end may prove necessary.

Fourth, the reference to the CAMPFIRE experience is of course important, but one must be careful to establish 'blue-prints' in situations where conditions are very different. The effect of fishing effort on the regeneration of fish stocks is certainly not the same as poaching on wildlife stocks. Furthermore, the team somewhat questions the realism of fishermen leasing their fishing grounds to the tourist industry. Given that the protected areas on the lake are vast, the fishing grounds of the fishermen will probably be of limited interest to the tourist industry.

Fifth, the team is not convinced that the proposed inshore management system will (as it is conceived) have positive effects in the problem areas towards reducing the numbers of non-licensed fishermen and the offences against existing regulations. The existing understanding of the social dynamics in these areas is generally found to be very weak and sometimes based more on visions about how it ought to be, rather than on the fishermen's own perceptions.

Finally, the preparatory work seems to have been more concerned about advocating a management plan, than really entering in dialogue with the fishermen. One clear indication is that the management plan still remains the same as it was when presented 4 years ago. The terms of reference of the newly appointed project sociologist also indicate the same. Rather than to establish more understanding and better dialogue, his task is said to promote the management plan in the fishing communities and prepare for its implementation.

The team is not convinced that putting the plan into operation will serve the target groups. In most areas it will probably have very little impact and in the problem areas it may even have some negative ones. The fact that most of the work of putting the plan into action and securing some contact with the fishermen more or less depends on one person, also seriously hamper its sustainability.

RESULTS IN LAKESHORE MANAGEMENT PLANNING

Two reports on lakeshore management have been produced. One is an extensive and interesting description (10 sub-reports) of the characteristics and the ongoing activities around the lake. The second is the draft of a Kariba Lakeshore Combination Master Plan. The plan is not a master plan, but more an analytical discussion paper for decision-making.

The team's argument presented above supports the need for lakeshore management in order to empower the inshore fishermen. However, it is difficult to see how the plan, the way it is presented, would serve such a purpose. In the team's opinion, lakeshore management is mainly a question of balancing the interest of the various stakeholders and provide institutions where the stakeholders, including local and central authorities, continuously can discuss and resolve conflicts and problems among them. The plan is really not focused on issues related to local conflict and problem resolution. No forum where this could take place is foreseen. It can best be characterised as traditional top-down development planning, where geographical areas are being defined for different purposes and activities, and where the plan as such and the legal system of government represent the main guarantors for avoiding conflicts and guaranteeing collaboration between stakeholders.

Interviews with representatives from tourism, Kapenta and inshore fisheries and a number of local government authorities revealed that the elaboration of the lakeshore management plan has not been participatory and that private stakeholders generally have been excluded from involvement in the planning nor informed about its outputs. Particularly among the representatives from Kapenta fisheries and tourism in Kariba this was conceived as both problematic and frustrating which added to a considerable economic insecurity in their work and their long term planning of business.

The need for a close dialogue with the private stakeholders is reinforced by the impression that some government agencies (like e.g. the district administrative office) seem weak with limited capabilities in fulfilling the tasks they are supposed to carry on. The team therefore questions the value of the lakeshore management plan and considers its realism as low. The potential impact of a failure in establishing adequate lakeshore management may turn out to be negative on the target groups of the inshore fisheries. The recent history of the lake tend to show that the inshore fishermen are becoming increasingly marginalised. Unless they are being empowered to take better care of their own interests in what many considers will become an increased competition for access to the lakeshore, the weakest stakeholders may end up as real losers.

Issues explaining the results

The review has revealed that despite a lot of activities and a lot of produced outputs on fisheries and lakeshore management in Zimbabwe, the team remains somewhat sceptical about the realism and the sustainability of existing plans. Some important issues in this respect need to be highlighted.

Establishing management systems requires something else than research

The design of the project very clearly reflects a traditional positivistic approach towards fisheries management. One conceived that purely on the basis of research results, it would be possible to establish clear-cut and 'rational' management systems. Although this approach has been under heavy critique for a long time, it is probably correct to say that it is only in the last decade that the approach really has been abandoned. There are generally three reasons for this:

- Research results do not provide certainty about how to exploit resources in a sustainable way. Rather they give us indications of what is possible.
- All management systems depends as much upon policies as upon research. In this case it means that the design of an inshore and lakeshore management system depends as much upon how the government chooses to divide the lakeshore for different economic purposes than upon what is found to be the MSY of different stocks. Research may then provide the government with insights about the consequences and the realism of various policy options.
- Since no government in the world possesses sufficient resources to build management exclusively on enforcement, it must be built upon some sort of collaboration with producers. This means that a management system requires the establishment of common norms and understandings between the various stakeholders before it can be expected to function. In many places common norms and understandings are found not to exist, they have to be created first.

Despite the heavy emphasis on the objective oriented planning which indicated otherwise, the project somehow understood that management would have to be established without clear-cut research results. That is why it produced an inshore management plan long time before one could really talk about results from research. However, the project design gave no indications (other than to base it on research) as to how this planning process could be performed. If little attention were given to investigate the consequences of various policy options and relate them to the need of establishing a system of collaboration based on common norms and understandings with the fishermen, one of the reasons is simply that the project design did not provide adequate methods and guidelines for how to do it.

An unrealistic belief in government's ability to manage

Government initiatives may create considerable effects in order to establish effective management (see section 8). However, it is today generally accepted that this only takes place if the initiatives are received and being developed further by the private stakeholders and the local authorities. A precondition for this to take place is that some of them see an interest in doing so. It is the impression of the team that too little concern has been given to assure that the proposed plans address what the stakeholders consider their main problems and preoccupations.

The need for fisheries management?

The direct connection between research and management established in the project document combined with the failures of identifying and undertaking adequate socio-economic research seem also to some extent to have prevented the project from raising the question of where, when and for what reasons there is a need for fisheries management. In a certain way it seems as if it became more important to establish a management plan rather than critically to examine the need for it. From what is said above one may see that the team is not convinced that a general need to actively manage the inshore fisheries really exists (except for monitoring its performance), unless major development initiatives are taken in order to intensify it.

8. Results related to establishing inshore, Kapenta and lakeshore management in Zambia.

(see Annex E.)

Review of results

The work on establishing fisheries and lakeshore management in Zambia has followed a very different path than in Zimbabwe.

THE INSHORE MANAGEMENT SYSTEM

An inshore management plan was produced as a result of a workshop in 1994 where most stakeholders were invited. This plan was abruptly put into implementation very soon after its creation, first in zones 1 and 2, and later in zones 3 and 4. The plan involved the relocation of a considerable number of fishermen into newly designated fishing camps and the creation of local management committees at village (VMC) and at zonal (ZMC) level. There is no doubt that the methods used at some occasions to relocate the fishermen - particularly in the first months - were very far from what this team would recommend. In many instances it included military force to chase the fishermen from islands in the lake. Interestingly, DoF is found only to have played a secondary and supporting role in initiating the new management system. The main actors in the initiation seem mainly to have been local chiefs in alliance with some of the main Kapenta operators. Other actors (both private and government) are also involved.

The immediate effects of initiating the plan were many and sometimes at considerable costs for the inshore fishermen. The forced relocation sometimes led to losses of material assets and the removal from the islands led to losses of important fishing grounds. Neither did they receive the infrastructural support which they had been promised by the chiefs and DoF personnel. However, as time has passed the management system has also created a series of other and more positive effects of which the most important are:

- New structures of collaboration and new modes of problem solving slowly seem to emerge at a local level. They are still rather weak and embedded with serious problems but the development over the last years is considered generally positive.
- As a result, improved dialogue is emerging between many stakeholders at the local level. This includes the fishermen (both the local and those originating from other regions in the country), DoF, the Chiefs, the Kapenta Fishermen's Association (KFA), fish traders, District councils and other government authorities at local level. Tourist interests are almost always connected to the Kapenta operators and they may therefore also be considered represented.
- The local management structures have, with help and support from many participants been able to secure their own funding. District councils have now accepted to reserve 40 per cent of the fish levies (both inshore and Kapenta) to the local management structures. This will improve further when DoF, after the

introduction of a new fisheries legislation - will allocate 60 per cent of license fees to the same structures.

- A changed attitude in DoF to decentralise its decision making and transfer control from DoF to the local management institutions and to apply very flexible approaches in the new situation.

- An integration of the management of Kapenta fisheries in the new local management system. (This is both an effect as well as an output of the project).

- A new national policy for fisheries management under the ASIP sub-programme on fisheries and a draft of a new fisheries act for the country which is in line with the experiences from Lake Kariba.

A certain interest from other donors (GTZ, Harvest Help) to support the development of the local management efforts.

The material improvements for the inshore fishermen is still very small. Better housing and some minor infrastructural and marketing improvements were reported. But it must also be observed that the implementation of the plan naturally has created new tensions in a set of areas, both within the fishing camps and in fishermen's relations to the local Tonga population who controls the use of land on the lakeshore. The team considers some of these conflicts as potentially very serious for a successful continuation of the process.

The content of the Zambian management plan as such is in many ways similar to the one in Zimbabwe. It includes the prolongation of existing regulations with regard to prohibition of gear. It introduces closed fishing areas (estuaries), and the concept of EFZs for the new fishing camps. The component of massive relocation of fishermen made it in many ways far more radical than the Zimbabwean plan which to a large extent served as its model. Like its model the content was not based on the results from project research.

In the context of the above, it may be useful to reflect briefly upon the pitfalls and uncertainties attached to this kind of reviews. Had the team been asked to review the plan when it was initiated in 1994, it is quite probable that it would have been very sceptical to its content. Although the history and the functioning of the inshore fisheries in Zambia is very different from what it is in Zimbabwe and the total fishing effort in the inshore fisheries is at least 5 times as high in Zambia, there is little in the content of the plan which would indicate a more positive assessment at that stage than what has been presented for the Zimbabwean plan. Besides, forced relocation raises ethical concerns and Zambian recent history proves that more or less forced displacements of people have frequently been tried without much success.

It is in retrospect, when one is able to observe the range of effects of the implementation that it becomes possible to reach other and more positive conclusions. 4 aspects in the implementation seem of particular relevance:

First is the enormous interest which local institutions took in putting the plan into action. This has entailed that most of the relevant stakeholders continue to be more or less actively involved in the ZMCs and that these institutions become more than empty shells. The level of participation indicates a considerable potential for the development of common norms and understandings which has been emphasised as one of the prerequisites for any management initiative. This was not foreseen by the authorities, it just 'happened'. It is also the high level of participation which explains that the district councils finally have agreed to allocate 40 per cent of the fish levies to the VMCs and ZMCs.

Secondly, the high level of participation indicates that the plan drew up some solutions which people identifies as essential problems in their living and work conditions. The fact that it was other stakeholders than the fishermen themselves who took the lead, indicates that the process initially was pushed by the interests of others more than those of the inshore fishermen. The Kapenta operators thought they could reduce thefts by getting the fishermen away from the islands, and the chiefs could control fishermen's movements and activities better in the new camps. However, the continuation also shows that the fishermen have been able to use the local management institutions to get support for their own interests. They have been able to get approval for returning to the islands and the number of new fishing camps have already been modified on several occasions due to requests and demands from the fishermen in the ZMCs.

This empowerment of the fishermen seem to some extent to have depended on the third factor which is the flexible approach taken by DoF in the process. DoF has not considered their original plan as a 'must'; on the contrary it seems as if DoF has been continuously willing to negotiate with the small scale fishermen and to act as their kind of spokesman in the ZMCs.

Finally, a fourth and interrelated aspect is the willingness DoF has proven to hand over much of its own decision making to local institutions including producers as well as local authorities.

If the team is positive about the way inshore fisheries now seem to be managed, it is not because the various regulations contained in the system are considered the most adequate. Many of them may be questioned when confronted with results e.g. from biological research. However, the overall reason for the positive assessment lies in the fact that a new institutional situation has been created which seems to facilitate the creation of common norms and understandings among the major stakeholders and thereby establish an environment of collaboration which is a prerequisite for any regulation to become effective.

This is not to say that team sees the situation as unproblematic. It has been able to identify a long range of problems which easily may jeopardise the whole process unless it is being

dealt with very carefully. There are the usual problems related to administration and leadership of the new institutions and infrastructural support to the new fishing camps seems to be hampered by many complicated issues. One of the main problems which the inshore system has failed to address and which seem to become more and more crucial is the question of access to land and to some extent other resources for the fishing populations. Until now the ZMCs seem to have been incapable of handling this problem. It seems as if the chiefs only have limited authority and influence in these questions and that the Village Headmen (who are not integrated in the system) have much more to say. Unless the conflicts between fishermen and local headmen is incorporated in the structures for conflict resolution, the system may easily prove to collapse.

In terms of potential impacts on the target groups, it may be useful to think in terms of two categorical scenarios. If one succeeds in establishing the system, the team is of the opinion that the target groups including women will benefit. It should be mentioned though, that one of the socio-economic papers clearly demonstrates how gender sensitivity in the implementation has been weak until now and that there is a need to strengthen this in terms of identifying adequate women activities which could be supported. The other scenario is that one is not able to avoid increased levels of conflicts. In that case the system will probably brake down and people will take up their previous practices, the target group will not have benefited, but nor will they have really lost. Realistically one must expect that the end result will lie somewhere in between.

INTEGRATED FISHERIES MANAGEMENT SYSTEM

In 1996, a new workshop was held (and a report produced) to address the issue of Kapenta management. Quite surprisingly, the unintended output of this meeting was a unanimous proposal to integrate the management of the Kapenta into the same structures as those already established for the inshore fisheries and to expand on the local management institutions by creating a *management board* for the whole lake, with representatives from all concerned stakeholders. Except for structuring the management of Kapenta, the plan does not contain details as to the regulations for this fishery, and it is therefore not possible to address its biological and economic rationale.

However, in terms of strengthening the structure of local management institutions this proposal is considered very useful. The economic importance of the Kapenta fishery will undoubtedly strengthen people's and authority's interests in participating in the ZMCs as well as in the new management board. The integration may therefore strengthen both the management of the inshore as well as the Kapenta if the implementation of the system is done with wisdom and care. This is particularly due to the inclusion of shares from the Kapenta licenses and Kapenta levies into the local management structures which will considerably strengthen the sustainability of the local management system.

The work started is arguably an extremely complicated task with a lot of pitfalls and inevitable problems, and there is still a long way to go. Yet the team is of the opinion that few (if any) better options seem to exist. In the long term, the system reduces dependencies on DoF in general and on Chilanga headquarters in particular. It is also a

strength that the strategy has strong support within DoF and seems to be much in line with general GRZ policy.

THE LAKESHORE MANAGEMENT SYSTEM

A lakeshore management report was produced already in 1993. Little or no follow-up has taken place since it was presented and no such system has been established as yet. Despite an obvious and increased need for lakeshore management, the team is of the opinion that the introduction of a new and parallel management system to the system being developed, probably would put the existing one at stake. Instead, the team wants to emphasise that the ongoing process towards an integrated fisheries management system for the lake may and should be considered as a very interesting and promising embryo for development towards proper lakeshore management. This will require that the emerging fisheries management structures at local, zonal and lake level are enlarged to include some of the other most important stakeholders regarding the lakeshore, such as e.g. the Village Headmen.

In order to avoid a parallel management system to be introduced, there is probably a need for DoF to ally with other Government structures (NCDP and MAFF) to convince them to build on what is already established.

Issues explaining the results

In order to explain the team's assessment of the management system in Zambia, it has been necessary to include the explanatory issues in the preceding sub-section. They are therefore only repeated as headlines here. Four factors explain why the present management system is considered as a promising start towards the establishment of an effective fisheries management regime:

- *It secured a high level of participation among various stakeholders for the new local management institutions*
- *It was able to address the issues which local stakeholders identified as important for their own living and work conditions.*
- *DoF's approach has been characterised by a high degree of flexibility.*
- *DoF has been willing to hand over a lot of its own decision making to the new institutions of local authorities and local producers.*

9. Results related to establishing a Kapenta management system.

(see Annex F)

Review of results

Since the Kapenta stock is a shared resource between the two countries it was decided that the project should work towards establishing a joint management system for this stock under the authority of a joint management committee. It was also realised that the management system would require support and collaboration from the producers. A series of outputs have been produced both related to producers collaboration and joint management. In Zimbabwe 2 (or possibly 3) workshops/agreements between authorities and producers have been achieved (1991 and 1995), and in Zambia an integrated plan for management of the Kapenta fisheries (see section 8) was approved and partly put into action in 1996. A draft protocol regulating economic and technical co-operation on management and development of the Lake Kariba fisheries was finalised in 1995 and submitted to the relevant ministries. For reasons of clarity the outputs concerning producers collaboration and those concerning joint management are dealt with separately.

RESULTS CONCERNING PRODUCERS COLLABORATION

In Zambia the Kapenta operators became actively involved in the fisheries management already with the implementation of the management plan for the inshore fisheries in 1994. Through KFA they participate actively in the ZMCs and the integration of Kapenta management into the inshore management system have strengthened the collaboration. KFA will be also be represented in the proposed Fisheries Management Board for Lake Kariba (for further details, see section 8). KFA and most operators willingly participate in the recording of data.

Although the management structures have been established in Zambia, the concrete regulations regarding management of the Kapenta is still not in place. DoF therefore continues to utilise the existing regulations, mainly based on limiting effort through licences and there still seems to be little dialogue concerning the regulations as such. It is also rumoured that the actual number of rigs probably exceeds official figures. No initiatives of collaboration to verify the content of these rumours have been taken.

In Zimbabwe the question of redistributing Kapenta permits (licences) from bigger to smaller firms and from white to black operators, according to national policies, has proved to be the overall management issue which has complicated the collaboration between producers and authorities. The project tried to facilitate this process through bringing the stakeholders (DNPWLM, KPA⁸ and cooperatives) together at workshops, already in 1991. The objective was to resolve the conflicts within the Kapenta industry itself as well as between DNPWLM and the industry. The project succeeded in establishing an agreement on these issues between DNPWLM and KPA in November

⁸ The Kapenta Producer's Association (KPA) in Zimbabwe organises the majority of the white operators and may be as much as 65-75 per cent of the total number of permits. However, some smaller individual white operators as well as the black operators remain outside the organisation. The great majority of the black operators are members of production cooperatives.

1991. Although KPA seems to have respected important elements of their part of the deal (reducing their number of permits), the agreement seems never to have been finally approved by the Ministry of Environment and Tourism (MET)/DNPWLM as was the stated intention. After a formal notification in May 1995 that all permits would be withdrawn by 31. December the same year, a new draft agreement was reached between DNPWLM and KPA in September and submitted to MET. Once again it seems not to have been approved and like in the first case, no notification of this was given. As a result, KPA raised a court case against DNPWLM which is to be tried in the Supreme Court in June this year. A verdict can only be expected in 1998.

The great majority of the Zimbabwean Kapenta operators has therefore for several years lived in a state of considerable uncertainty concerning their future and whichever confidence which may have existed between the parties seems now to be lost. Except for participating in the collection of data, there is no collaboration between operators and fisheries authorities.

The team realises the delicacy of this complicated issue and leaves of course to the Zimbabwean court to judge on the question of right and wrong. What the team observes however, is only that the feeling among the operators is one of great frustration. According to their own point of view, they have shown a lot of understanding and willingness to reduce considerably on their number of permits in return for somewhat better security for their investments. In spite of this, they feel they have achieved nothing.

The process shows that there seems to exist a lot of uncertainty within government about what the policy of redistribution permits really implies. Otherwise, it becomes difficult to understand how draft agreements have been reached and later seem to have been disapproved. The direct consequence of this uncertainty has been rather unfortunate for the establishment of producers collaboration. The team considers it very doubtful that a Kapenta management system can be put in place and function effectively unless there exists a close collaboration with producers in both countries.

RESULTS CONCERNING A JOINT MANAGEMENT SYSTEM

The draft protocol on 'joint management and development' is a result of a long process of meetings and discussions between personnel from DoF and DNPWLM with the support from external specialists. Communication between DoF and DNPWLM has been improved considerably during the project. This has led to a better understanding between fisheries personnel between the two countries on the status of the Kapenta fishery in the lake.

Several previous drafts were produced before the final one was approved by the parties in 1995. If one compares the various drafts, one realises that the mandate of the proposed joint management committee has been considerably tuned down. In the final draft the committee is referred to as 'the technical committee on fisheries management'. Management decisions to be taken by the committee have been reduced and/or kept in a

more general and imprecise language. The team interprets these changes to mean that both countries wish to keep the final decision making on management of Kapenta a unilateral government concern, but based upon the recommendations of the joint technical committee. However, the team still considers the final draft a bit unclear on the exact mandate of the committee (see e.g. articles 3 and 4 in the final draft).

Given the delicate problems connected to the functioning of the Kapenta fisheries and the clarification of government policies, the team considers it a wise decision to scale down the management mandate of the joint committee. It is important to strengthen the institutionalisation of the collaboration which have already been established as a consequence of the project. The establishment of a joint technical committee with a limited mandate is considered a useful approach to ensure exchange of information, coordination of research activities and monitoring, and - on joint basis - follow the development in the Kapenta stocks and the economic performance of the industry. This requires a cautious attitude in terms of not proposing a mandate which may be considered to interfere too much with each government's possibility to organise and structure its own national Kapenta industry and which therefore may be rejected at higher levels within the two governments.

Little has happened since the final draft was submitted to MAFF in Zambia and to MET in Zimbabwe and no-one seems to know when the signing of it will take place. At the Annual Meeting in February this year, Zambia informed that the delays should be understood as a reflection of the presidential elections which took place in 1996. Zimbabwe informed the meeting that the draft had been returned to DNPWLM with a question of addressing the collaboration under the Zambezi River Authority Act instead of under the Zambia-Zimbabwe Joint Permanent Commission as it has been proposed until now. Such a shift would delay the signing of the agreement substantially since it will require the approval and participation of other ministries than MET.

The team is not in a position to say what the reasons behind this shift in attitude may be. There are many possible explanations, but one may be that there still exist some uncertainties at higher levels of government as to the implications of the agreement regarding each country's possibility to formulate their own independent policies for the Kapenta fisheries. Just like for the agreements with the Kapenta operators, the achievements of one of the projects primary objectives become dependent on factors outside the control of the project as such, and the countries policies on how the industry should be organised may easily affect on their willingness to share the decision making.

One possibility could therefore be to redraft the existing proposal in order to make it absolutely clear that decisions concerning the management of the Kapenta will remain with the respective governments and that the joint technical committee only will provide recommendations based on what is found to be the biological and economic situation of the fisheries.

The team considers that the potential impact of a joint technical committee - even with a reduced mandate - will improve the monitoring and the research of both Kapenta and inshore fisheries. This again might have positive effects for the identification and development of national management systems in both countries.

Issues explaining the results

A lot of effort, competence and good will have been invested by the project in order to establish a management system for the Kapenta fisheries on the lake. The approach of trying to secure both producers collaboration as well as collaboration between the two countries is considered to have been a necessary approach with a considerable potential impact. Nevertheless, the results in terms of management must be considered meagre. Only in Zambia is there at present something which may be considered an embryo to a national management system for the Kapenta fisheries, but there is still a need to define the regulations according to government policies and results from existing economic and biological research. In Zimbabwe, the conflict which prevails and which have been accentuated over the last years seems to prevent the possibility to establish a Kapenta management system in the short term. A joint management system for the two countries first of all requires clearly defined policies at national level and as long as the team does not see much progress in this respect, it can not really see how such a system may emerge in the near future, even if an increased collaboration in applied research and exchange of information is considered both realistic and very positive. The following issue which seem to be a recurrent one for all the project's efforts in establishing fisheries management on Lake Kariba is considered to be the main reason for this situation.

Research is neither a sufficient nor the most important element in order to establish effective fisheries management.

In retrospect it is easy to see that the project must have underestimated the importance of clear national policies and strategies as the backbone for a management system for Kapenta. Most of the seemingly very valuable and relevant work undertaken by the project, both in terms of establishing agreements with the producers, as well as between the countries seems to have been seriously hampered by different considerations at higher levels in government. This should not be read as a critique of the interventions from other structures in government. In principle, it is their obvious right and responsibility to weigh proposals regarding fisheries management against a long range of political considerations, and an assessment to which extent government really has done so, goes far beyond the ToR of this review.

The problem is rather the initial conception in the project documents regarding the requirements needed to establish fisheries management systems. Once again it is the simplistic and positivistic approach that management systems may be objectively constructed on the basis of research results which must take most of the blame for why results until now have been meagre. At no stage in the project cycle seems there to have been raised any concern about identifying if there existed detailed enough government policies which should serve as a framework for a management system, and eventually what these policies were. Project history indicates that there in Zimbabwe probably exists

different policies at different levels of government and that this is what has jeopardised project results. If the situation in Zambia is judged to be somewhat better, the reason is not related to a different approach by the project, but simply that the situation regarding policies of relevance to the Kapenta fisheries is less complicated. It has therefore been easier for government to leave decisions regarding the policy for Kapenta fisheries to DoF.

10. A final comment

It has often been said that the main problem of the project has been its biology bias. Although this bias is arguably there, it is probably more correct to say that its main problem has been its *research bias*. Fisheries management, like management in general is about politics. Ideally it regulates peoples access to vital resources according to the knowledge one has about resources and about how the fisheries function. In that respect, research is a useful tool. But it also regulates the same access according to ideas about what is fair and equitable. Such ideas vary considerably and can never be established 'objectively'.

Management is therefore always a question of balancing different interests against each other and not the least of facilitating negotiation and collaboration between relevant parties and groups. The history of the project may serve as a very good illustrator of how fisheries management always requires the establishment of common norms and understandings of the need and the reasons for regulations. Management is therefore - just like politics - about institutional development and the building of commonly shared institution.

If there is one overall lesson to be drawn from the Zambia Zimbabwe SADC Fishery Project it must be that the project never really realised how uneasy the relationship between research and fisheries management really is. It was not realised during a long and thorough planning phase and it seems also to have been difficult to realise during the later stages of the project. However, if Zambia has been more successful than Zimbabwe in developing what in the future may turn out to become effective management systems, the reason must be sought in the fact that DoF personnel seems to be realising it now.

The reasons for this are many, and it must be emphasised that it has not been the team's intention to put the blame on any parties or persons. It should be recalled that it has taken a very long time to reach this type of realisation and that many still tend to 'forget' it. It may however be important to note that, despite a lot of positive effects identified as a result of thorough and objective oriented project planning, the method of LFA was not able to rectify what the team considers as the major weakness of the project. Like any other planning instrument the outcome of LFA planning always depends on the underlying conceptions people have of the objectives. If these conceptions prove to be inadequate the planning procedure can not change it.

11. Recommendations

Based on the above assessments and analyses, the team wishes to present the following recommendations. Some more detailed recommendations may be found in the annexes.

Recommendations to DoF/MAFF, Zambia

The team recommends that the path on which DoF has started to establish an integrated and locally based management system for the lake be continued and strengthened as much as financial and personnel requirements allow for. DoF's role should mainly be a supporter of the emerging local management structures.

Skills and competence in DoF's area of work need to be adapted to the new policies. DoF should do what it can to broaden and strengthen its capacity base, particularly in the fields of economics, sociology and conflict resolution, particularly with regard to the situation in the local stations.

DoF should immediately raise the problem of access to land in the ZMCs in order for them to take action for how this issue may be integrated and attended to by the zonal committees.

DoF should seek alliances within MAFF and NCDP in order to avoid a separate lakeshore management system being established. Instead, it should - in alliance with both local and national public services - seek to consolidate the emerging structures as the embryo of a system for lakeshore management.

DoF should be cautious to take too much responsibility regarding needs in the local management structures for specific extension and training services. Such needs may have to be provided elsewhere (other public agencies or donors), while DoF should function as a mediator/coordinator of such activities.

By improving and extending the existing collaboration with the Kapenta operators, DoF should seek to expand its knowledge about the *de facto* mode of functioning of the industry, and eventually reach agreements with KFA of how to reduce abuses.

DoF should support the research station in Sinazongwe to continue and improve its ongoing research and monitoring activities, i.a. in the following ways (see also joint recommendations to DoF and DNPWLM):

A clear choice concerning the site of the CEDRS database management should be made. The team recommends this to be in Sinazongwe, as this is nearest to the sites where data are collected. This makes response to the enumerators an easier task. For the station to be able to do so, enlargement of the staff trained in data handling and storage is needed.

One should consider to establish a biological research data collection system for the various fishing methods used in the fishery in which the fishers are involved in

the collection of length frequencies data itself as has been done in other fisheries in Zambia. Such a data collection system has proven to add valuable information in addition to the experimental gillnet surveys, is relatively cheap to implement and if well constructed will be of use to evaluate the CDERS on inshore stocks as well.

A critical examination of the results of past frame surveys should be undertaken.

Ensure that enforcement of regulations and enumeration are clearly separated activities in the field.

The execution of the experimental gillnetting should be critically examined to avoid the bias in the present sampling design where nets are always set in increasing mesh sizes from inshore to offshore.

DoF should facilitate SFTC's possibility to link and collaborate with research institutes world wide on issues of relevance for the lake.

DoF should seek to expand on the knowledge of the economics of the Kapenta industry. A marketing study should be considered implemented, may be as an activity within the present phase of this project.

DoF should as soon as possible establish a training plan, specifically aiming to improve personnel's capacities in the field of fisheries and lake shore management.

Recommendations to DNPWLM, Zimbabwe

With regard to Kapenta management, DNPWLM should inform MET that no realistic management system can be expected before a relatively clear and detailed strategy exists concerning the industry's organisation and structure.

Improved knowledge about the economic viability and risks of the various types of Kapenta enterprises may facilitate the development of such strategies. DNPWLM should take initiatives for such studies to be undertaken.

With regard to inshore management, the work should be concentrated to the identified problem areas. The work of creating improved dialogue initiated by the project sociologist should be strengthened. Possibilities for establishing locally based institutions for conflict resolution and improved collaboration between all stakeholders should be investigated.

DNPWLM should as soon as possible investigate for the possibility of opening new areas for inshore fishing or redistribute licenses or leases in already existing ones.

Until one has achieved a better picture of what the fishermen in the problem areas see as their main constraints and an agreement has been reached with them on how to proceed, one should wait to put the existing management plan into execution.

DNPWLM should as soon as possible establish a task force to look into how the present personnel crisis at LKFRI can be solved.

DNPWLM should support LKFRI to continue and improve its ongoing research and monitoring activities, i.a. in the following ways (see also joint recommendations to DoF and DNPWLM):

Efforts should be made to secure the database set up by one of the Kapenta operators in Chilala. The database gives a minute account of the operations, external conditions and catches (per haul) of quite a few fishing rigs. It is of high quality and covers a ten-year period of fishing in a basin which is less well researched.

Measures should be taken to improve the effort data in the inshore fishery and the catch and effort data in the Kapenta fishery.

DNPWLM should facilitate for LKFRI to link and collaborate with research institutes world wide on issues of relevance for the lake.

Joint recommendations to DoF and DNPWLM

The team recommends both institutions to review once again the draft protocol and make sure that it only reflects an agreement concerning collaboration in the fields of joint research (both Kapenta and inshore), exchange of data and information and general scientific dialogue. The agreement may later be enlarged to include issues of joint management if the general conditions open for this.

Both institutions should as soon as possible establish a training plan, specifically aiming to improve personnel's capacities in the field of fisheries and lakeshore management.

It is recommended that present joint research activities are continued and improved and that both institutions secure the provision of necessary funding for these activities. Joint research activities should be strengthened in the following ways:

Both stations should reassess their biological research programmes in the light of the results of the project. The joint workshops regularly held between the researchers of the two countries should be used for such an exercise while simultaneously the workshop could be used to divide the work. Assistance from elsewhere should be found if felt needed.

A prioritisation of biological research issues on inshore stocks should be done by both institutes. Localised effects of fishing on stocks of commercially important

species should be an important subject to be addressed. Discussions on how to tackle such research with the limited work force available could be done through joint working groups.

Make sure that the experimental gillnetting set up in both countries to obtain long term data series, are maintained even with low levels of funding. Length frequency data collection in the CEDRS should be given high priority.

Much work has been done on the inshore fisheries from which often -seemingly - contradictory conclusions may be drawn. Simultaneously many new data have been collected that have not been analysed yet. This information should be summarised in the light of new findings. This could be done in the form of a joint workshop. The output of the workshop should a.o. lead to clear recommendations on directions of future management related research in the two institutions. The workshop could be seen as a conclusion on the findings of the research of the Artisanal Fishery sub-project and could strengthen the initiative taken by some project researchers to establish a regular joint workshop.

To a large extent the results on Kapenta still needs to be documented in ways more accessible to the scientific community than the present reports. As has been pointed out often during the project, the Kapenta fishery with its single targeted stock and with a very high turnover rate, presents a relatively simple resource management problem at the biological level. The research done and lessons learned could attract attention from researchers and managers elsewhere in the world, and this potential should be used.

The economic research on Kapenta should be enforced and broadened. A research agenda identifying major issues of interest to the authorities and the industry should be developed jointly together with KFA and KPA.

Recommendations to the SADC secretariat

The team recommends to the SADC secretariat to find ways to thoroughly examine the set up, execution, achievements and weaknesses of the Zambia - Zimbabwe SADC Fisheries Project in order to learn from the experience gained. The situation with very different management policies on each side of the lake and with two distinct fisheries, makes Lake Kariba a very good study area for the effects of different management strategies. The results of such an examination could serve to improve on fisheries management systems elsewhere in the region. An adequate and effective way to disseminate the results must be an important task of this exercise.

Recommendations to NORAD

The team recommends NORAD to consider funding the DoFs efforts in establishing a joint and locally based management system for the Zambian side of the lake. This would probably best be established as a normal bilateral project which will have to be prepared and designed separately. The financial support should mainly be aimed towards the

establishment of the new management structures, but given the uncertainties as to their legal status, funds will have to be channelled through DoF. Activities which NORAD should consider to fund could a.o. be the following:

Facilitate the development of the local management structures. This could include training of people in the fishing communities in how to use, operate and relate to these structures. Facilitation in conflict resolution may also be needed. The team is uncertain if more material and infrastructural needs will be required, but this should be investigated.

Improve DoFs capacity to support and advice the new management structures. In this respect it would be useful if a systematic analysis of the existing research results aiming to draw the implications of these results for management could be undertaken. Furthermore, an improvement of DoFs capacity to integrate economic and sociological work in its support would also need to be strengthened.

NORAD is recommended to fund an outphasing of the present Zambia Zimbabwe SADC Fisheries Project. An outphasing should last for a period of 3 years and should contain the following activities:

The establishment of the joint technical committee on fisheries research, provided that an adequate protocol is being signed and put into application by the respective ministries of the two countries.

A certain number of joint workshops related to research and management of both the Kapenta and the inshore resources according to what have been recommended above. The workshops should have as their objectives to integrate biological, economic as well as sociological concerns related to the management of these resources. Scientific facilitation and/or collaboration with other research institutions could be needed.

Improvement of the catch and effort data recording system that has been in place for five years and could use a critical assessment. For this an external advisor is considered needed for three months. Provisions of necessary hardware and possibly software to improve on the system will be required. Activities to include in the consultancy could be:

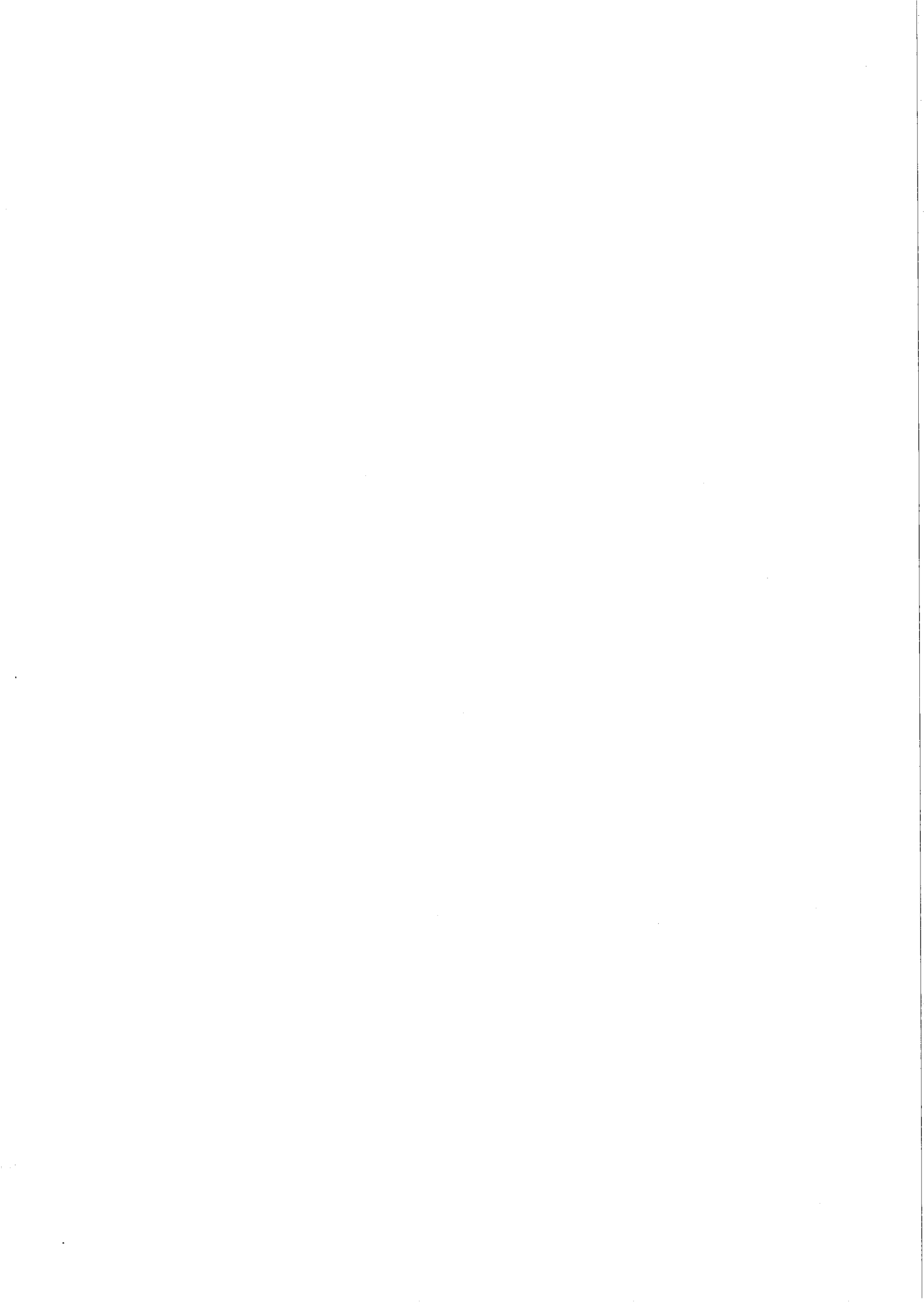
- improvement of present fallacies due to the hardware and database software used
- assessment of the data flow and handling capacity needed
- improve data storage and retrieval system
- critical assessment of the data collected
- further training of database managers both on data handling and guidance of data collectors
- training of enumerators in data collection
- assessment of Total Frame Surveys and advise on improvements of this system
- carry out Frame Survey on both sides

- a final workshop on findings to assess data collected up to now with recommendations to both countries how to continue

Reorientation of the work on inshore management in Zimbabwe according to the recommendations made to DNPWLM above.

NORAD should consider to fund the examination of the lessons drawn from the Zambia-Zimbabwe SADC Fisheries Project to be undertaken by SADC as well as the dissemination of the results.





Annex A

Assessment of the biological research programs

Outputs from the biological research are discussed in the way they were set up in the project planning workshops of 1991.

1. Research on Kapenta
2. Research on the inshore stocks of the two countries Zambia and Zimbabwe
3. Catch and effort data recording system (CEDRS)

The last mentioned is a monitoring system producing data that is important for the research both on Kapenta and the inshore stocks as well, and cannot be seen in separation from these. With 'research' then generally is meant both short term projects and in depth analysis of data from the monitoring exercises to come to an understanding of the dynamics of the fishery and the stocks as seen a.o. in the CEDRS output.

1. Some notes on the development of the research objectives.

The way the projects' objectives are achieved is through formulation of policies and proposals towards the improvement of management of the Lake Kariba fisheries for consideration of both DoF and DNPWLM. Institutional coordination to come to joint management needed to be addressed. This was seen as one of the most important parts of the project. Studies and research were needed to substantiate proposals and policies. Although it was recognised that social and economic studies and research was important to come to a management system, this work did not form part of the core of the project. In part this was due to the dominant role of biologists in the formulation of management of the fishery in both institutes as almost anywhere else in the world. This approach is reflected in the initial formulation of the development objectives of the two sub-projects on the kapenta and the artisanal fisheries where 'all else' hinged on and would be developed from the MSY of the two fisheries. Such an objective was not derived directly from the working principles of the two institutes as such: DoF has as its mission statement a much more development oriented objective, while the DNPWLM worked with a system of adaptive management. However, as was explained to us, it was felt that for a joint management system of the Kapenta fishery to work a goal should be set from which both countries could derive their share of the yield of kapenta stocks. It was felt that MSY (Maximum Sustainable Yield) was a reasonable goal, while it also reflected the fear that the fishery - which had grown considerably in the decade before the start of the project - had reached catches close to or over sustainability. MEY (Maximum Economic Yield) seems to have been discussed as well in the development phase of the project but was not chosen as it was felt that such an objective could interfere with maximizing participation and equity concerns. However, in a later formulation of the kapenta sub-project objective economic maximisation of the kapenta yields returned.

The main concern of the project was with the joint management of the kapenta fishery. The development objective of the Artisanal Fishery both for Zambia and Zimbabwe reflected the need to come to a cohesive development plan of the lakeshore, where several major constraints - one of which was the security regarding access to land and water - were frustrating the development of the lakeshore fishing communities. Although this was the major concern in both countries, MSY again was put central in the overall objective of the sub-project: "*The exploitation of the resources of Lake Kariba by artisanal fishers is at MSY*". Some consequences of this choice will be discussed under the assessment of the inshore research activities. It does however, reflect the general approach of the project where

biological research is given a central role in the development of management of the fisheries, while this approach may not reflect or address the actual concerns and bottlenecks in the operation of the inshore fishers.

2. Kapenta research: Zambia/Zimbabwe

SHORT DESCRIPTION OF RESEARCH GOALS

From the outset the Kapenta sub-project and the biological research needed was considered as the most important part of the project. The high economic value of the fishery for both countries surpassed the artisanal fishery by a considerable margin; it offered employment in an area with little other opportunities and it provided a cheap source of protein. There was felt an urgent need for a bilateral agreement plan resulting in long term optimisation of the fishery, which was to be a major goal for both countries. Research was needed to settle some controversies existing around the status of the Kapenta stocks - assessments ranged from 'overfished' (Marshall) to 'room for expansion of number of licences' (P. Degenbol), disagreements on growth rate, mortality, feeding periodicity and reasons for the stunted size of the Kariba populations of the species - and the creation of a management strategy based on this research was seen as the single most important component of the project. In anticipation of the project providing guidelines as to the appropriate levels of fishing effort allowed, neither Zambia nor Zimbabwe were issuing more licences. Information on the status of the stocks therefore was urgently needed.

The Kapenta fishery sub-project planning workshop held in September 1990 developed two outputs relating to Kapenta research:

"Output 2: models for the exploitation of kapenta stocks are developed and adopted through a literature review, the selection and application of appropriate models, an age determination program, appropriate catch and effort data and a unified program for length/weight frequencies. Hydroacoustic surveys should give an estimate of the fishable biomass."

And *"Output 3: a programme of biological studies implemented. Studies were to be conducted on the pre-recruitment ecology, feeding habits, migration patterns and seasonal changes in stocks. A joint hydro-acoustic monitoring program was to be set up, limnological studies carried out as explanatory variables. The findings were to be disseminated and related to the management study"*

This program was thoroughly discussed with several advisors (a.o. E. Ursin) in the light of needs and staff capacity and revised in September 1991. The studies were to concentrate on growth and mortality, the ongoing program of analysis of existing data was to continue, while the measuring of effort would have to be intensified. Age determination and growth studies needed to be verified. The programs on seasonal patterns, migration and limnology were to receive less attention.

DESCRIPTION OF OUTPUTS AND EFFECTS

Reports

- two reports on hydroacoustic surveys of the Lake (1, 9)
- two reports on midwater trawling trials (17, 29)
- two workshop reports (11, 41) and an update on the status of Kapenta research (27)
- one report on the feeding habits of Kapenta (30)
- a report on a hydroacoustic assessment of lake Cabora Bassa (Mozambique)

- two M.Sc./MPhil theses on the characteristics and efficiency of fishing rigs used in the industry and a hydroacoustic assessment of Kapenta
 - a PhD thesis on the recruitment ecology of *Limnothrissa miodon*; one internationally published article on the evaluation of lift-net selectivity based on the PhD.
- The M.Phil. study was not funded by the project except field work, data storage and use of project facilities. However, it can be considered an effect of the project as it is closely related to the intended research.

Activities and effects

- an important effect of the joint effort to come to an understanding of the dynamics of the Kapenta stocks is the agreement of researchers of both sides to share data and analysis, leading to regular institutionalised contacts between researchers of both stations in - recently - combined inshore and kapenta workshops.
- 6 full hydroacoustic surveys conducted, a programme of bimonthly joint lake wide hydroacoustic monitoring is in place, and estimates of abundance are now available. Estimates for fishing mortality were obtained.
- local surveys to determine area specific changes and catchability have been and are still done
- method for collection daytime samples and 'non-selective' capturing developed (mid-water trawling)
- there is some understanding of size limitation of Kapenta (food particle size limitation) and its feeding habits (limited to a few hours at dawn and dusk)
- classical and more refined versions of surplus production models were found not-applicable: there was no better correlation between effort and C/f with the aid of these models than with any random number set. CPUE seems unaffected by effort. The correlation of CPUE with environmental changes (hydrology) is higher than with effort.
- length frequency analytic methods were ineffective in producing growth estimates, otolith examination techniques were more productive and provided estimates for growth parameters.
- there are indications of continuous recruitment and *Limnothrissa miodon* seems to use most of the shoreline as nursery grounds. Recruitment is at 41 mm. Migration to the pelagic zone as fish grows larger was established. With the current mesh size of 8 mm fishing should be restricted to areas deeper than 15m.
- some factors affecting fishing effort have been identified
- a unified CEDRS has been established (see further)

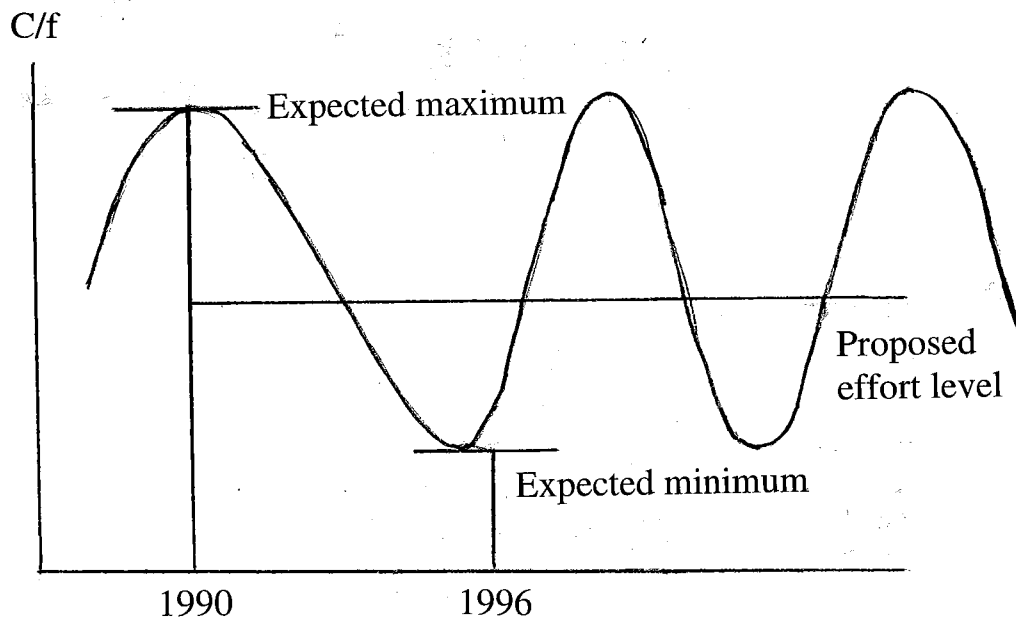
QUALITY OF RESEARCH AND WORKSHOPS

The workshops were generally considered important and good quality by the persons attending them. Collection, summarising and re-analysis of old results and studies and new information has been an important achievement. Several controversies mentioned earlier were settled and management conclusions on the dynamics of the stocks in relation to environmental fluctuations could be drawn, the most important of which is that limitation of effort should be done more out of economic than out of biological considerations. However, some issues regarding this conclusion remain open: no independent estimates of natural mortality and therefore total mortality exists, and is therefore the largest source of uncertainty in the evaluation of the relation between yield and effort. This uncertainty may invalidate attempts to quantify the economic costs and benefits to effort change. Improved precision in mortality estimates should therefore primarily be seen in a context of precision needed in an economic evaluation (see the chapter on assessment of economic studies and recommendations on the bioeconomic workshop to be held later this year).

The research work done on both the Zambian and Zimbabwean side is generally of high quality and has contributed considerably to the understanding reached in the workshops. Due to rigorous discussions at the outset of the project on the strategy to be followed the research was focussed, albeit heavily biased towards an understanding of the stock dynamics and biological questions while little work has been done on an understanding of the dynamics of the fishery. Some work has been done on (changes) in rig efficiencies, but an evaluation of the chosen unit of effort (catch/night/rig) remains to be done. This is possible as the catch effort data collected by the two institutes contain information on the number of hauls per night.

RELEVANCE OF RESEARCH DONE TO MANAGEMENT

Much time and thinking has been spent on the revision of the conceptual framework present at the outset of the project that lead to the idea that the kapenta stocks were affected by the fishery - perhaps even overfished. The workshops focussed this discussion in what was sometimes described as 'crusade' against the idea that kapenta stocks were on the verge of collapsing. The revised view on dynamics of the stocks is highly relevant to management. There is little chance of biological overfishing. The present wisdom as expressed by workers from the LKFRI is: fishing effort regulations need to be set such that it allows for hydrological and climatic influences. The limits of the fishery during adverse climatic conditions are to be considered when evaluating effort. Any possible increase in effort should be done prudently: if effort is set to exploit maximally during the production in good rainfall years, companies will experience reductions in CPUE and economic hardship during periods of low rain. It is thought that the CPUE reached in 1995 - the year that the lowest waterlevel ever was reached during the last year of the drought - could be considered as a possible 'lowest' level, while the peak in CPUE in 1990 may be regarded as a 'highest' attainable level. The idea is that effort should be set somewhere between those two figures as otherwise a large part of the stocks would be unfished during the peak periods (see figure).



Much is expected from a bio-economic analysis to establish such an optimal effort level. The idea hinges on an expectation that since the observed stabilisation of the CPUE minimum and maximum catch per effort levels can be identified with some certainty. However, some

questions can be raised concerning the significance of the observed variation in CPUE. Although we got the impression from kapenta operators that the previous years' catches were not particularly good others were less convinced and talked about 'business as usual'. An operator could graphically relate monthly and early fluctuations in his catches over the years with relative waterlevel data and other environmental changes and could put monthly targets for himself based on such observations. These observations point to a fishery that is relatively stable where individual fishers find such variability in catch 'easy to explain': such explanations of variability invariably relate to environmental factors and not increased effort, even despite increased effort. Variability in catches should therefore be scrutinised thoroughly - by basin, by individual fisher - to assess the rationality of limiting effort in this way (see further under assessment of CEDRS).

While the research both through re-analysis of old data and new work effectively sank the idea that an 'MSY' as stated in the original development objective could be defined unequivocally, the project has gone some way towards defining one of the constituting elements in the rephrased development objective of September 1991: 'yield of kapenta is ecologically sustainable and economically maximised' through a 'strategy of joint sustainable management'. The project has assessed that present effort is ecologically sustainable, while from a biological point of view stocks are expected to sustain moderate increases in effort levels. However, we observed that the outcome of the bio-economic workshop is expected to suggest maximum effort levels at which the fishery is economically sustainable. If, as might happen, such will not be an outcome of the workshop, a strategy of joint sustainable management based on some essentially fixed point of effort levels as implied by the project objectives cannot be devised.

The report on the workshop of 1996 (41) gives the status of the biological knowledge needed for management, based on a management regime with overall effort control through licensing. Many key research issues mentioned there are addressed in present research, although not consistently.

- Predation mortality estimates through Hydrocynus feeding to improve natural and total mortality estimates in ecological pathway modelling is now being done. A large amount of data has been collected on the feeding of the tigerfish of various sizes regarding both temporal and spatial aspects, but await further analysis.
- Growth parameters: as far as we could observe no work presently is being done on the issues of otolith readings of fish larger than 5 cm and data from various basins.
- Environmental factors: as argued above further refinement in the analysis of existing and new catch and effort data is needed but may not be done yet

The monitoring activities - biomass estimates through hydroacoustics and catch-effort data - are in place, although a critical validation of the hydroacoustic surveys still needs to be done and there are many serious problems with the collection of Catch and Effort data (see later).

The relevance of some research done sometimes is dependent on the view on management or its objectives of different researchers and the research strategy to be followed to reach that objective. Such differences were present regarding the study on the pre-recruitment ecology of kapenta, where it was argued that it was very unlikely that kapenta stocks suffer from recruitment limitation and that to ensure the parent stock it would suffice to study the size of recruitment to the fishery. Conversely the study was initiated when this issue was still much debated within the project, and its justification was in the hope that understanding the recruitment variability of kapenta would improve quantitative prediction accuracy of stock

assessment. Despite that considerable research effort in other fisheries throughout the world did not result in clarity on mechanisms of recruitment variability, the hope was to come to a Recruitment Forecasting System for the kapenta fishery. The study did not succeed to reach such a forecasting system as it failed a.o. to gain some necessary information (estimate of larval abundances) that is difficult and costly to obtain let alone monitor (disregarding difficulties in establishing causal mechanisms of larval survival and subsequent recruitment). However, the study did yield quite some interesting biological information of the species a.o. on habitat preferences for larval and adult stages of kapenta and associated behavioural and migrational patterns, growth of pre-recruits, selectivity and size of recruitment to the fishery etc., while knowledge is now available at the LKFRI to establish otolith-based models for growth of kapenta,

The relevance of collecting Length Frequency data from the commercial fishery to obtain growth estimates have proven to be highly questionable. However, Length Frequency data are still being collected in combination with hydroacoustic monitoring to obtain information at the size (changes) of commercially caught kapenta.

An achievement of the project was the rejection of the previously estimated very high mortalities of kapenta, supported by indications that fish stops growing when they reach a certain length possibly due to the unavailability of sufficient amounts of food of a certain size. If the food limitation hypothesis is true (i.e. if total food production is limiting, and not only temporal, spatial distribution or size spectrums of food) than the management of this fishery will differ from traditional management where smaller sizes suggest increased fishing pressure. On the contrary, increased fishing effort would then lead to increased production of fish of maximum size as the remaining stock can better utilise the remaining food for growth. Knowledge on factors controlling plankton production than will be the best tool to predict changes in the kapenta stocks, and with that the choice of management options.

The project did attempt to disseminate results to kapenta producers through workshops and two issues of a newsletter. However, the interest regarding biological information was small according to LKFRI. On the other hand several operators we spoke to did show a keen interest in such information: possibly the techniques with which the information is disseminated should be reviewed (e.g. kapenta operators said to us that workshops of longer duration are not preferred unless they are highly relevant to the day to day operations of the producer). Right now no established structure of dissemination of results exists both in Zimbabwe and Zambia (though the new management system may provide for that in Zambia). When someone asks, he will get the information. In Zambia it is felt that some information produced is for the benefit of the 'manager' alone to enable him to decide and will require no further dissemination. Nevertheless, some Kapenta operators from Zambia who have contributed considerably to the database needed were asked to join in the coming bioeconomic workshop.

SUSTAINABILITY (MONITORING SYSTEM)

The joint hydroacoustic surveys faced problems in 1996 due to the breakdown of navigational equipment, while the research vessel Pelican has been undergoing renovations and was not available for use before December 1996. However, the bimonthly surveys were resumed since then. The two responsible researchers from Zambia and Zimbabwe alternate on the surveys so that each does three surveys a year. Both are project co-managers as well and

have many other duties making their workload quite high. Monthly Basin III surveys are done but face problems when the MV Mweemba breaks down: in 1996 only five out of twelve surveys were done. Thus both the joint and the Zambian programs are highly dependent on good maintenance of the vessels used (see under 'Assessment of training and of infrastructure').

The sustainability of the research program also hinges on the sense of direction and the need of certain biological knowledge for management. While the project through the research and the workshops have given some building blocks for such a program, and while both stations in Zambia and Zimbabwe have competent researchers who can conduct such programs, such direction may be lacking right now. For example, the outline of project proposals for Phase II given to us under the heading Biological Research simply reads: 'applied biological research programs', by which seems to be meant research based on 'requests from the fishing industry'. While this may be one sense of applied research, much 'applied' research as for answering questions related to management as outlined in the 1996 workshop report and above can and should be done. We feel that both stations should reassess their biological research programs in the light of the results of the project. The joint workshops regularly held between the researchers of the two countries should be used for such an exercise while simultaneously it could be used to divide the work between researchers. Assistance from elsewhere should be found if felt needed.

ANALYSIS OF ACHIEVEMENTS

The kapenta research program was thoroughly planned by highly qualified personnel. Much of the success could be related to the wise decision from the outset not to launch a full scale biological research program, but to reanalyse existing data and through that assess existing assumptions concerning the Kapenta stocks. This has led to a major shift in the assessment of the dynamics of the stocks.

The use of scientific workshops to reanalyse data and assess research results has helped in achieving the results discussed. It should be noted that the form in itself is not a guarantee for success. The quality and level of discussion reached depends as much on the quality and receptiveness of the participants and the use of experienced research facilitators. Both conditions were met.

This being so, the shift from a fixed point on which management could be based seems to have resulted in a stagnation of the research on kapenta fisheries (not monitoring). In our view this relates to the ecological/biological orientation of the researchers with a heavy concentration on the assessment of the fish stocks, while there may be little consensus for what management goals such research is needed. While an MSY and possibly soon MEY is out of sight, no clear reformulation of objectives has taken place. Another aspect related to this is that there seems to be a lack of understanding concerning the role of producers in applied research, both in the sense of usage of information from the industry as in trying to understand the way the industry works (on the level of fishing). We often got the impression, notably in Zimbabwe, that the industry seems to be viewed in opposition to the goals of sustainability and conservation instead of as possible allies.

RECOMMENDATIONS

Zambia/Zimbabwe: To a large extent the results of the project still needs to be documented in ways more accessible to the scientific community than the present reports. As has been

pointed out often during the project, the kapenta fishery with its single targeted stock and with a very high turnover rate, presents a relatively simple resource management problem at the biological level. The research done and lessons learned could attract attention from researchers and managers elsewhere in the world, and this potential should be used.

Zambia/Zimbabwe: both stations should reassess their biological research programs in the light of the results of the project. The joint workshops regularly held between the researchers of the two countries should be used for such an exercise while simultaneously the workshop could be used to divide the work. Assistance from elsewhere should be found if felt needed.

Zambia/Zimbabwe: both institutes should find ways to link and collaborate with research institutes world wide to issues of relevance to the lake.

Zimbabwe: some effort should be made to secure the database set up by a Kapenta operator in Chilala. The database gives a minute account of the operations, external conditions and catches (per haul!) of quite a few fishing rigs, is of high quality and covers a ten-year period of fishing in a basin that is less well researched.

2. Inshore (artisanal) fisheries: Zambia/Zimbabwe

DESCRIPTION OF RESEARCH GOALS

The program on biological research and catch and effort studies on the inshore stocks initially aimed at an analysis of a large amount of data collected over a long period. These data needed to be made accessible for analysis by transferring them from the field data forms to computer. It was felt that gill-net sampling programmes in operation at the time should be reviewed and modified if needed to address specific issues. Attention should be given to the relation between fishing effort, catch per unit of effort and overall catch in various parts of the lake to come to indications of - localised - optimum fishing effort and maximum sustainable yields.

In the planning workshop in March 1990 the goals were set in the outputs two and three as respectively:

Output 2: baseline data on the 1990 level of catch should be reliably defined, while the MSY of the inshore stocks should be defined using appropriate models. Research programs were to be set up to achieve this, including the collection of age and length composition data and an estimate of the inshore biomass, data bases set up, models chosen and a level of exploitation recommended.

and

Output 3: for prioritized inshore fish stocks (bream, tiger fish, barbels, squeakers) species composition related to environmental factors, trophic structures, relationships of stock parameters to fishing intensity and distribution were to be defined, while growth rates, breeding seasonality, fish dispersal, fish migrations should be established by the end of the project. Studies to this effect were to be implemented while existing data were to be analysed, with the aim to relate stock parameters to fishing intensity while findings should be disseminated.

This overly ambitious program was revised in September 1991, considering the available professional and technical staff, in a working group on proposed biological studies on Kapenta and inshore stocks of Lake Kariba to:

- existing gill-net data computerised, analysed and review reports written while the results of this exercise should be assessed in a working group together with a DIFMAR assessment specialist
- high priority was to be given to analyse differences between fished and unfished areas
- mesh size selectivity curves should be established using Zimbabwean gillnet survey data
- growth rates of important species should be calculated using length frequencies and gillnet selectivities. Tagging should be considered as a possibility
- length frequency data should be included in CEDRS to obtain population size distributions
- total biomass estimates were not considered vital. Acoustic programs could give an index of biomass.

Around 1993 the mid term review report mentions several studies taking place in addition to this on:

1. the movements of cichlid species,
2. analysis of stomach contents of major species,
3. on whether the introduction of the Nile tilapia *Oreochromis niloticus* had been successful,
4. a determination of a potential for a fishery on the vundu - *Heterobranchus zambezensis* -, and
5. a test of fishing methods on *Brycinus (Alestes?) imberi*.

DESCRIPTION OF OUTPUTS AND EFFECTS

Reports (numbers in brackets) and other written material (see attached list of reports)

- One workshop report on the Assessment of the inshore fishery (26) and a report on the relation of hydrology and fisheries (25).
 - Several articles in the proceedings of the inshore working group (45: see list) and reports on individual species (35, 45)
 - A report on fishing trials for *Synodontis zambezensis* (18)
 - four M.Sc/MPhil theses on several subjects related to the inshore stocks (inshore fish population changes on both sides of the Lake; population biology; assessment of possibilities for a *Synodontis* fishery)
 - 1 PhD thesis on the inshore fish populations of Lake Kariba with four internationally published articles on a comparison of fished and unfished areas, an assessment of the trophic structure of Lake Kariba, management in relation to biodiversity and conservation issues next to work on the biology of the squeaker *Synodontis zambezensis*; 1 PhD thesis with two articles on inshore population changes in Kariba related to hydrology, both published;
- Two of the M.Sc./M.Phil. and both PhD theses were not funded by the project except field work, data storage and use of project facilities. However, as all are closely related to the intended research of the project they can be considered as an effect of the project.

Activities

- introduction of a customised data base package intended for experimental fishery data from passive gear (PASGEAR) and set up of a database with long time series of experimental gillnet fishing data: both historical data from 1962 to present in Zimbabwe and from 1980 to present in Zambia are now accessible
- Set up of a long term experimental gillnet program in Zambia
- experimental sampling activities on a squeaker *Synodontis zambezensis*, the tigerfish *Hydrocynus vittatus* and the giant catfish (vundu) *Heterobranchus zambezensis*
- construction of a remote triggered net for inshore biomass estimates
- introduction of Length Frequencies in CEDRS system (see following section)

- communication between researchers established through an inshore working group

ASSESSMENT OF QUALITY OF WORKSHOPS AND RESEARCH DONE

The workshop on the Assessment of the inshore fishery in 1993 was considered of high quality. It was the first attempt to analyse all existing historical data on the inshore fishery, while it focussed the ensuing data collection and research activities on the inshore fisheries. Growth parameters, mortality, exploitation levels and recruitment to the fishery of three important species were estimated using classical length-based analytic assessments (including gillnet selectivity). The assessment is not without problems as is pointed out in the report of the workshop. E.g. data were limited to experimental catches mainly in an unfished area of the lake which makes extrapolation to the whole lake problematic. A comprehensive analysis of the long term experimental data series of all species was not possible within the time frame of the workshop.

However, many issues have later been assessed in separate studies by staff of both institutes in the framework of M.Sc. studies, both of which are of high quality, and in two internationally published articles. Both studies, one in Zimbabwe and one in Zambia and the articles focus on the long term species changes and fluctuations in the fishery in relation to lake water level fluctuations.

Mesh size selectivity curves were established using experimental gillnet survey data, while growth rates of important species were being calculated using length frequencies and gillnet selectivities (see an article in Naga). The possibilities of tagging were not pursued further. Length frequency data are included in the CEDRS (see further) to obtain population size distributions.

A separate study on the biology of the tigerfish (*Hydrocynus vittatus*) has been initiated, and should lead to both an assessment of spatial and temporal variations in catches, a stock assessment and an estimate of predation mortality of Kapenta (*Limnothrissa miodon*). The only written output seen by us on this subject was a paper in Project report 45. The paper was of reasonable quality but could have gained by focussing on its stated objective of temporal and spatial variation in catches, which is of high relevance to the research objectives of the artisanal fisheries sub-project.

We did not find output (verbal or written) on the experimental longline trials of the vundu, the movements of cichlids, the stomach content analysis of major species or the experimental fishing trials on *Alestes imberi*. Little work has been done - either new or as summarised findings of earlier research - on breeding seasonality, fish dispersal, fish migrations all of which are of high relevance to the stated objectives of the artisanal fisheries sub-project!

Although total biomass estimates were not considered vital to the assessment of the inshore stocks, experimental trials with a remote triggered net are now underway. Experimental gillnet sampling with a standard fleet of gillnets has been standardised between the LKFRI and the DoF Sinazongwe.

The research work done on Synodontis is generally of good quality. However, some questions should be raised to the standards of peer reviewing of the two articles with a more general scope published in 'Hydrobiologia' and 'Environmental Conservation' (In: Sanyanga, 1996). The type of reasoning in the 'Hydrobiologia' article used is substandard and leads to the - given the data presented - false conclusion that the observed differences between fished and unfished areas suggest that fishing has a major impact on fish population structure. While this may be true in general wherever fishing occurs, it cannot be concluded from the data

presented in the article. At the most it can be hypothesised¹. The arguments used in the 'Environmental Conservation' article (e.g. in "It is widely supposed that illegal fishermen get larger fish and have higher catches in comparison with what the licenced fishermen get out of the Lake") point to a somewhat naive level of understanding of the inshore fisheries and leads to a rather easy vilification of 'illegal fishers'. While illegal practices may be a serious problem, this can hardly be the way to address possible solutions to them. The article leads to the remarkable conclusion that the tigerfish should be considered an endangered species and should be recommended to be given conservation status. This to ensure the yearly tigerfish tournament, which is a big revenue earner for the area. Other articles, e.g. Karengu and Kolding 1994 and even in the same PhD study point out that the tigerfish *Hydrocynus vittatus* may not be overfished at all, that an observed decline between 1975 and 1980 may be the result of a spurious correlation, that density dependant processes may be taking place on fish of sizes that are not subject to fishing pointing to a more general cause of fluctuations etc. All this leads to the conclusion that the last word has not been said yet on the status of this important species and the dynamics of its populations.

ASSESSMENT OF RELEVANCE TO MANAGEMENT

An assessment of the relevance of the research to the intended management cannot receive a clear-cut answer as the management objectives as implied in the development and immediate objectives are not clear at all.

The Development objective of the Artisanal fisheries sub-project is:

"The exploitation of the resources of Lake Kariba by artisanal fishers is at MSY"

while the Immediate objective is stated as:

"A strategy for the development and sustainable management of inshore stocks is in operation"

Both these objectives have several conceptual difficulties that have not, and could not as we will argue later, be addressed by the project:

1. The inshore artisanal fishery is multispecies fishery on species with widely differing habits as to movement, breeding habits, reaction to external influences including fishing and accessibility by various fishing methods etc. For each of these species an 'MSY' in the classical sense, like it has been done in the inshore workshop, could be constructed. Conclusions can be drawn of the nature that the stocks are either 'overfished' or 'underfished' and concerns of that nature can be confirmed or rejected. Yet this does not imply what management directions should be taken: the nature of the fish stocks and the multispecies fisheries acting on them do not allow a generalised approach and choices must be made based on more specific management objectives that are not evident in itself. Apart from that, the exercise done in the workshops has shown the difficulties to the approach due to the nature of the tropical fish species many of which have high mortalities resulting in predictive

¹Three arguments are used to explain differences in fished and unfished areas:

- a difference in size frequencies of *Hydrocynus* and *Serranochromis* where in fished areas both have less small and large sizes. This is explained as an effect of fishing where selective cropping of the large fish must lead to decreased recruitment. This can only be done if it is assumed that populations are separated, while stock-recruitment relations may not be as clear as the argument suggests.

- Cichlids are said to be very vulnerable to fishing as they are nest guarders and mouth brooders. Once depleted stocks should take a long time to recover. This is contrary to almost anything that is known about the speed of recovery of stocks of many cichlids (including *O. mortimeri*) after adverse conditions.

- the observations that catches of *S. zambezensis* is actually higher in fished stocks while at the same time for other species there is no difference is explained away by juggling with the tautological catch all phrases 'niche', 'vacant niche' and 'adaptability'. Although a peer reviewer not familiar with tropical fish may be excused in letting the first two arguments pass, accepting the third argument is simply inexcusable.

Although it may seem somewhat overdone, we present this analysis as it points to some important assumptions in the approach towards the management of the inshore fisheries on the Zimbabwean side of Lake Kariba (see later).

catch/effort curves that do not show a clear-cut MSY, and the objective that a management plan can regulate a total annual catch to closer to 20% of MSY seems therefore somewhat pretentious.

2. The objectives are based on an assumption that an African artisanal open access fishery as on the Zambian side or an underdeveloped fishery as on the Zimbabwean side can be regulated to MSY, without either major changes in the present management approach based on a set of generalised common sense regulations - with all uncertainties on whether it will work - or without a great increase in possibilities of the management institutions to enforce. Conversely, if the catches had been found much lower than MSY - assuming it could be calculated - what means did the project or both institutions have to increase them to the intended 20% closer to MSY? Apart from developing an inshore management plan, no development activities were intended. However, in the development plans no mention of the MSY objective is mentioned.

A much more pragmatic approach can be seen in many intended research proposals in the project on breeding seasonality, fish dispersal, fish migrations, difference between fished and unfished areas and the development of specific fisheries. However, many of these studies either have not been done or remain unfocussed due to the specific management objectives of the two institutions.

There is a great difference in management approach in Zambia and Zimbabwe: management objectives in Zambia have been somewhat unfocussed but can be characterised as an open access policy with certain regulations - mostly based on observations and common sense, not research - which in principle are meant to ensure the sustainability of the fisheries. With the newly proposed management structure in which regulations are left open to be determined per fishery, biological research can be focussed to the needs to ensure the sustainability of each fishery.

The Zimbabwean approach is towards resource management and can be characterised as conservational. There are no objectives towards the development of the inshore fisheries other than limiting access, and generally the concern seems to be more on the disappearance of 'big fish', on ensuring the countries revenue from game fishing and on poaching rather than with the needs - as for the development of fishing, and possibly to the expense of the inshore small-scale and subsistence fishers. The results from research on inshore fishing by the project are in many ways contrary to the assumptions of this approach. The spatial approach on managing fishers both in Zimbabwe and Zambia (separation of stakeholders) may be reflected in the two institutions approach to research into the temporal aspects of the stocks (migration, fluctuations due to external drivers) and fishers (migration to certain areas) initially for being relatively irrelevant, while it has turned out to be highly relevant.

Results and insights - sometimes conflicting - gained from the research done do lead to several conclusions on the nature of the fluctuations and effects of the fishery that can lead to a more focussed approach towards management needs.

The main results from the workshop and subsequent work in M.Sc./MPhil, PhD studies and published research are that

1. exploitation levels of three species examined do not give reason for concern of possible overfishing of the stocks. However, no conclusion is permitted that the stocks are exploited beyond the MSY as this has not been established. Suggestions on conservation measures (closed seasons, areas etc.) should be carried out or monitored based on the results of catch rate analysis. This analysis should be done as a next step in response to some warning signals on the status of the inshore stocks on certain localities in Zambia and Zimbabwe.

2. a clear relation between hydrology and changes in fish stocks has been established, and fluctuations in stocks may be influenced largely by external drivers more than through fishing. Abiotic and biotic factors (hydrological regimes and fishing effort) should be recognized in setting management goals. Closely monitored, experimental gillnet surveys will be an aid to follow changes.

4. In the Zambian research strong correlations both between hydrological regimes and CPUE and fishing pressure and CPUE are found. However, deciding which of the two effects are most important is not possible. Furthermore, trends in population sizes of each species examined is similar for the unfished Zimbabwe side and the fished Zambian area, except the tigerfish. The quality of catch and effort data in the CEDRS, including length frequencies, should be upgraded, if the assessments of the impact of effort on the inshore fishery are not to lead to misguided management measures related to control in fishing effort.

3. Indications are that either there may be localised effects through fishing or there are differences in productivity between various basins and/or areas. Generalizing the results obtained from one area of the lake to the whole lake is not possible as has been done in some publications. There are major differences in both species composition and relative stock levels. This has major implications for earlier attempts to synthesize and model the whole lake system, and conclusions drawn from such exercises.

4. The continued presence of *Distichodus schenga* (a large sized schooling species with a well-defined spawning run, generally considered being particularly vulnerable to exploitation) in the experimental gillnet catches in the heavily fished area in Zambia may suggest that the differences between Zambia and Zimbabwe cannot depend on the fishing pressure alone.

ASSESSMENT OF SUSTAINABILITY (MONITORING SYSTEM)

The experimental gillnetting set up in both countries to obtain long term data so that it can be maintained even with low levels of funding available have already proven its value, and will prove its value in the future.

As for the sustainability of the research program the remarks made under the same heading in the section under assessment of kapenta research apply here as well. The project has produced a general framework with which the dynamics of the fish stocks, both inshore and offshore, can be understood. Within this framework many issues need to be addressed for a better understanding of the effects of fishing on the inshore stocks. A prioritisation of such issues needs to be made by both stations. In our view localised effects of fishing on stocks of commercially important species could be a main subject to be addressed. Discussions on how to tackle such research with the limited work force available could be done in the joint working groups.

ANALYSIS OF ACHIEVEMENTS

Much of the achievements and lack of achievement can be related to what has been said under the heading of the assessment of relevance to management. The unrealistic development and immediate objectives concerning biological research needs and the difference in attitudes to management may have led to unfocussed research objectives. Important subjects on breeding seasonality, fish dispersal, fish migrations and the development of specific fisheries have not been addressed. Another important subject often mentioned being crucial in various reports, i.e. the difference between fished and unfished areas and the effects of fishing on the stocks, did not receive the attention it needed. The conceptualisation of the problem into meaningful research questions is extremely difficult due to the large 'natural' variations of areas in the lake. This problem seems to have been

severely underestimated when the field work was done and although it was the main subject for a PhD thesis it had to be abandoned due to this difficulty. Although much effort has gone into the study of *Synodontis zambezensis* no recommendations towards the management or exploitation of the species seems to have been made. Nevertheless, the study has important descriptions on the species that can be useful in more comprehensive studies. Studies on the tigerfish are important both to the assessment of the part of the natural mortality of kapenta caused by predation and of an assessment of the reasons of its decline in inshore catches, while knowledge of its migration patterns may lead to a realistic assessment of the effects of fishing in estuaries. Care must be taken in the assessment to include long term trends and effects of lake hydrology on changes in stocks.

The insights gained by the studies done on the inshore stock changes and possible explanations to its dynamics has been a major achievement of the project. Clearly, lake hydrology plays an important role in this respect, though the mechanisms have not been sorted out yet (inflow of nutrients from rivers, the role of inundation, lake stratification and turnover etc.). The research has laid the groundwork for more specific research into various basins and local effects by inundation and fishing on resident and mobile populations of fish stocks. Attempts to use long term CEDRS data into the boundary review of Lake Kariba (39) show how such data can be used to local management issues. The addition of Length frequency data into the CEDRS system will increase the value of these data to address such issues, and the possible use of analytic models such as cohort analysis and age/length structured predictions.

RECOMMENDATIONS

Zambia: the execution of the experimental gillnetting should be critically examined to avoid the bias in the present sampling design where nets are always set in increasing mesh sizes from inshore to offshore. The matter has been discussed with Mr. B. Musango on our visit in Sinazongwe.

Zambia/Zimbabwe: a prioritisation of biological research issues on inshore stocks should be done by both institutes. In our view localised effects of fishing on stocks of commercially important species could be a main subject to be addressed. Discussions on how to tackle such research with the limited work force available could be done through the joint working groups.

Zambia/Zimbabwe: both the experimental gillnetting set up in both countries to obtain long term data so that it can be maintained even with low levels of funding and the Length Frequency data collection in the CEDRS should be given high priority.

Zambia/Zimbabwe/NORAD: much work has been done on the inshore fisheries from which often -seemingly - contradictory conclusions may be drawn. Simultaneously many new data have been collected that have not been analysed yet. This information should be summarised in the light of new findings. We propose that this could be done in the form of a joint workshop. The output of the workshop should lead a.o. to clear recommendations on directions of future management related biological research of the two institutions. The workshop could be seen as a conclusion on the findings of the research of the Artisanal Fishery sub-project and could strengthen the initiative taken by some project researchers to establish a regular joint workshop.

3. Catch Effort Data Recording System (CEDRS) Zambia/Zimbabwe

DESCRIPTION OF GOALS

To come to a joint management approach for the Lake Kariba fisheries it was felt by the project and its partners that a unified data collection system for both the Kapenta fishery and the Artisanal Fishery should form the basis on which such an approach could be evaluated. Yet, differences in policies and practices regulating the fisheries in each country have made them very different in terms of distribution of landing sites, organisation and effort levels. Regarding the inshore fishery Zambia basically has a policy of open access with no limitations on settlement and on effort (number of nets) and some limitations on methods and mesh sizes. In contrast, access, settlement and effort, mesh sizes and methods are highly regulated in Zimbabwe. Regarding the Kapenta fishery both countries work through a licensing system, but whereas Zimbabwe appears to have a strict policy on the total licences and the distribution of licences between operators such policies are much less restricted in Zambia. In Zambia the Kapenta fishery started eight years later and is less well developed than in Zimbabwe. The reverse can be said of the Artisanal Fishery.

The two countries had developed different systems of catch-effort data recording systems both of which had its advantages and disadvantages. These issues are spelled out in great detail in the project documents 6,7 and 13 and need not to be repeated here. A compromise between good coverage in space (the former CEDRS of DoF), good coverage in time (the former CEDRS of the LKFRI) and practical considerations (costs, distances, staff) needed to be made. As a detection of trends in time was considered important, the emphasis was on the development of a system that would give good time series, but with information on the total catch of the whole lake. The Zambian system was therefore sacrificed to a system that was more like the system in Zimbabwe while the coverage of the lake in Zimbabwe needed to be improved.

Other issues to be tackled to come to a uniform system were:

- a unified system of collecting gross effort levels through total frame surveys and supplementary frame surveys
- the construction of simple and flexible relational databases so that old and new data of similar kind would be compatible
- collection of data (framesurveys, CEDRS data on Artisanal and Kapenta fisheries)
- to establish system of data analysis, analyse and dissemination of results and the establishment of an information exchange program

OUTPUTS

Reports

- Four reports on the evaluation, proposal and establishment of a unified Catch and Effort data recording system and Frame Surveys including the results of the 1990 Frame Survey for the LKFRI and the DoF Sinazongwe (Project reports 6, 7, 13 22)
- Two Frame Survey reports one for each side of the fishery (1993) (Project reports 31 I and II)

- Four lake Kariba Joint Statistical Reports with a fifth in the making (1992 to 1997) (Project Reports 12, 36, 43, 49)
- An MSc thesis on the changes in fishing efficiency of Kapenta rigs in Zimbabwe

Activities

- Two Frame Surveys carried out in both Zambia and Zimbabwe (1990, 1993) and a third in Zambia (1995). Both the 1990 and 1993 frame surveys were to be conducted together with a socioeconomic team. However, in both cases the socioeconomic team was not available at the time allocated for the survey. Some cooperation in the preparation of the 1990 survey was.
- data base systems both for the Kapenta fishery as the artisanal fishery are in place. Both countries use the same system (see report 13)
- uniform CEDRS in place and being executed. The data recording system is not yet fully established in Zambia. In Zimbabwe due to staff shortages right now only 3-6 villages are covered since 1995. Separate reports are written for each country, after which a joint report is collated in combined sessions of the responsible
- trained staff in data collection, computerising data and data management (see 'assessment of training activities' and project report 13 §2.6 and §2.7).
- in Zimbabwe enumeration (catch/effort) data have been computerised from present back to 1971. In Zambia a minor backlog of two months exists.
- no system of dissemination of results to resource users both in the Kapenta and the Artisanal fishery both in Zambia and Zimbabwe is in place.

ASSESSMENT OF QUALITY

Quality of data collection

The discussions and deliberations on the Catch and Effort Data Recording systems were thorough and of high quality and has lead to a system that, although not fully 'unified' for practical reasons, makes direct comparison between the fisheries in both countries possible in principle. The role of the advisor in establishing the new system was considered useful. The system has undergone some modifications in the years that it has been in place, the most important of which is that length frequency data are now collected by the enumerators as well. In practice several issues can be raised that makes the quality of the data collected and a critical examination of trends somewhat uncertain.

1. Effort in the CEDRS of the Artisanal Fishery is not yet standardised: all joint statistical reports mention that the unit of effort on the Zambian side is a boat night while it is 100m net/night on the Zimbabwean side. It is stated in the foreword of all these reports that the Zambian effort should be changed to net length or area, but apparently no follow up on this recommendation has been made yet.

2. In both countries the enumeration system of the Artisanal Fishery is not fully set up in both cases due to staff shortages. In Zimbabwe data are now collected in three to six villages instead of the proposed ten. In Zambia delays in the building of houses for the enumerators (three of the seven planned are built) and the refusal of several enumerators to be settled in CEDRS villages has limited the number of villages where data are collected to five. However, we were told that the enumerators in these five camps right now cover the remaining five as well. DoF projections are that under the present conditions it will take another five years before the system is fully in place. However, the DoF considers the problems regarding the collection of data to be minor.

3. The effort data collected on the Artisanal Fishery in Zimbabwe are considered highly inaccurate. This can be attributed to the licensing system, where both licences and the number of nets per licence are restricted. Fishers therefore consequently report only the allowed number of nets to the enumerators when declaring their catch. As an example: a major change in effort was seen in the two framesurveys conducted where the number of nets rose from a mere 1487 in 1990 to 4899 in 1993. In the joint report of 1995 this rise was attributed entirely to a change in restriction of number of nets per licence from three to five in the Nyamiyami district within that period. The total number of nets in the fishery is suspected to be twice as many than recorded. The emphasis on the illegality of fishers without a licence makes the total number of fishers counted highly suspect, and changes in numbers are therefore highly correlated to changes in regulations. On the other hand, the LKFRI considers the quality of the artisanal catch data collected to be accurate due to the limited number of landing points in the fishery. We have not ascertained the quality of the catch and effort data through enumeration on the Zambian side.

4. Examination of the data produced by the frame surveys in Zambia reveal several conspicuous changes that are generally reviewed uncritically. No explanation is given for the drop of 28% in the number of nets from 1990 to 1993, while both number of fishers and boats increased essentially to expectation. From 1993 to 1995 the number of fishers decreased dramatically with 41% for which several reasons were given in writing and verbally:

- a) The regrouping of fishers had taken place just months before the survey took place and many 'immigrant' fishers -, i.e. from other fisheries within Zambia predominantly from Luapula province (Mweru and Bangweulu) and Kafue/Ithezi Thezi - were thought to have left the fishery.
- b) Only 'professional' fulltime fishers were counted in the 1995 survey. Farmers and cattle keepers who are part-time or seasonal subsistence fishers with only a few nets were not counted.

The two explanations are thought to be conflicting as the great majority of 'professional' fishers are 'immigrants' from the fisheries mentioned before. Furthermore there is a seasonal migration of fishers from Kafue, Lukanga and other areas within Zambia where a closed season is in place. The timing of this and previous frame survey could be important in this respect, as there is an expected increase at least from December to March.

5. Both Zambia and Zimbabwe report a high incidence of seemingly organised Kapenta thefts on the lake that has started to be a serious problem only in the past few years. Estimates of the level of thefts are difficult to assess but are thought to be in the order of 10-20% of the catch². This makes total catch data on Kapenta unreliable. Furthermore, we obtained repeated indications from several informants in Zimbabwe that the total number of rigs operating from on the lake may be higher than the official figures represent, while DoF staff in Zambia held similar suspicions regarding their fishery. If this is the case than both catch and effort data may be underestimated. However, CPUE data were thought to be fairly accurate (but see the footnote) as submissions of Kapenta operators were considered accurate.

6. The unit of effort of the Kapenta fishery on both sides is defined as one rig night fishing. The choice of this unit is justified as obtaining it and maintenance is easy. However, it is a

²This in itself could be a possible cause for the decline in CPUE reported in 1995 and 1996.

relatively flawed measure of effort, as changes in efficiency of the rigs have taken place. A Zimbabwean study on change in fishing power and the availability of the number of hauls and spatial distribution of fishing effort (between basins and within basins) in data collection system since 1985 could lead to an evaluation of the accuracy of the present measure of effort but have not been used (yet). Effects of number of hauls, periodicity in catches etc. could lead to a further understanding of (changes in) the CPUE. Furthermore, there are some Kapenta operators who very carefully monitor and record their own catches (down to the catch per haul!) combined with observations on spatial and temporal distribution of Kapenta and external factors as wind direction and force, waterlevels etc. over a long period. An alliance with such operators could lead to a better understanding of the fishery. Our remarks apply equally to the data collection system in Zambia as it is done similarly as in Zimbabwe.

The CEDRS of Zambia has undergone the greatest change of the two systems in place before the introduction of the new approach. As far as we know no validation to compare the two systems and the resulting total catch data has taken place.

Quality of database software, databases, storage and retrieval

The set up of the relational databases for both the Kapenta fishery and the Artisanal fishery is regarded as adequate and well considered. However, the software used for the databases is Open Access III. We do not know what the rationale was of the choice of this software, but on both sides some concern was raised by the database managers on the user friendliness of the system and the data storage space needs of the package. It appears rather cumbersome and time consuming to translate the Open Access data to other software and/or ASCII for further specific analysis. The data storage capacities of the computers used are limited, and right now the data after entering on hard disc are stored onto 3¼" floppies. It appears that one floppy can contain only a maximum of 3000 data lines. As two backups are made of each data series this leads to an enormous proliferation of floppies (estimate of 120/year for inshore fisheries alone!) and a severe partitioning of the database. Joining the stored data into larger databases for further analysis is time-consuming. Furthermore the vulnerability of floppies to heat and humidity raises concern on the sustainability of the data storage.

ASSESSMENT OF RELEVANCE

A unified system of catch and effort data collection is highly relevant as an aid to management and in the assessment of the widely different management policies of both countries. As for the latter aspect a study of the effects of the different management systems is highly relevant for other fisheries in the region. The unified system is an important step forward to enable such comparisons.

The inclusion of length frequency data for the species caught in the Artisanal Fisheries is considered important in that it reflect the catches of different groups of fishers who use different kinds and sizes of nets and for the study of local effects on effort. Furthermore, the length frequencies obtained from the inshore commercial fishery are useful for the application of analytic models (cohort analysis, age/length structured predictions).

The databases presently are underutilised both regarding the inshore and kapenta fisheries. They could be used more rigorously in the assessment of the effects of the different management regimes and changes in the fisheries. On the other hand, this may be too early regarding the Zambian side as the system is now in place for only a relatively short time

during which some major changes in the distribution of the fishers over the shore has taken place as well.

ASSESSMENT OF SUSTAINABILITY

Catch assessment surveys have been carried out almost since the fisheries in Kariba started, although somewhat irregularly. They consume much time and resources. However, they are the only means available to estimate the total catch of the Lake. A consistent approach to the guidance, training and feedback to the data collectors (enumerators) and a continuous assessment of the quality of the data produced is needed. Improvement on this matter is needed especially on the Zambian side.

The amount of data produced by the system is large. Right now in Zambia the database manager is stationed in Chilanga and before long the data were handled at headquarters. Now the data are stored on a computer in Sinazongwe by one person assisted by one researcher who has several other duties as well. Although they assert that they are on top of the database, we feel that the staff needs for data input and storage is severely underestimated. It is likely that after some time the work involved with each database will be too much for part-time attendance and that more people should be trained to handle the flow of data to ensure the sustainability of the system. Although we did not assess the infrastructure and the data storage system in Chilanga (set up by the project), data storage in Sinazongwe is poor and suffers from the same flaws as mentioned for Zimbabwe if not worse.

In Zimbabwe the database manager is stationed at the LKFRI. The Institute has a good infrastructure as to work force and machinery for data input. The system looks generally sustainable apart from the data storage and retrieval system.

The database managers both in Zambia and Zimbabwe have changed several times during the project. As the databases involved are large and should be accessible to more than one person they should be under strict control and management. In Zimbabwe the system is well under control. It is questionable if the same can be said of Zambia where both Chilanga and Sinazongwe are involved in the entering and storage of the data, while the database manager in Chilanga has many other fisheries to attend to as well.

Frame surveys are expensive and time-consuming operations. Although improvements have been made on both sides, it is not likely that they can be carried out regularly without outside financial assistance. In Zambia major changes have taken place in the inshore fisheries, which may render the data collected in the three surveys done in the duration of the project obsolete over a short period. There is no easy solution to this problem. An alternative mentioned in several reports are the Supplementary Surveys carried out by enumerators, which could be more cost effective. However, such surveys, if they can replace a Frame Survey, would need quite some organisation and training.

ANALYSIS OF ACHIEVEMENTS

We have discussed in some detail some fallacies in the practice of the present system as we consider a rigorously executed catch and effort data collecting system very important to the assessment of the fisheries on both sides. A transparent system of data collection, rigorous analysis and wide dissemination of the results among the users of the resource may greatly improve the discussions on the management of the fisheries with these users.

The problems with both total catch and effort estimation on Kapenta Fishery may be due to a highly politicised and non-transparent licensing system, and a general distrust among Artisanal Fishers towards the institute staff as enforcement of regulations and data collection

are done by the same people. The latter problem has been noted in Zambia as well. During the project this issue has been raised often but no solution has been offered yet. Both the problems with the Kapenta fishery and the Artisanal Fishery need to be resolved to ensure that the data collected are of high quality.

The unification of the Catch and Effort data and the willingness of professional staff on both sides of the lake to cooperate on this and share data can be regarded as a great achievement of the project. However, the emphasis of the individual researchers at both stations should shift from biological research and a 'resource management' outlook to fisheries research and a 'fisheries management' outlook to make full use of this achievement. This is needed to come to a proper methodology and a problem oriented attitude regarding data collection systems.

RECOMMENDATIONS

Zambia: a clear choice on the site of the CEDRS database management should be made. We recommend this to be in Sinazongwe, as this is nearest to the sites where the data are collected which makes response to the enumerators an easier task. For the station to be able to do so enlargement of the staff trained in data handling and storage is needed.

Zambia: a critical examination of the results of past framesurveys. Separation of enforcement and enumeration.

Zimbabwe: improvement on effort in the Artisanal fishery and catch and effort in the Kapenta fishery.

NORAD: the new system is in place for five years and could use a critical assessment

- improvement of present fallacies due to the hardware and database software used
- assessment of the data flow and handling capacity needed
- improve data storage and retrieval system
- critical assessment of the data collected
- further training of database managers both on data handling and guidance of data collectors
- training of enumerators in data collection
- assessment of Total Frame Surveys and advise on improvements of this system
- carry out Frame Survey on both sides
- a final workshop on findings to assess data collected up to now with recommendations to both countries how to continue

For this is needed an advisor for three months, financial assistance in acquiring the necessary hardware and possibly software to improve on the system.

4. General recommendations

SADC: an assessment of the management regimes on both sides and the database systems in use as part of the examination of the results of the Zambia-SADC Fisheries Project.

The situation with very different management policies on each side of the lake with two distinct fisheries makes Lake Kariba a very good study area for the effects of different management strategies. Such a study would be very useful for fisheries science in the region to aid in improving fisheries management systems elsewhere. An adequate and effective way to distribute the results must be an important task of this exercise.

Zambia/Zimbabwe/NORAD/SADC: much of the research of the project is mostly inaccessible as it is published in reports, M.Sc theses or unpublished PhD theses. Ways should be found to publish these results in a form meant for wider distribution. This could be done through research articles in international journals, but this would limit the scope of such publications mostly to biological research papers. Another option could be the conception of a book in which both research work as reflections on the management of the lake could be published.

Table A-1. Listed Output on Biological research: project documents. MSC/MPhil studies, PhD. Indicated is which were part of the project and which were paid for outside the project; the first three columns are project documents related to the subjects mentioned in the heading.

Year	Kapenta Fishery	Inshore Fisheries	Catch Effort Data Recording System	MPhil/MSc Studies	PHD Studies/Seperate Articles
1988	Results from the hydroacoustic survey of Lake Kariba (September 1988) - T.Lindem (1)				
1988	A review of the stock assessment of Kapenta in Lake Kariba - M. Pearce				
1989	Assessment of the potential yield of Limnothrissa miodon in Lake Kariba based on data presented by Marshall (1985, 1987) - P. Degnbol, DIFMAR)			H.G. Mudenda - The population biology of the most abundant species of fish in lake Kariba - Alestes imberbi; A. lateralis; Hydrocynus forskahlii; Tilapia rendalli; Mormyrops longirostris; Synodontis zambezensis; Limnothrissa miodon	
1991			Report on the evaluation of the catch and effort data recording system for LKFRI (Zimbabwe) and DoF (Zambia) and the Frame Survey of Lake Kariba V.Thorsteinsson, R.A. Sanyanga, J. Lupikisha (6)	P.C. Chifamba Evaluation of some of the Lake Kariba 'Kapenta Fishing Unit' University of Bangor (Wales)	

Year	Kapenta Fishery	Inshore Fisheries	Catch Effort Data Recording System	MPhil/MSc Studies	PHD Studies/Seperate Articles
1991	Report on Consultancy to the Zambia/Zimbabwe SADC Fisheries Project. September 1991. E. Ursin	Report on Consultancy to the Zambia/Zimbabwe SADC Fisheries Project. September 1991. E. Ursin	The proposed catch and effort data recording system for LKFRI (Zimbabwe) and DoF (Zambia) and the Frame Survey of Lake Kariba V.Thorsteinsson, R.A. Sanyanga, J. Lupikisha (7)		
1992	Results from the hydroacoustic survey of Lake Kariba (January 1992) - T. Lindem (9)		Lake Kariba Joint Statistical Report -April 1992 R.A. Sanyanga, J. Lupikisha, L.D. Muchabaiwa (12)	L.P. Karengere 1992. Inshore fish population changes at Lakeside, Kariba, between 1969 to 1991. M.Phil thesis. University of Bergen 54 pp.	Growth, mortality, maturity and Length Weight parameters of fishes in Lake Kariba, Africa- J. Kolding, E.M. Tira in, L. Karengere - Naga, October 1992
1992	Midwater trawling trials on Lake Kariba for Kapenta (Limnothrissa miodon) (October 1992) C. Radcliffe (17)		The Catch and Effort Data Recording systems, frame surveys and databases for fisheries data on Kariba in Zambia and Zimbabwe July 1992 V.Thorsteinsson (13)	N. Songore - Assessment of the potential development of a Synodontis zambezensis fishery on Lake Kariba, Zimbabwe - University of Hull	
1992	Working group on assessment of Kapenta (Limnothrissa miodon) in Lake Kariba (Zambia and Zimbabwe) (11)	Fishing trials for Synodontis zambezensis on Lake Kariba on behalf of the LKFRI (October 1992) - C. Radcliffe (18)			

Year	Kapenta Fishery	Inshore Fisheries	Catch Effort Data Recording System	MPhil/MSc Studies	PHD Studies/Seperate Articles
1993	An update on the status of Kapenta research (Septemebr 1993) ZZSPF Staff and P. Degnbol (27)	On the relation between hydrology and fisheries in man made Lake Kariba, Central Africa (September 1993) L. Karengi and J. Kolding (25)	A manual for the Zambia/Zimbabwe SADC Fisheries Project Database (September 1993) R.A. Sanyanga, J. Lupikisha, L.D. Muchabaiwa (22)		
1993	Mid water trawling trials on Lake Kariba - an update of developments to August 1993 (August 1993) C. Radcliffe (29)	Report on the assessment of the inshore stocks of Lake Kariba (September 1993) ZZSFP staff and P. degnbol (26)	1993 Frame Survey Report - Part I Zimbabwe (Septmeber 1993) R.A. sanyanga, L.D. Muchabaiwa. Part II- (Zambia) (December 1993 J.M. Lupikisha (31)		
1993	The feeding habits of Kapenta (Limnothrissa miodon) on Lake Kariba (March 1994) H. Paulsen (30)				

1994	A hydroacoustic assessment of the stocks of Kapenta (Limnothrissa miodon) in Lake Cabora Bassa (Mozambique) and a comparison with the stocks in Lake Kariba - Draft Only . P. Ngalande, W. Mhlanga, N. Songore, A. Baloi, A. Pegado (34)	A report on the status of the Nile Bream (Oreochromis niloticus) in Lake Kariba - Ddraft Only. P.C. Chifamba (35)	1993 Joint Fishreis statistics report for Lake Kariba (October 1994). R.A. Sanyanga, L.d. Muchabaiwa, R.M. Chitembure and J. Lupikisha (36)		Plus ça change, plus c'est le même chose - On the ecology and exploitation of fish in fluctuating tropical freshwater systems - Jeppe Kolding DFMB, University of Bergen, Norway (article III. On the relation between hydrology and fisheries in Lake Kariba, Central Africa)
1995		A boundary review of the inshore fishing zones of Lake Kariba (Zambia and Zimbabwe may 1995 L. karengwe and I Games (39)	1994 Joint Fisheries Statistical Report - Lake Kariba (October 1995) L. karengwe, L.D. Ncube, M. Mugwagwa, R. Chitembure, J. Mun'gomba (43)	Assessment of the tanganyika clupeid, Limnothrissa miodon, in Lake Kariba, M.Phil thesis Uni. of Bergen	Inshore fish population changes in Lake Kariba, Zimbabwe. pp245-275 in T.J. Pitches and P.J.B. Hart (eds.) impact of species changes in African lakes. Chapman& Hall
1995		The status of the artisanal fishery on Lake Kariba: indications from the gillnet sampling program P.C. Munandalu (in 45)	Results of the Frame Surveys and Catch and effort data Recording Systems on Lake Kariba, Zambian side R.M, Chitembure (in 45)		
1996	Working group on the assessment of Kapenta (Limnothrissa miodon) in Lake Kariba (Zambia and Zimbabwe) March 1996 - DIFMAR and ZZSFP staff (41)		1995 Joint Fisheries Statistical Report - Lake Kariba (November 1996) L. Karengwe, L.D. Ncube, R.M. Chitembure (49)	Inshore fish population changes in the Zambian waters of Lake Kariba from 1980 to 1995 B. Musando. Mphil thesis, DFMB Uni. of bergen Norway	Some management aspects of the recruitment ecology of the freshwater sardine limnothrissa miodon in Lake Kariba M.Z. Mtsambiwa University of British Columbia June 1996

Year	Kapenta Fishery	Inshore Fisheries	Catch Effort Data Recording System	MPhil/MSc Studies	PHD Studies/Seperate Articles
1995		A study of tigerfish (<i>Hydrocynus vittatus</i> , Castelnau) in the Bumi basin of lake Kariba, Zimbabwe - W. Mhlanga (in 45)			
1996					Evaluation of lift-net selectivity in the freshwater sardine <i>Limnothrissa miodon</i> fishery on Lake Kariba, Zimbabwe - M.Z. Mtsambiwa, Fisheries Research 26:373-379
1996					R.A. Sanyanga - the inshore fish populations of Lake Kariba with reference to the biology of <i>Synodontis zambezensis</i> Peters 1852





Annex B

Assessment of the economic and sociological research

Economic Research

SHORT DESCRIPTION OF THE HISTORY OF ECONOMIC RESEARCH WITHIN THE PROJECT

In the project proposal elaborated by Dr. Lewis, May 1989 the importance of conducting economic research in relation to management of the kapenta fishery was clearly emphasized, and it was proposed that an economic appraisal of the kapenta fishery together with an examination of the marketing system for kapenta should be conducted.

However, in the Project document, May 1990 economic research was not mentioned among the main activities to be undertaken in order to elaborate management plans for the kapenta fishery in Zambia and Zimbabwe. Anyhow, an outcome of the LFA workshop of the kapenta fishery September 1990 was to develop a bio-economic management model for the kapenta fishery (Output 6).

The economic research component has always been seen as a consultancy service. Regardless hereof no clear strategy has been developed on how to apply the bio-economic results in a management perspective.

DESCRIPTION OF OUTPUTS

Two reports have been prepared on economic research, project report nos.:

14: An Economic Assessment of the Lake Kariba Kapenta Fishery in Zambia and Zimbabwe. A. Palfreman and J. Løvland. August 1992. Supplemented by A Technical Addendum. November 1993.

37: A Fish Marketing Survey of Zimbabwe. ZZSFP, ALCOM and Sevaly Sen. February 1995.

No workshop has been organised to disseminate economic research. However, a bio-economic workshop is scheduled for June 1997 to be facilitated by an international expert.

ASSESSMENT OF QUALITY

The quality of the economic assessment of the kapenta fishery is found to be below average. It especially fails to undertake detailed comparative analysis of the economic performance of different categories of operators. In this respect it would have been appropriate to undertake simple sensitivity analysis to assess what impact changes in various costs and revenue factors would have on profit. Furthermore, the market issues are largely neglected, and the consultants do not to any major extent supplement their own findings with the data presented in a FAO report: "Economic appraisal of the pelagic fishery of Lake Kariba", 1991.

Compared to the FAO report the economic assessment study does only to a minor extent provide additional information of importance for management decisions. Even though the economic assessment study contains relevant management information, it is poorly presented and difficult to use for managers.

However, it must be taken into account, that the ToR were very broadly formulated and not clearly prioritized. Furthermore, the consultants had limited time at their disposal to do the research, and therefore they were already from the outset placed in a difficult position. It should be mentioned, that the quality of the study was improved considerably by the submission of the technical addendum.

The marketing study is a good study, containing valuable information about the market for fish and fish products in Zimbabwe. The study has been carried out in accordance to TOR. It is, however, the impression of the team, that the market study should have been expanded to include an analysis of the power structure at the Zimbabwean fish market and an estimation of the future demand for the most important species in Zimbabwe. Such studies would provide valuable information on the prospects of fish prices to managers.

ASSESSMENT OF RELEVANCE

The research undertaken is extremely relevant and important in a management perspective, especially the economic viability study of the kapenta industry and the marketing study.

However, the team found it rather premature that the project at an early stage decided to primarily focus the economic research on the development of a bio-economic model for the kapenta fishery due to the fact that thorough, biological research on the sustainability of the kapenta resource was on-going. It may, however, have been difficult and against traditional wisdom to foresee in 1990, that CPUE in the kapenta fishery should be fairly constant with increased effort. Based on the latest biological results it seems irrelevant to undertake traditional bio-economic modelling of the kapenta fishery.

The team strongly questions the relevance of the scheduled bio-economic workshop, if the intention is to have a "traditional bio-economic" workshop, as neither the traditional biological models nor the economic models seem to be applicable to the kapenta fishery to any large extent. In spite of this the team sees the need for an economic workshop on the economic viability and financial situation of the kapenta industry.

ASSESSMENT OF SUSTAINABILITY

As the economic research has been carried out by external consultants, the sustainability of the research is doubtful, but the upcoming workshop can be very helpful. A large data collection is on-going involving the two economists at DoF in Zambia, but unfortunately there has not been any economist available at the Zimbabwean side. It is the impression of the team, that the kapenta operators in both countries would like to see the economic assessment to be an annual event, which is a promising perspective.

However, such an exercise will especially in the first couple of years need some form of supervision or back-stopping from an experienced fishery economist in order to build up the capacity within DoF and DNPWLM.

ANALYSIS OF THE ACHIEVEMENTS

It is difficult to assess the economic achievements during the project, first of all due to the fact that economic research had rather low/no importance in the project documents. Economic research has been carried out to support management decisions. However, for various reasons none of the two studies have had any major impact on kapenta management. Furthermore, no marketing study has been undertaken in Zambia.

As external consultants have been used to undertake the economic research, the capacity building within DoF and DNPWLM in the economic discipline has been marginal. In relation to kapenta management the importance of economic research has been underestimated, which to a large extent is a consequence of lack of advice to the project on how economic research can support management and difficulties within the project to formulate economic research need for management purposes.

RECOMMENDATIONS

The team recommends the project to refocus the economic workshop towards an assessment of cost and revenue structures of the kapenta industry, including sensitivity analysis in order to assess how profit is sensitive to changes in various costs and revenue factors, e.g. labour and fuel cost and the kapenta price.

The team recommends, that the project in collaboration with KFA in Zambia and KPA in Zimbabwe develops a simple spreadsheet to assess the economic performance of the kapenta industry. The spreadsheet should be disseminated to interested kapenta operators for their individual daily/weekly economic management.

The project should initiate the fish marketing study in Zambia in accordance to the project proposal.

It is recommended, that DNPWLM strengthen its economic expertise by creating a permanent position for a fisheries economist.

It is recommended, that NORAD provide funding for an experienced fishery economist on short term basis (3 mm over a 2 year period) for supervision and back-stopping in order to build up capacity within DoF and DNPWLM.

Sociological research¹

THE FIRST CONTRACT 1992-95

CASS' involvement in the Project dates back to the preparatory phase when they presented a substantial report on what was known about the inshore fishery on both sides of the lake. They also actively participated in the design and the planning of the project. At a certain stage it was decided that CASS as an institution should not participate in the project as participating institution, but rather that it should have a consultative role. CASS was therefore not a member of SC, but had status as observant, but it was expected that it would continue to play a pro-active role in project implementation. In April 1992 a three-years contract was signed between the Project and CASS with terms of reference which in some details outline CASS' responsibilities. The main points in the ToR are the following:

1. Participate in SC meetings and present progress reports on their activities
2. Give general advice on socio-economic aspects to the project
3. Advise DoF on establishing its own base of socio-economic competence.
4. Advise on inputs needed in the socio-economic field in Zambia
5. Design and implement base-line studies in Zimbabwe and Zambia.
6. Conduct in-depth studies in the fields of:
 - Economic motivations in fisheries
 - Existing community management structures
 - Existing resource and property rights and strategies for sustainable resource management.
7. Establish a computerised socio-economic data-base for Lake Kariba in conjunction with the data-base managers of the project.
8. Design and supervise a long-term socio-economic monitoring system.

It was foreseen that CASS staff would contain one co-ordinator and four younger researchers, Two from Zambia and two from Zimbabwe. The contract did not, as far as I know, contain budget or a plan for time allocation for the co-ordinator. The Project agreed to cover all costs (including fellowships) in relation to the work of the four researchers. From accounts we know that the Project has paid CASS 880,000 Zimbabwean Dollars in the period in question. It is hence not too difficult to evaluate what has been done according to this list and what has not.

Re. 1.

The CASS co-ordinator has participated in all six SC meetings. In one meeting he arrived very late due to problems in crossing the border. I have had access to four progress reports to SC and one to the Annual Meeting, covering the period from the beginning of the contract to September 1994. The quality of these reports varies. Their general weakness is that they do not give a sufficiently clear picture of what CASS really has been doing. They do not systematically relate to the terms of reference. As an example the reports do not contain any systematic information on the progress concerning items 3,4 and 8 above. They talk a lot about

¹ The following sub-section is to a very large extent reproduced from a review the team leader did in 1995 of CASS' work in the project. It therefore follows an other outline than the one used in the rest of the annexes.

various advisory activities, but nothing about which advice has been given. The reports very seldom talk about the concrete outputs of various activities. When they do it is as intended outputs which most often are 'forgotten' in the next report. On the other hand the Project has never commented upon or criticised these weaknesses as far as I know.

Re. 2

The progress reports give a fairly good indication of what sort of advice CASS has provided to the project. It mainly concerns participation and input in workshops in Zimbabwe. Very little - if anything - has resulted in written outputs. The workshop in early May which I attended, and where CASS was to present some of their findings to the project, had a weakness in that parts of what was presented was too general and difficult to relate to what is conceived the concrete dilemmas of the Project. Two reports presented by the two Zimbabwean researchers (M.Phil. students), contained a lot of very useful information, but there is probably a need to systematise it further in order for the Project to make maximum use of it.

The Project, on their side, criticise CASS heavily for not having fulfilled their advisory task and for not playing a much more pro-active role. Although I can understand that the Project would have liked much more socio-economic advice, their criticism is difficult to endorse, given the formulation in the terms of reference on this point which is very vague ("advise ... on socio-economic matters as and when necessary"), and no clarity as to how much time the coordinator was supposed to spend for the Project. The example of the two reports presented at the workshop in May illustrates a dilemma in this connection. Is it the responsibility of the consultant or the Project to do the systematisation of very useful information contained in the reports? To me the answer to this question is unclear. The advice issue must to some extent also be assessed in relation to how much the project actually have paid CASS for such services, but specific information on this issue was not possible to obtain. I shall return to the advice issue below.

Re. 3 and 4

The terms of reference explicitly say that the work on these two issues (and on the issue of a base-line study in Zambia), shall be seen in relation to DoFs work to identify a Zambian institution which can assume the advisory role on that side through a contract with the Project. A lot of effort was invested in this task and CASS participated. However it took more than two years before it became clear that no such institution was possible to recruit at an acceptable cost and DoF found itself without a socio-economic consultant and with little internal competence for this kind of work. CASS can not be blamed for this, but given the terms of references, one could have expected that they might have contributed more actively to find other solutions.

Re. 5

It took more than a year (June 1993) before the base-line study of the Zimbabwean shore was undertaken. The reasons are particularly related to the fact that it took much longer time than anticipated to recruit the necessary research personnel (see 6). Besides, CASS had also to design survey methods and content. The report from the survey was first planned to

be presented in September 93 (Progress report dated 4/5-93). In the next report dated November 93, the presentation is postponed until Mid-January 94. In the report dated 31/5-94, the date of presentation has become 'Mid-June' (94?) and no explanation is forwarded for the new delay. The work must be in its absolute final stage since this is written only two weeks before the new dead-line and since a specific number of pages (140) is given.

In the last progress report of 25/9-94, no mention of the survey report is made at all and the report is still not out as per June 1995 - almost two years after CASS themselves initially had planned to circulate it. What has been presented are the annexes to the report, but they are in a form which makes them completely unreadable for a normal user. Despite intensive investigations on the issue I have not been able to get a clear understanding of the reasons behind this sad state of affairs. I therefore feel obliged to conclude that only CASS can be blamed for this failure in performance.

What is somewhat surprising is that the Project and SC do not follow up on the issue after the first letter of notification dated 16/5-94 was sent. The letter express that SC now is concerned about progress in the work of CASS. According to the project management, the reason is that they by September 94 had lost all faith in CASS and given up expecting anything.

The implementation of a base-line survey in Zambia was pending the recruitment of a Zambian institution. Since that failed to materialise, the study was designed, but not implemented in the project period. It was implemented in May 1995, immediately after the signature of the new contract and led by the two Zambian researchers at CASS. It should be noticed however, that they only participated in the field work in two of the four zones, before they left for seminars in Europe. The survey of the two remaining zones were done by assistants and DoF personnel.

Re. 6

The in-depth studies were to be undertaken by the four researchers to be recruited. The recruitment process proved to take more time than anticipated. The two Zimbabwean, one with an M.A in development studies and the other with a first degree in economics, were recruited in January-February 1993 for three years. Later, two Zambians at that time working in the ministry of agriculture in Zambia were recruited for three years in September-October same year. Both have M.A.s in relevant fields.

For reasons which are somewhat unclear, all the four researchers were registered as M.phil. students at the University of Zimbabwe in spite of the wishes from three of them (according to one of them) to go for Ph.D.s. Although passing from M.A to Ph.D. in the past often included preparation for a M.phil. degree, this seems a bit cumbersome procedure today. Three years is however too short to finish a Ph.D. from an M.A. I fully agree with the principle of utilising this type of contracts for academic capacity building; that is in everyone's interest. The problem is however, that all three researchers feel that they are left with little academic incentives from this engagement at the same time as their research for the project is being somewhat hampered by university procedures connected to the submission of M.phil degrees.

If it was not possible to register the researchers for Ph.D., it would probably have been better and more cost effective to engage them as temporary researchers.

In general, I find that the researchers have been using too much time at CASS in Harare instead of in the field. Approximately one year was spent by each of them on literature reviews and preparation of research proposals which were submitted mid 1994. In a time perspective of three years I find this preparation exaggerated. After this, the Zimbabwean researchers have been regularly in the field although their stays are often of limited duration. The short visit we had together in the field convinced me that they have a good understanding of the present situation and many of the social processes that are taking place. They sometimes have, however, certain problems in seeing what the consequences of these insights are for various resource management options.

The lack of time in the field is particularly serious in the case of the Zambian researchers who have not yet started their fieldwork and who visited the field for the first time when they led the base-line study in May - approximately 20 months after they were recruited. The reasons given for this delay are either connected to the problems in recruiting a Zambian institution or a series of administrative constraints in connection to them working for a Zimbabwean institution while doing research in Zambia. Although I acknowledge that these may have complicated the task, I have difficulties in understanding why no field work has taken place as yet and I have doubts about the realism in terminating the two studies within the three years framework.

The Project does not feel too happy with the research proposals. From an academic point of view, the quality of three of the four research proposals is acceptable, while one is considered rather weak. From the more practical point of view, it is important to notice that the results of the studies very unlikely will bring any 'direct' advice to the Project. There will be a need to reformulate the knowledge they produce into a practical perspective and this task has not been planned for in the new contract. CASS has, however, a good point when they say that if the Project feels uncomfortable with the content of the research proposals it should have reacted when they received them about a year ago. The Project never did.

Re. 7

This has been one of the 'hottest potatoes' in the controversy. In late 1994 the Project reacted because they claimed never to have received the data files from the base-line study in order to integrate these data in their overall data base. CASS on their side, claimed that they had sent the data files to the Project in June 1994 (according to minutes from meeting held in Kariba 1/3-95). In itself that must be considered rather late, but as already shown under point 5, the work on the base-line study was not characterised by high speed. There is of course no way to find out what really happened, but the fact is that CASS in their progress report to SC, dated 31/5-94, clearly states that the files have just been sent. If the project only reacted much later, they must in my opinion bear the responsibility. The normal thing would have been to ask what had happened shortly after they received the progress report. New files have later been received by the project.

Re. 8

No reference to any such activity taking place have been found. Nor does it seem that the project have asked for it.

THE SECOND CONTRACT 1995-97

In February and March 1995 a series of meetings were held between the Project and CASS where one tried to sort out the problems which had arisen and which have just been described. On the basis of this, the Project decided to extend CASS' contract for another two years. In substance, the new terms of reference are fairly similar to the previous one, except that most activities in relation to Zambia has been removed. What remains is the responsibility for the Zambian base-line survey and the supervision of the two Zambian researchers. In form, the ToR is more specific, in particular concerning expected written outputs which have been listed with deadlines.

The list contains 19 reports, including the four M.phil. theses and the two base-line studies. Each of the four researchers is to present two reports in addition to their theses, the remaining seven is the task of the CASS co-ordinator. Approximately four or five of these reports already exist in draft form. The initial contract period of three years (from the date of recruitment) for the four researchers will, according to the budget, not be extended. The total budget for the contract is approximately 805,000 ZWD.

By now, the consultant has produced 15 reports and 3 are said to be pending, but the reports are not always the same as what was foreseen in the contract. Except for the theses, most of the reports constitute shorter papers produced by the students. Only 2 have been produced by the coordinator and 1 is said to be pending. Compared to the initial contract, 14 of the produced reports must be classified as in-depth studies and 1 as project advice. All the 4 students have submitted their theses and will probably graduate. One of them continues his studies at Ph.D. level at CASS, but despite what was reported in the last Annual Meeting, the funding has not yet been secured.

On all of the other initially intended activities, no outputs seem to have been produced. The analysis of the data-files was finally done by a project biologist/ecologist, but the result of a simple frequency analysis of the data has led to rather strange and confused results which the team considers of virtually no value.

Dissemination of results have not taken place, and at project headquarters in Kariba the team was able to trace only 5 of the reports. Disagreement seems to exist as to whether the rest has been submitted. Knowledge about the content among project personnel is very weak, but seems to be somewhat better in Zambia than in Zimbabwe. One must therefore conclude that one important

objective of the project - to integrate socio-economic research with biological research for inshore management purposes - has failed.

The quality of the reports consulted by the team varies but must be said to fall below expectations. This is natural given that they are mainly prepared by the students. They are theoretically and methodologically weak and the empirical data they rest upon are limited. Analyses are often shallow and there is a strong tendency of falling into 'popularly correct explanations'.

The themes of all the papers are of great relevance to the project and they also raise a lot of very interesting information which could serve as basis for continued research. The contract of the consultant has however, not been extended and the sustainability of the activities is therefore highly doubtful. This is to some extent counteracted by a one year contract as project sociologist given to one of the Zimbabwean students and the affiliation the two Zambian fellows have to MAFF.





Annex C

Assessment of results in training.

Short description of activities

The training activities are mentioned in the project proposal in relation to relevance for both the Artisanal Fisheries sub-project and the Kapenta sub project. In the planning workshops on both sub-program held in March and September 1990 respectively the outputs were defined as such. Added to the activities were points of self-assessment and a review of training programs by an external assessor.

On the job training on workshop management and mechanics/boat repair was provided through Mr. H. Bjarnasson. On the job training of data base managers in the new Catch and Effort Data Recording System (CEDRS) was done by Mr.V. Thorsteinsson. Scouts and fisheries assistants were trained in the new CEDRS system by the senior staff of DoF and LKFRI.

In the OOPP workshop of 12-23 March 1990 support measures to be carried out in relation to the Artisanal Fishery that have some bearing on the Assessment of training programs were defined as follows:

Output 9 Support measures carried out (Artisanal Fishery)

- 9.1 establish regular dialogue with local communities and fishing communities
- 9.2 identify training areas for fisherman, e.g. in
 - self management
 - negotiating skills
 - boat handling
 - fishing gear etc.
- 9.3 Conduct appropriate training for artisanal fishermen
- 9.4 Consider measures to support credit facilities on a pilot basis

Description of outputs

See attached (Table A) listing of courses followed by staff and support staff of both Department of Fisheries and the LKFRI. The table includes staff training not funded directly by the project (marked by asterisks), but which can be regarded as an effect of the project as all subjects relate to its biological research program. Field work of these researchers generally has been funded through the project. Two of the professional staffs have been approved to go for PhD level studies, but no action has been taken yet to effectuate this approval.

As far as the review team has established, no output on the intended review of training and further training needs of staff has been produced.

Selected senior staffs of DoF and LKFRI, two of DoF and three of LKFRI, were trained in the set up and utilisation of a relational database for fisheries data (CEDRS). The activity was continuous throughout the two periods Mr. Thorsteinsson was in the area. Two members of staff, one from each country, after following a course in the Netherlands aimed at data handling for tropical fisheries went on a trip to Iceland to discuss results of the frames survey, an evaluation of the CEDRS and a proposal for a new unified CEDRS.

As for the support measures 9.2 to 9.4 as described above LKFRI has done some courses and extension activities, e.g. on bookkeeping for some cooperatives and through workshops. Some initiatives are presently taken to identify training needs for Fishermen Associations. The LKFRI presently plays a coordinating role in various training programs offered through other government institutions donors and NGO's. In Zambia initiatives towards the identification of training needs of artisanal fishers are now being taken.

Assessment of outputs

The training of professional staff was heavily biased towards biological themes or related technological subjects (data handling, marine mechanics/engineering, post harvest fish technology). In Zambia of the 14 training programs four were on economic and sociological subjects (two each). In Zimbabwe of the 17 training programs three were on administration and two on sociology.

Discussions with NORAD and various other persons related to the project raised the point that many trained professional staffs had left the two institutions. It was expressed that the training did not have the intended effect of strengthening both LKFRI and the DoF station in Sinazongwe.

Table A makes clear that of the 14 professional staffs trained in Zambia three have left the Department of Fisheries while one person has moved to a higher post within the same Department. Of the two persons trained based at the Ministry of Agriculture Food and Fisheries one is preparing his PhD studies, but in principle will return to his post afterwards. In Zimbabwe of the 17 professional staffs trained three have left the LKFRI and DNPWL, one person is on temporary basis stationed at the ALCOM project within the DNPWL, but will return in principle to the LKFRI. Two persons have moved to higher posts within the DNPWL, although one of them should be available for tasks within the LKFRI.

Thus three points can be on the views expressed:

1. Several people trained have left the project to work elsewhere. However, it could (or should) not have been the intention of the training that all people trained were to continue for the project as such. It should be assessed whether the stations are strengthened by the training, in relation to the present positions of the trained staff.
2. When looking at the positions the professional LKFRI staff trained have now the great majority still clearly works in fisheries research and/or management. The LKFRI can draw on the knowledge and experiences of the two researchers at the University Institute at Kariba in Zimbabwe, one of whom is still doing fisheries related research, and both of whom have regular personal contacts with the LKFRI.
3. Except the two economists and the database manager based in Chilanga that have left the DoF all of the Zambian trained staff and most of the trained professional staff in Zambia are working either in the Department of Fisheries Sinazongwe or at headquarters in Chilanga. The DoF made clear that the two sociologists trained were working or were to return to a position at the Ministry of Agriculture Food and Fisheries (MAFF) and could be used by the Department if needed. However, both are heavily involved in other duties as well.

Courses in data handling on computers are only useful if participants will be working with their own databases afterwards with regular access to database specialists for a long period of time. The project has seen a number of changes in the database managers and all persons trained initially have left their positions in subsequent years. Both countries seem to have

been able to handle this situation in their appointment and training of new staff. But whereas in Zimbabwe the new database managers still have access to the previously trained persons, such is not the case in Zambia. The present staff in Sinazongwe responsible for the database has received no training and further assistance in this respect may be needed.

Due to staffing problems both in Zambia and Zimbabwe attempts for on the job training on workshop management and marine maintenance/repair were fruitless (see also the annex on the assessment of infrastructure supplies). In Zimbabwe the situation may improve after the appointed mechanic returns from a training course in Malawi, depending on the extension of the contract of the advisor. In Zambia no such improvement is currently envisaged other than the move of the daily management of the project from Chilanga to Sinazongwe. The DoF is aware of the problems and is trying to address the situation by looking into the possibility of appointing a qualified mechanic for the station.

Many support staffs of the LKFRI have been trained. Most of the support staff trained in Zambia was at headquarters level in Chilanga, while the station received little attention in this respect. This may be due to the situation that a number of activities (e.g. database management) are/were centralised for all zambian fisheries in Chilanga. Current training needs will have to be reviewed in the light of the present transition to a more decentralised structure of the DoF.

Training of fishers

In Zambia no such training has been done yet from the Department of Fisheries. The project has yet not made an assessment of its own and fisher's needs in this respect.

In Zimbabwe a sociologist has been contracted for one year (1997) to carry out extension work towards organising fishers and assisting cooperatives and Fishermen's Associations. Some FA's were initially organised through CAMPFIRE programs. The sociologist has now changed his role into coordinating existing training activities by various organisations (Agritex, District Councils, NGO's) partially to divert some attention of these organisations to areas along the lake that receive little assistance. However, his organising activities do not result from a clear perspective on fisheries (co-)management and may result in organising for organising sake.

Sustainability of staff training

Training to MSc level either through the project or with other funding with subjects directly related to its research program had a positive impact. Studies carried out generally were of high relevance in explaining observed changes in fish stocks and in giving a better view on the potential impact of the fishery. Sinazongwe station now has a highly qualified staff able to carry out its own research programs, and if it can retain intellectual support has the potential of becoming a strong institution. Despite the leaving of some professional staff of the LKFRI, it remains with highly qualified staff able to carry out its own research programs, while at National Parks level in Harare highly trained and experienced staff are present for guidance.

However, both stations remain extremely weak on social and economic issues concerning fisheries' management, and neither the project nor both institutions have addressed this issue properly. If both DoF and LKFRI are to be sustainable on a broader basis of management implied in the objectives of the project, high level skills within both fields of expertise are desperately needed. The biological bias of the training programs, and the felt lack of understanding of the need for these skills other than on a temporary basis (Zimbabwe) and

with a limited 'extension mandate' (not research), may turn out to be a serious shortcoming of both institutions in the future. It was expressed in one of the interviews that it was "an impossibility to ask of anybody to make friends with fishers in one year through an institution regarded by them as their enemy for more than thirty years".

The absence of a qualified mechanic at both stations, but especially in Zambia due to the lack of other mechanics mechanical workshops in the neighbourhood, may have serious consequences for the sustainability of the vessels, and subsequently the sustainability especially of the kapenta research programs.

Both the decentralisation within the Department of Fisheries (financial, data analysis) and the proposed management structure will put high demands on both professional and support staff of the station. Too little attention has been given to training needs on extension, data handling, general financial and administrative management of the Sinazongwe station, which may hamper its well functioning.

Rapid changes in staff responsible for the database management both in Zambia as well as in Zimbabwe may be detrimental for the quality and rigour with which the database is handled.

Impact of proposed management structures

The new fisheries' management structure in Zambia provides fora in which a regular institutionally organised dialogue with the fishers both artisanal and kapenta can take place. Identification of training needs in, e.g. self management, leadership, negotiating skills of the artisanal fishers still has to be done. This can be done systematically through the established fora (Village Management Committees, Zonal Management Committees). The Department of Fisheries will be the institution through which these needs may be identified. However, it has only limited capacity both in terms of staff and skills in establishing such needs. Furthermore, it has only limited capacity for carrying out the necessary training in, for example, self management, leadership, accountability next to more technical training, in whichever form.

The DoF working as it is with a clearly defined group of fishers is in an excellent position to find out about the problems and potentials of the new management structure at the lowest level and translate those into services needed. Skills and capacity building at the DoF in this respect are needed. However, specific extension and training services may have to be provided elsewhere: in that respect the Department should function as a mediator and a coordinator of such activities.

In Zimbabwe the institutionalisation of the dialogue with fishers on management of the stocks is weak. Other than through the present sociologist working on a one year contract with the LKFRI - who has an extension mandate - and attempts to include both kapenta and inshore fishers at workshops, the proposed management structure does not address the role of the fishers (both artisanal and kapenta) in the decision making process on fisheries management. The efforts of the sociologist to coordinate and extend existing training efforts of artisanal fishers is laudable, but has yet no continuation after his contract expires nor does it have a clear relation to the intended management of the fisheries. The LKFRI is, in the words of one staff member, "still battling to have a voice among fishers" with whom dialogue is "mostly confrontational". It has identified this situation as a weakness on its part.

Analysis of the results

Are needs in management equivalent to needs for biological research? The biological bias of the higher level studies is considered due to a combination of factors of which the

organisational the setup of the project, the organisation of both institutions and the professional interests of the staff probably are the most important. The DoF does have an Extension and Development section, but in the recent past its role has been limited almost entirely to enforcement of regulations, and its possible roles in management has received little attention both by the Department and the project. The project document assumes a straight link between biological research on the resource via assertions on the level of exploitation of the resource to fisheries management. For instance: in the project planning workshop on the artisanal fisheries (OOPP, May 1990) the development objective and its indicators of the artisanal fishery are closely tied to MSY, catch-effort data collection, MSY and total annual catch. Socioeconomic studies are to be carried out as described under output number 1, but they are not related to the development objective and indicators.

Usage of government of high level trained personnel. If the LKFRI is in identified crisis because of persons leaving the station to work elsewhere the reason for this seems to lie in government working conditions and incentives and government policies, which may have resulted in a down scaling of the institutes importance for the government.

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✓
Mechanical training infrastructure. The need for careful maintenance of vital infrastructure like research vessels, boats and engines seems to have been underestimated by both institutes. Despite the attempts by the ^{expatriate to engineer} ~~mechanical~~ advisor, Mr. Bjarnasson, to establish proper infrastructure and well trained mechanical support staff, this has not led to the intended effect of a good maintenance structure. For Zambia the stationing of ^{the expatriate} ~~Mr. Bjarnasson~~ in Zimbabwe made that he was available for limited periods of time. This may have compounded the problem for the Sinazongwe station, though it may be added that the Department seems not to have taken advantage of his presence. Although a recurrent problem with regard to this type of work in a development context, the question needs to be raised whether the use of expatriates is justifiable, if insufficient mechanical infrastructure (personnel and means) and little will to address a sub-optimal situation exists. Often the work will be - and often is expected to be - taken over by the expatriate. This has been the case in this project as well.

Recommendations

Zimbabwe: As the LKFRI is perceived by both Kapenta fishers and more especially the Artisanal Fishers as the governments face of the DNPWL to the fishing industry, the government may have to reconsider its role if our interpretation of its present situation holds.

Zambia and Zimbabwe, NORAD: apart from the approved training programs no proposals for further training needs have been forwarded both by Zambia and Zimbabwe. The approved training on PhD level should be effectuated as soon as possible.

Zambia and Zimbabwe: we recommend that both Zambia and Zimbabwe should address the need for sociological research skills, preferably at the level of the station and the research institute respectively. Zimbabwe may consider gaining economic expertise to address their management needs.

Zambia and Zimbabwe: high priority should be given to contract a well trained mechanic for both the station in Sinazongwe and the LKFRI.

Zambia: in view of its decentralisation efforts, training needs of support staff in the field stations should be identified.

Zambia/NORAD: lower level staff in Sinazongwe should be trained in extension techniques, data handling and maintenance and administration.

Zambia/Zimbabwe/NORAD: with regard to training of staff in database management see recommendations under the 'Assessment of the Catch and Effort Data Recording System'

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Table C-1. Training of staff of DoF and LKFRI. * =not funded by the SADC Project but can be regarded as effect of the project (see text). Year = year of completion study. Short courses = 6 months and less

Name	Level	On	Where	Year	Presently Working
Zambia: Courses					
P. Kasangula	MA	Development Economics	?	1989	NCDP
V. Kanondo	MA	Economics	?	1989	Retired
P.C. Munandalu	M.Sc.	Limnology/hydrobiology	?	1989	DoF Sinazongwe
H.G. Mudenda	M.Sc.	Fish biology	Uni. Grimsby	1989	DoF Chilanga
J.C. Lupikisha	Diploma	Fish Biology	?	1988	Kapenta Fisher
J.C. Lupikisha	Msc	Fish Biology	?	1990	Kapenta Fisher
S. Banda	Diploma	Fisheries Technology/Fish management	Uni. Humber side	1994	DoF Sinazongwe
K.Kalunga	M.Sc.	Fish Biology Management	Uni. Hull	1994	DoF Samfya
B.Musando*	M.Phil.	Fisheries Biology	Uni. Bergen	1994	DoF Sinazongwe
P. Ngalande*	M.Sc.	Hydroacoustics	Uni. Bergen	1995	DoF Sinazongwe
R.M. Chitembure	Diploma	Information technology/Data handling	?	1995	Dof Chilanga
P. Haachongela	M.Phil.	M.Phil. Social Sciences	Harare	1996	MAFF
I. Malasha	M.Phil.	M.Phil. Social Sciences	Harare	1996	PhD CASS
A. Chilala	Diploma	Marine engineers Cadet course	Sinazongwe?	1998	DoF Sinazongwe
P. Ngalande	PhD	Hydro-acoustics	Approved		DoF Sinazongwe
W. Siame	Diploma	Marine mech.and Cert.in Adv.Mechanics	Approved?		DoF Chilanga?
A. Chilala	Diploma	Marine engineering	Approved		DoF Sinazongwe
Zambia: Short Courses					
J. Lupikisha		Data Handling	IAC/Wageningen	1991	
Sinazongwe FA's		Fish Technology		1993	
J. Mung'omba		Dip. personal computer (correspondence)		1993	
A. Katundu		Monitoring and Evaluation	Harare	1994	
A. Chilala		Volvo Penta engines	Harare	1994	
A. Katundu		Object Oriented Project Planning	Harare	1994	
R. Mubamba		Object Oriented Project Planning	Harare	1994	
W. Siame		Association of Accountants technical level		1995	
DoF Senior staff		Principles of management		1995	

R. Mubamba		Monitoring and Evaluation	Harare	1995	
C. Musuka		Group Dip. on Management studies (correspondence)		1995	
C. Musuka		Computer Maintenance Course		1995	
A. Katundu		Facilitator's course	Approved	?	
Lab Assistant		Lab tech	Approved	?	
Librarian (Sinazongwe)		Library studies	Approved	?	
S. Banda		Basic fish gear technology	Approved	?	
D. Nabuyanda		Fisheries Policy	Approved	?	
Zimbabwe courses					
M.Z. Mtsambiwa	Diploma	Fisheries Biology	Uni. of Wales	1988	DNPWL/LKFRI
H. Nyaruwa	Diploma	Post harvest fish technology	Uni. of Humber side	1989	DNPWL
M.Z. Mtsambiwa	Msc	Fisheries Biology	Uni. of Wales	1990	DNPWL/LKFRI
H. Nyaruwa	MSc	Post harvest fish technology	Uni. of Humber side	1990	DNPWL
P.C. Chifamba	MSc	Fisheries Biology and Management	Uni. of Wales	1991	Uni.Res.Stat.Kariba
C. Kamuto	Diploma	Foundation for business study		1992	Public Service Ass.
N. Nyau de	Diploma	Foundation for business study		1992	Town Council Karib.
N. Songore	Diploma	Fisheries Management	Uni. of Hull	1992	ALCOM/LKFRI
N. Songore	MSc	Fisheries Technology Management	Uni. of Hull	1992	ALCOM/LKFRI
W. Mhlanga	MSc	Applied hydrobiology	Uni. of Wales	1992	LKFRI
P. Mwera	Diploma	Fisheries Management	Uni. Humber side	1994	LKFRI
L. Kareng*	MSc	Fisheries Biology	Uni. of Bergen	1995	LKFRI
R. Sanyanga*	PhD	Fisheries ecology	Uni. of Stockholm	1995	Uni.Res.Stat.Kariba
M.Mtsambiwa	PhD	Ecology pre-recruitment stages kapenta	Uni.Brit. Columbia	1995	DNPWL-Fisheries
W. Muriritirwa	M.Phil.	M.Phil. Social Sciences	Harare	1996?	
K. Nyikahadzoi	M.Phil.	M.Phil. Social Sciences	Harare	1996	LKFRI(temp. contract)
N. Mukome	Diploma	Chartered Institute of Secretaries and Administrators		1997	LKFRI
L. Kareng	PhD	Biomass of inshore fish populations in L. Kariba	Approved	?	LKFRI

Zimbabwe: Short Courses					
N. Mukome	Financial management of donor funded projects	DNPWM	1992		
P. Chifamba	Management/Otolith reading	Tromso, Flodvigen	1992		
F. Gapara	Computer course (correspondence)	Harare	1992		
L.D. Muchabaiwa	Computer course (correspondence)		1992		
M. Mtsambiwa	Otolith Reading	Flodvigen MRS	1992		
R. Sanyanga	Computer course (correspondence)	Harare	1992		
F. Gapara	Computer course (1 day)		1992		
N. Mukome	Advanced financial accounting		1993		
W. Mhlanga	Data handling for tropical fisheries management	IAC/Wageningen	1993		
P.C. Chifamba	Data handling for tropical fisheries management	IAC/Wageningen	1993		
M. Mtsambiwa	Data handling for tropical fisheries management	IAC/Wageningen	1994		
P.C. Chifamba	Zoology		1994		
W. Mhlanga	Data handling	IAC/Wageningen	1994		
S. Moyo	Computer course		1995		
L. Chitenga	Boat maintenance		1995		
P. Mwera	Workshop management/Boat maintenance		1995		
N. Mukome	Public Sector Financial Management	Esami, Malawi	1995		
N. Songore	Fisheries Planning and management		1995		
P. Mwera	Planned Maintenance Using personal computers		1996		
S. Moyo	Computer course		1996		
M. Ngwarai	Lotus 123	Harare	1996		
C. Machena	Project management		1996		
Administr. staff	Computer training		1996		
L. Kareng	Project management		1996		
W. Mhlanga	Computer course		1996		
M. Chitsere	Mechanics		?		
S. Nzunga	Management skills for rural development		?		
N. Songore	Data Handling Wageningen	Approved	?		
P. Mwera	Diesel&Petrol Mechanics	Approved	?		
Two admin. staff	Computer Courses	Approved	?		
2 workshop staff	Basic motor Mechanics	Approved	?		

Annex D

Assessment of the results in inshore and lakeshore management in Zimbabwe

The inshore fisheries sub-project in Zimbabwe had as one of its main objectives to establish a management system for this fishery and to support initiatives for better lakeshore management.

Inshore management

BRIEF BACKGROUND OF THE WORK

The inshore fisheries on the Zimbabwean side has been regulated in a number of ways since the fisheries started in 1962. The main regulatory mechanisms are the following:

- Divisions of the lake into areas open and closed to fishing. At present it is reported that only approximately 40 per cent of the lakeshore is open to inshore fishermen.
- In addition to the closed lakeshore, it is prohibited to fish in rivers and in estuaries.
- Licensing of fishermen is in the hands of the District Councils. The number of licences is reported to be around 1,200. In principle it should not increase.
- Each licensed fisherman is entitled to operate a specifically decided number of nets and one boat. He may employ two helpers.
- Certain types of gear is prohibited and minimum mesh sizes is also defined.

At the initiation of the project, two main concerns seem to have existed relating to existing regulations. First, little was known concerning the rationale of the various regulations, and secondly, it was clear that - in spite of a relatively strong enforcement - abuses and braking of regulations were frequent among the fishermen. A need was therefore felt for the development of a new a new management system.

DESCRIPTION OF OUTPUTS AND VISIBLE EFFECTS

2 reports and a paper for an international workshop have been produced by the project:

Rep. no.19: Machena & Moinuddin, 1993: *Management of the Lake Kariba inshore fisheries, a proposal.*

Rep. no. 39: Karengé & Games, 1995: *A boundary review of inshore fishing zones of Lake Kariba.*

Machena & Kwaramba 1995: *The creation of property rights to promote sustainable development in the Lake Kariba inshore fishery in Zimbabwe.*

Report no 19 is a management plan. In addition to extending existing regulations, the new elements in the management plan include the establishment of what is called 'exclusive fishing zones' (EFZ) for the about 40 fishing camps which exist in the 7 concession areas along the lake, and emphasis on the need to establish collaboration between fishermen and authorities (co-management). This should be achieved through the creation of fishermen's associations. The plan has not yet been put into implementation, but field preparations have included discussions with fishermen and the establishment of some fishermen's associations under the umbrella of the CAMPFIRE organisational structure. Workshops with some of the concerned fishermen and with Nyaminyami and Binga district authorities have been organised. Most of these meetings and workshops have been localised at LKFRI in Kariba.

Since January 1997 a project sociologist has worked full time on promoting the plan among fishermen, prepare for its implementation and help the fishermen to establish associations.

The only visible effects which the team has been able to observe related to these activities, is an increase in the expectations among fishermen for material support from government and a certain reported resentment among fishermen in some areas towards the idea of EFZ.

ASSESSMENT OF THE PLANS RATIONALE

Assessing the Zimbabwean management plan and the preparatory work is an extremely difficult task. First, it appears quite obvious that the plan - opposite to what was the initial intention - is not based upon the results of project research. There is little or nothing in the biological or sociological research which supports the various components of the plan; on the contrary it may be argued that the biological research only to a limited extent supports the biological rationale of much of the existing regulations as well as the zoning. In terms of economic or sociological research, results must be considered so weak or random that the team consider them inappropriate for any type of planning. Nor does the plan relate to such results.

It is the conviction of the team that this observation, in itself, can not serve as basis to disqualify the plan. Reading of the documents reveals that the rationale as well as the strategy of the plan is based partly on a general knowledge about the history and the functioning of the lake's fisheries and partly upon experiences from local resource management in other domains - particularly the CAMPFIRE programme in wildlife management. In addition the plan contains a lot of what can be classified as common sense. In establishing local management (or co-management) the team considers all three factors to be as important as any result from research. This means that assessing the quality and the relevance of the plan mainly must be based on whether the team thinks that available knowledge, experience and common sense have been used in a manner which addresses what can be said to represent what can be expected to represent the real problems in the fishing communities and in a manner which makes the proposed strategy a realistic option.

The reference to the CAMPFIRE experience is of course important, but it is found to be somewhat problematic. 'Blue-prints' in situations where conditions are very different may be dangerous. The effect of fishing effort on the regeneration of fish stocks is certainly not the same as poaching on wildlife stocks. Furthermore, the team somewhat questions the realism of fishermen leasing their fishing grounds to the tourist industry. Given that the protected areas on the lake are vast, the fishing grounds of the fishermen will probably be of limited interest to the tourist industry.

ASSESSMENT FOR THE NEED OF A PLAN

The team questions the assumption that there is a general need for an inshore fisheries management system on the Zimbabwean side of the lake. Except for certain areas, the biological, economic and social conditions seem to indicate that fisheries, the way they are performed, can take place virtually without regulations and that they even could expand and be rendered more efficient. The number of fishermen, nets and boat is low and the team estimate the total effort to represent about one fifth of what it is in Zambia. The majority of the fishermen seem to be part time fishermen with stronger interests and possibilities in other

economic sectors. They are neither very efficient as fishermen, nor do they seem interested in reinvesting surpluses into fisheries. In most of the fishing areas, the need seems to be greater for a development plan (improvement of vessels, gear and market conditions) than a management plan. The fishermen also emphasised the need for material support in their discussions with the team.

In 3 areas however, covering the Gatcegatche communal land and one camp in the Sengwa and one in the Binga area, problems are reported which indicate a need for fisheries management. The problem there seems mainly to be connected to a too high number of fishermen in too restricted areas and CPUE is reported to be very low. As a result, the pressure on prohibited areas and utilisation of prohibited gear intensify.

ASSESSMENT OF THE SUSTAINABILITY

One observes that in the more overall socio-political framework, the plan has a strong conservationist approach and favours a sort of *status quo* regarding access to fishing grounds. It does therefore not properly address what is found to be the main problem of the fishermen in the problem areas. This is what the team suspects to constitute the main problem of the plan. Only about 40 per cent of the lakeshore are at present open to fisheries, and the internal distribution of access is extremely uneven. Concession area C-1 which is far bigger than C-2, is attributed to less than 50 fishermen, while there in C-2 are approximately 150 fishermen in addition to a substantial number (sometimes estimated to 250) of 'illegal' fishermen. The result is too many fishermen in some restricted areas where catch per unit effort naturally becomes very low. It seems natural to relate the reported resentment in the problem areas towards EFZ to these questions.

As long as the plan does not address what the fishermen sees as their most serious problems the team is not convinced that the proposed inshore management system will (as it is conceived) have positive effects in these areas towards reducing the numbers of non-licensed fishermen or other offences against the existing regulations.

The preparatory work seems to have been more concerned about advocating a management plan, than really entering in dialogue with the fishermen. One clear indication is that the management plan still remains the same as it was when presented 4 years ago. The terms of reference of the newly appointed project sociologist also indicate the same. Rather than to establish more understanding and better dialogue, his task is said to promote the management plan in the fishing communities and prepare for its implementation.

Besides, the fishermen's associations are found to be very fragile. The fact that most of the work of putting the plan into action and securing some contact with the fishermen more or less depends on one person, also seriously hamper its sustainability.

ASSESSMENT OF IMPACT

It can not be denied - and it was confirmed in one fishing camp visited by the team - that formal gazetting of EFZ, in certain parts of the lake, may serve the interests of the inshore fishermen in their competition with other stakeholders. However, in the problem areas the gazetting of the proposed areas will probably be of limited value since fishermen already are far too many to share a limited access, and it may even complicate reallocations or redistribution of grounds which in the end may prove necessary.

The team is not convinced that putting the plan into operation will serve the target groups. In most areas it will probably have very little impact and in the problem areas it may even have some negative ones.

ANALYSIS OF THE RESULTS

Establishing management systems requires something else than research

The design of the project very clearly reflects a traditional positivistic approach towards fisheries management. One conceived that purely on the basis of research results, it would be possible to establish clear-cut and 'rational' management systems. Although this approach has been under heavy critique for a long time, it is probably correct to say that it is only in the last decade that the approach really has been abandoned. There are generally three reasons for this:

- Research results do not provide certainty about how to exploit resources in a sustainable way. Rather they give us indications of what is possible.
- All management systems depends as much upon policies as upon research. In this case it means that the design of an inshore and lakeshore management system depends as much upon how the government chooses to divide the lakeshore for different economic purposes than upon what is found to be the MSY of different stocks. Research may then provide the government with insights about the consequences and the realism of various policy options.
- Since no government in the world possesses sufficient resources to build management exclusively on enforcement, it must be built upon some sort of collaboration with producers. This means that a management system requires the establishment of common norms and understandings between the various stakeholders before it can be expected to function. In many places common norms and understandings are found not to exist, they have to be created first.

Despite the heavy emphasis on the objective oriented planning which indicated otherwise, the project somehow understood that management would have to be established without clear-cut research results. That is why it produced an inshore management plan long time before one could really talk about results from research. However, the project design gave no indications (other than to base it on research) as to how this planning process could be performed. If little attention were given to investigate the consequences of various policy options and relate them to the need of establishing a system of collaboration based on common norms and understandings with the fishermen, one of the reasons is simply that the project design did not provide adequate methods and guidelines for how to do it.

An unrealistic belief in government's ability to manage

Government initiatives may create considerable effects in order to establish effective management (see section 8). However, it is today generally accepted that this only takes place if the initiatives are received and being developed further by the private stakeholders and the local authorities. A precondition for this to take place is that some of them see an interest in doing so. It is the impression of the team that too little concern has been given to assure that the proposed plans address what the stakeholders consider their main problems and preoccupations.

The need for fisheries management?

The direct connection between research and management established in the project document combined with the failures of identifying and undertaking adequate socio-economic research seem also to some extent to have prevented the project from raising the question of where, when and for what reasons there is a need for fisheries management. In a certain way it seems as if it became more important to establish a management plan rather than critically to examine the need for it. From what is said above one may see that the team is not convinced that a general need to actively manage the inshore fisheries really exists (except for monitoring its performance), unless major development initiatives are taken in order to intensify it.

Lakeshore management

SHORT DESCRIPTION OF THE WORK

It was realised at a very early stage that development and management of the fisheries of Lake Kariba could not be viewed in isolation. The lake and its shores involve many sectors, e.g. tourism, wildlife, agriculture, crocodile farming, transport. Any attempts to develop one sector without paying regard to the demands from other sectors would therefore not be appropriate.

A variety of attempts over the last 20 years to coordinate planning in the Zambezi Valley as a whole have been tried, but none of these have been implemented. The project therefore attempted to coordinate and rationalise development in the Lake Kariba area.

In February 1993 the project and Department of Physical Planning under the Ministry of Local Government and Urban Development organized the Zambezi Valley Regional Planning Conference in Kariba. At the conference it was decided to prepare a Regional Plan for the Zambezi Valley as a whole as soon as possible, but since the preparation of a regional plan for the valley as a whole is a complex, and therefore relatively long-term process, immediate steps should be taken to prepare a Master Plan for the Lake Kariba area.

The project took over the responsibility for the master plan and hereby initiated the development of lakeshore development plans which incorporated all sectors in the planning. A previous study under the project undertaken by a local consultancy company served as the basis for the elaboration of the Kariba Lakeshore Combination Master Plan.

DESCRIPTION OF THE OUTPUTS AND EFFECTS

The lakeshore management is an integrated component of the artisanal subproject. An outcome of the LFA workshop (March 1990) on artisanal fishery was to elaborate a long-term lake (+shore) development plan. Two reports have been produced by the project, report nos.:

10) *Lakeshore development study - Zimbabwe*. J. M. Hutton Pvt. Ltd., October 1991. (10 sub-reports)

42) *Kariba Lakeshore Combination Master Plan - Report of study*. Technical team, April 1996.

Report 10 is an extensive and interesting description of the characteristics and the ongoing activities around the lake. Report 42 is the draft of the Kariba Lakeshore Combination Master Plan.

The team is aware that the lakeshore planning process has had at least one side effect, in Kariba Town a participatory process including the stakeholders in managing the land/lakeshore south of the powerline has been initiated. By the end of the year a management/development plan for the area should be finalized.

ASSESSMENT OF PROPOSED MANAGEMENT RATIONALE

The rationale for lakeshore management is, that conflicts related to the use of the lake can only be solved by taking an integrated approach. Thus, the inshore fishery should be considered as one user among several users.

This rationale is extremely valid, especially when taking into consideration that inshore fisheries have problems, which can only be solved by taking an integrated approach.

ASSESSMENT OF REALISM

Lakeshore management is a question of balancing the interests of the various stakeholders and resolve conflicts among the stakeholders. The planning process needs to have a participatory approach, where dialogue between stakeholders and managers is crucial for a positive outcome.

After interviewing several people from tourism, kapenta and inshore fisheries and a number of government organisations the team is convinced, that the process towards the elaboration of lakeshore management has not been participatory, as the stakeholders have generally not been involved in the planning. The planning can be characterized as traditional top-down development planning, where areas are being defined for different purposes and activities, and where the plan as such (and government) shall contribute to avoid conflicts and guarantee collaboration between stakeholders.

As stakeholders have not been involved, the team doubts the realism of the approach, and besides, the realism of similar plans elsewhere has proved to be very doubtful.

The team is also somewhat concerned about the consequences of introducing such a plan to the target groups of the inshore fisheries. Unless the interests of these groups are carefully taken account of, the plan may easily turn into a useful instrument for the strongest stakeholders at the expense of the weaker ones.

ASSESSMENT OF POTENTIAL IMPACT

The team anticipates two different scenarios. If the top-down planning continues with only minimal consultation of stakeholders, the team foresees a plan with no legitimacy among stakeholders, and consequently the impact will be limited, and present problems will remain unsolved.

However, if a more participatory approach is taken in both the planning and implementation stages, one can foresee a plan, that is most likely to be respected by the stakeholders. However, the outcome may be somewhat different and may not be in accordance with government policies, which will create another type of problems.

ANALYSIS OF THE ACHIEVEMENTS

The Kariba Lakeshore Combination Master Plan can actually not be characterized as a master plan, but is more a comprehensive analytical discussion paper and a valid and useful tool in the

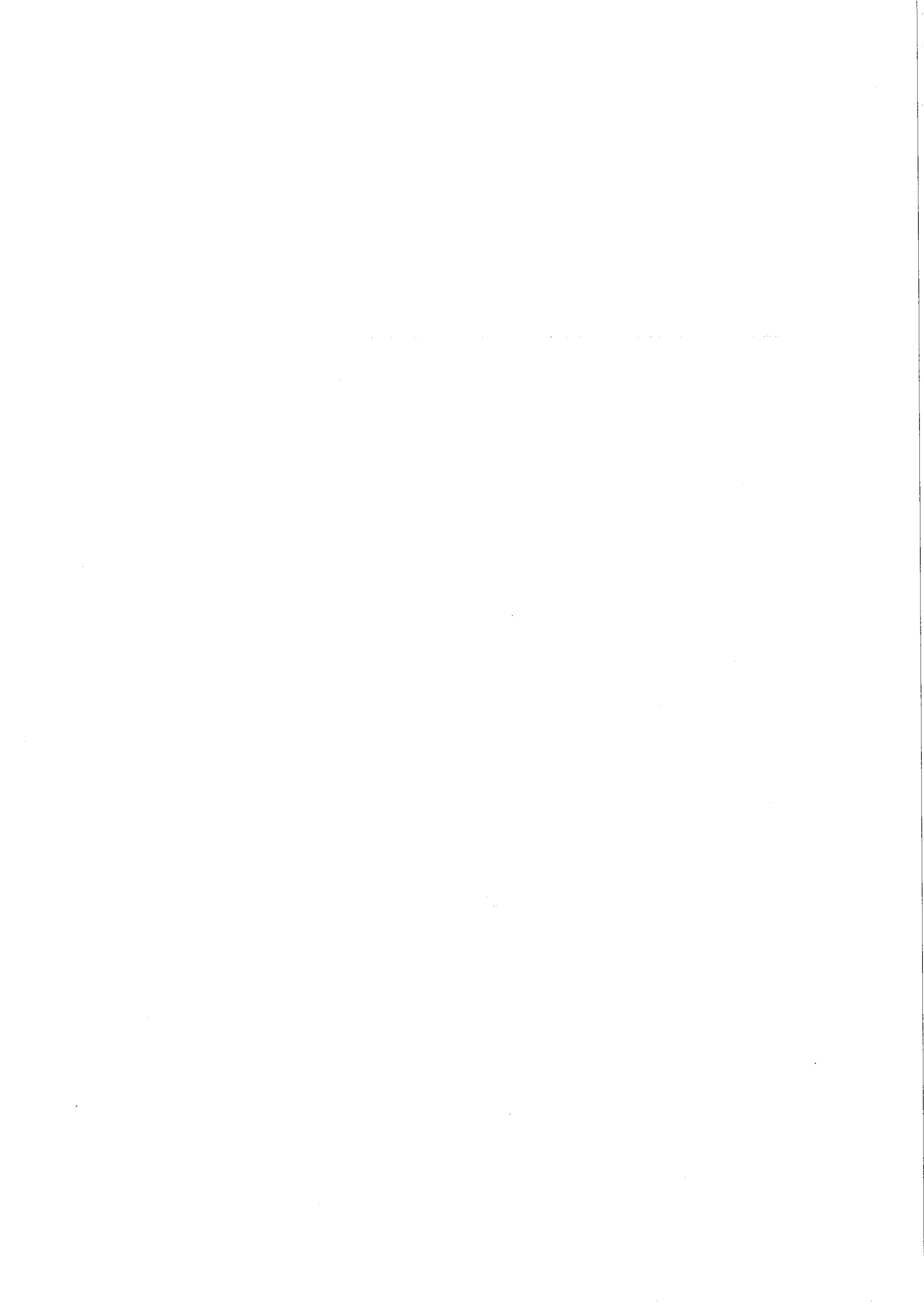
decision-making process. The plan do not in detail focus on issues related to local conflict resolution, which the team identifies as one of the most important issues to be addressed in relation to lakeshore management.

Furthermore, the process of formulating the lakeshore master plan has generally been top-down driven, with the consequence that among the stakeholders the plan is generally not perceived as their plan. Thus, the commitment from the stakeholders to stick to the plan is therefore most likely to be low.

RECOMMENDATIONS

The team recommends, that the government of Zimbabwe integrate inshore fisheries management and lakeshore management due to the fact that their management problems are interrelated. Furthermore, the management problems in the inshore fishery are generally not related to sustainable utilization of the fish stocks, but are more related to resolution of conflicts with other users of the lake and the lakeshore.





Annex E

Assessment of establishing a fisheries and lakeshore management system in Zambia

Short Description of History of Management of Fisheries in Zambia

The Zambia/Zimbabwe SADC Fisheries Project (hereinafter project) initiated in 1991, had a primary objective to develop a sustainable management systems for the Kapenta and inshore fisheries. The aim of the research component which constituted project's main activities was to generate biological and socio-economic data with implications for fisheries management.

At the onset of the project, management of the fisheries resources was the overall responsibility of the Ministry of Agriculture, Food and Fisheries. The Department of Fisheries (DoF) is empowered through the Fisheries Act of 1974 (CAP 314) to control fishing through prohibition of destructive fishing methods, control mesh sizes, register fishermen, assign fishing areas and licences. Law enforcement and control of the regulations are carried out by fisheries extension staff of DoF with the help of the Police to arrest, imprison or confiscate equipment of culprits. The Act has been updated from time to time through statutory instruments which are specific provisions of fisheries regulations. DoF is also responsible for the formulation of policy with regard to development and management of all fisheries resources in Zambia.

In 1994 changes in the current fisheries policy were initiated in order to promote community-based resource management. These changes started because of DoF's limited capacity to monitor and enforce fisheries regulations and as a result of the donor-driven policy through the project to promote co-management. Structural changes were designed taking into account the wider context of a Wide Bank sponsored Agricultural Sector Investment Programme (ASIP) which promotes decentralization and aims at attracting funding for the sector as a whole.

Except for the District Councils which are involved in collecting levies from fish traders, no other authorities were responsible for management of fisheries. Prior to Independence traditional chiefs exercised control over its people and common resources such as land and water. At independence this system was replaced by a National Access regime (Hachongela *et al.*), which opened up access to resources of the country to all Zambians, as reflected in the slogan "One Zambia, One Nation". Thus, Kariba fisheries became a target by immigrant fishers from elsewhere in Zambia between 1968 - 1974, who become geographically dispersed along the shoreline and on the islands. Due to insecurity caused by the the Zimbabwean war of liberation between 1974-1980, DoF withdrew from the lake and Commercial fishing activities came to a stand still. As a consequence the fisheries on lake Kariba had become "open access " by 1993. Incidences of crime in form of cross border trafficking of guns and valuable goods, Kapenta thefts from the rigs and poaching of game in Zimbabwe became order of the day.

It was within this perspective that a new structure was designed. Briefly the basis of the new structure consisted of relocating fishermen scattered along the shoreline into

designated fishing camps after an agreement was reached among the stakeholders in a workshop in 1993. The number of settlements was reduced from about 278 in 1993 to 67 fishing villages.

According to this new structure, the lake was divided into four zones which fall under the jurisdiction of the four chiefs namely Mweemba, Zinazongwe, Chipepo and Simamba. The Zones are subdivided further into fishing villages to accommodate the 40 designated fishing camps, managed by Village Management Committees (VMC). Zonal Management Committees (ZMC) were established comprising of the Chief as the chairman, representatives of the Council, VMC, Kapenta operators, Non-Governmental Organizations and recognised business men or traders in the Zone. The role of the ZMC is to monitor fishing practices, fisheries regulations and operations of VMCs and source for funding for development of the area.

Fishing Village Management Committees (VMC) which comprise of a chief's representative, elected members among fishermen are responsible for monitoring day to day activities of fishing villages, recommend fishers for licences, facilitate and assist in enforcement of fisheries regulations.

Under this structure a fisheries management board for Lake Kariba will be established responsible for overall coordination of all zones and for issuing licences. The Director of Fisheries will chair Lake Kariba Fisheries Management Board. Other proposed members to be appointed to the board are three Kapenta operators, three representatives from the District Councils, three chiefs, representatives from shoreline-based NGO and business, inshore fishers or village headmen. A secretariat will be established to assist the boards in matters such as revenue collection, regulation and policing, research and extension and a division for development promotion. The boards shall report to the Fisheries Management Authority which has been proposed to be set up under the proposed Act. Although the new structure has not yet been sanctioned, implementation has already initiated.

2. Description of the Outputs and Visible Effects

The present framework for fisheries and lakeshore management system in Zambia has developed according to four main outputs as per project report number:

- (21 a & b) Lakeshore Development Planning Lake Kariba - Zambia (Sep. 1993, Parts 1 & II- 1V), by AGRINDCO INTERNATIONAL (Z) LIMITED LUSAKA, ZAMBIA;
- (32) "Management of the Lake Kariba Inshore Fisheries (Zambia). A Proposal Project" (Feb. 1994);
- Implementation of the Plan: Relocation of artisanal fishermen into fishing camps, creation of management structures (Village Management Committees and Zonal Management Committees);
- (46) Fisheries Management Plan (Chipungu and Moinuddin, 1996) - Combined Management Plan for Kapenta and Inshore Fisheries.

As a result of this proposed new management structure the fisheries policy is undergoing review to accommodate community-based resource management systems. This change in policy is guided by overhaul structural changes in the Ministry within the context of the World Bank sponsored Agricultural Sector Investment Programme, which promotes decentralization and is aimed at attracting donor funding for the sector as a whole (including fishing) and at local level.

In order to support these changes in the fisheries sub-sector new regulations for the fisheries have been drafted by DoF and have been accepted by the Ministry of Legal Affairs. An international legal consultant has been engaged with the support of FAO to review the new legislation before it is sent to the Cabinet for approval and signature of the Minister and finally its publication in the Government Gazette.

Although the legislation has not come into force yet, the new structure is already being implemented. For example the team was told that the implementation of the agreement reached at the workshop in 1996 for ZMC to retain 60% of the Kapenta levies shall be implemented as from 1st June 1997, although agreement has been amended to retain 40%. At the time of the visit of the review team, the District Council was in the process of passing by-laws to facilitate collection and retention of levies by VMCs and ZCs.

The immediate effects during the implementation of the plan were the loss of important fishing grounds, especially around the islands and the expectations raised in form of improved infrastructure not met. Generally other visible effects of the plan include better and more sedentary houses erected at the village level through self help and some common facilities put in place in some villages, such as the sinking of bore holes, upgrading (although not entirely) of feeder roads and fish markets. In some fishing villages fishermen's children are seen to go to nearby schools and the community can access the nearby clinic or is reached through the operations of a mobile clinic.

A certain interest has arisen from some donors such as GTZ and Harvest Help to assist the management efforts. GTZ has provided some support to some fishing camps in form of implementing a reforestation programme and supply of working equipment and material support such as carpentry tools and boats to be used for transport. Further support by GTZ to fund the construction of a school in a fishing village has however, been made with resistance by the local headman.

Despite serious problems, improved dialogue has emerged among the different stakeholders and new modes of problem solving and resolution of conflicts seen to take course. The Zonal and Village Management Committees are not only responsible for issues related to fisheries management but are also seen as the arena for resolving land disputes between the tonga and non-tongas. New or increasing tensions have arisen in relation to land and water, witchcraft, the use and management of funds by VMC's.

3. Assessment of the Outputs

3.1. Inshore fisheries management plan

The proposed inshore management plan was developed at a workshop in 1994, which had convened most of the stakeholders. The basis for implementation of the plan is the relocation of inshore fishermen into designated fishing villages and the formation of new local management structures of Village Management Committees and Zonal Management Committees.

Biological rationale

As admitted by DoF, very little can be affirmed from the biological data available in terms of stock depletion. The fluctuations in total catches over the period 1990-1993 between 1000 and 3000 tons appear to be explained by lake level variations that affect its productivity other than increase in catch effort due to increase in fishermen or boats/nights. In fact over the years only a steady increase in number of fishermen is registered, from 236 in 1983 to 2283 in 1993 and no significant increase in technology has been observed. Moreover, the number of fishermen in fact dropped sharply in 1995 (number of boats decreased from 2,013 to 1,310) after the implementation of the relocation exercise.

There are certainly biological implications for the regulations introduced such as closed areas and mesh size, which are aimed at protecting juvenile fish or spawning adults. However, the flexibility shown by managers in the implementation of the new management systems by allowing fishermen to fish near the islands, from where they were originally removed, reflect biological concerns in terms of localised overfishing in designated fishing grounds other than evidence from research results as such.

Economical rationale

Virtually no economic research with a management perspective of the inshore fisheries has been carried out. There is no data or enough grounds to support the economic rationale in terms of improved returns and incomes accruing to fishermen as a result of reduced number of fishermen or as a result of arresting illegal fishing. Possibly, improvements have taken place in market outlets for camps near access roads such as Siavong, Chipepo and Sinazongwe as evidenced by presence of traders in the camps dealing in fresh and dry fish.

In the event that fishing activities are confined to designated areas and in the absence of alternatives to obtain a livelihood such as agriculture and animal husbandry, there is a danger of decreased incomes from fishing which could affect living conditions especially the poorest segments of the fishing communities. It must be noted that the majority of fishers depend totally on fish production through out the year, adapted only to minor seasonal variability in catches through occupational multiplicity within the same sphere of production, such as the purchase and sell of gear, or by engaging directly in fish trade.

Socio-political rationale

The inshore management plan is perhaps best explained by its socio-political rationale. The need to establish dialogue between inshore fishermen and other stakeholders in order to address problems and find solutions to issues of real

importance to them such as theft, illegal fishing and poaching, improved living conditions for inshore fisherment and control seem to justify and further explains the speed at which the plan was implemented. Although there are shifts in alliances and interaction among stakeholders in their incentives to cooperate, DoF's position as mediator/coordinator appears to be central and crucial in insuring an institutionally based interactions and dialogue.

3.2 Kapenta

A workshop held in 1996 to address issues related to the management of Kapenta fishery, is documented as Project Output no. 3 (May, 1990). It was decided to integrate the management of the Kapenta fishery in the same structure already established for the inshore fishery. The regulatory authority for the Kapenta fishery shall be entrusted to Kapenta Fisheries Board in the New Fisheries Act which shall assume responsible over registration, licencing, and enforcement of regulations. As the regulation for the management of the Kapenta fishery have not yet been spelt out in the new plan, it is has not been possible for the team to assess its rationale.

Of particular interest is the Kapenta Fishermen's Association (KFA), which seem to provide a channel for improved communication and dialogue between DoF and Kapenta operators.

3.3 Integrated Fisheries Management

The socio-political rationale for integration are well founded in the management plan and this may very well strengthen the management of both the inshore and kapenta fisheries. In particular, the plan establishes that some part of the fish levies and licences are retained for use at the local management structure level.

3.4 Lakeshore Management

The need for establishing a framework for lakeshore management is quite urgent given the need to extend collaboration to other stakeholders in the other sectors and regulatory authorities on the lake to resolve issues related to land and water. As such a plan has not yet been prepared, the team is of the opinion that the established structure for integrated management of fisheries represents a well founded and interesting framework and embryo towards lakeshore management and the development of a new and parallel structure would increase the chances for failure. All that is required is that the emerging local fisheries management structures are widened to embrace other important stakeholders of the lakeshore.

4. Assessment of Realism

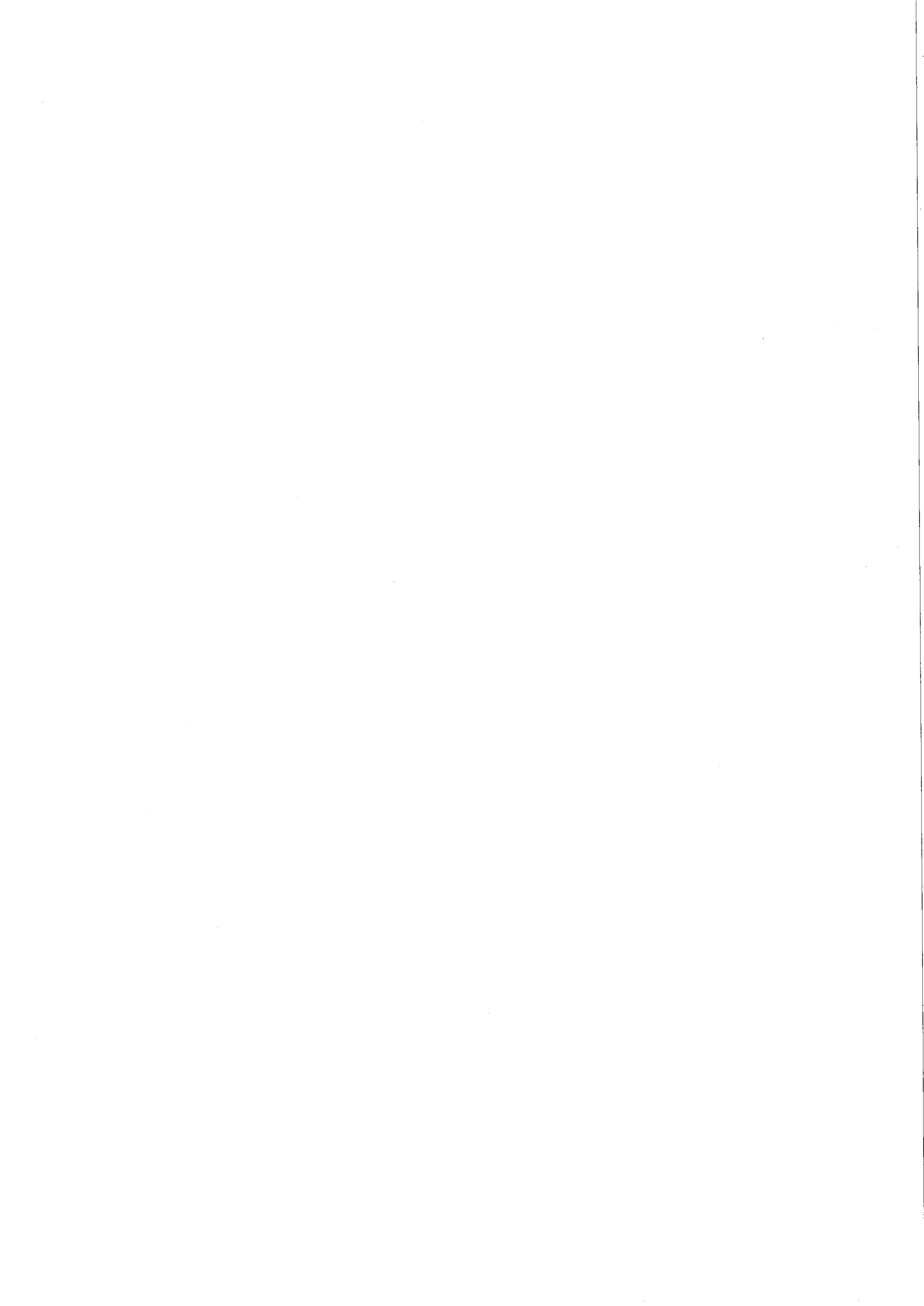
The situation at hand is arguably delicate and complicated. In the face of strong competition for resources among actors few other options exist other than to cooperate. The new management system currently being implemented sets a forum for cooperation between the government and user groups. Some level of interaction in form of consultations and discussions between DoF and user groups namely KFA, Fishers, Chiefs DoF staff, the Council and other interested groups is taking place.

Although the regime is not yet fully operational, it appears that interaction among fishermen themselves as a group has increased as well at the VMC levels, more than when they were geographically dispersed. Under this new arrangement, fishermen are for the first time going to secure representation in decision-making process and make recommendations to DoF through the ZFMC.

Although the plan is very much questioned especially by the donor community, there is strong support from the DoF and personal commitment from among the staff to implement the new structure. The team further observed that there was good relations between DoF and Kapenta Fishermen Association.

5. Assessment of Potential Impact

We need to analyse the outcomes of the old management regime in order to predict potential impact of the new regime. These predictions are based on two main scenarios: (1) based on the plan; and (2) based on complete breakdown of the structure. The most probable result would fall somewhere in between, but if further support is given to the new structure the outcome may come somewhat closer to plan than to a complete breakdown.





Annex F

Assessment of results in Kapenta fishery management

Short description of the work

The Kapenta fishery takes place in the open waters of the Lake. However, the Kapenta stock is one single stock, and thus the actions of the fishery of one of the riparian states can affect the fishery in the other. It has therefore been one of the primary aims of the Project to establish a joint fisheries management committee at a high level and to draw up an agreement for co-operation in research and management of the Kapenta stock.

Research and management of the Kapenta fishery were before the initiation of the project carried out independently in both Zambia and Zimbabwe, and there was basically no communication between the two countries on research and management issues.

As part of the project a protocol has been prepared and presented for consideration of the two governments in March 1996. However, in May 1997 the proposed protocol is still in the process of consideration and still has to be signed by the two governments.

The project has facilitated the dialogue between Kapenta operators and DoF in Zambia and DNPLWM in Zimbabwe respectively. In Zambia an integrated management plan for inshore and Kapenta management has been elaborated and proposed to MAFF. In Zimbabwe, the process of establishing a management plan has literally collapsed, and the KPA has taken DNPWLM to court.

Description of the outputs and effects

Within the Kapenta sub-project the foreseen outputs can be divided into research outputs and more direct management outputs. Research outputs are treated separately in the annexes on biological and socio-economic research. In this annex an assessment and analysis will be undertaken of the following outputs, which the team considers to be direct management outputs:

Output 7: Dialogue with Kapenta producers established

Output 8: Joint management plan for Kapenta proposed

Output 9: Joint management committee established

Output 10: Supplementary measures carried out

The output numbers refer to the LFA matrix for the Kapenta sub-project, project report 4b, September 1990. The project has produced the following outputs:

- Project oriented Project planning workshop of the Kapenta fishery, September 1990
- Workshop on Conflict Resolution within the Kapenta Industry, September 1991
- Conflict Resolution between DNPWLM and Kapenta Industry, November, 1991
- Joint (DNPWLM/KPA) proposal on the reallocation of Kapenta fishing permit, September 1995 (Need to be confirmed by Anne Mette)

- Final draft of Protocol on Economic and Technical co-operation concerning management and development of fisheries on Lake Kariba and the transboundary waters of Zambezi River elaborated and presented to governments in ZA and ZW, March 1996.
- Management of Lake Kariba Kapenta and inshore fisheries, Zambia, October 1996.
- Working groups have been established to set up joint management and research activities.

Communication between DoF and LKFRI has been improved considerably during the project and a discussion forum for management and research issues has been established. This has led to a better understanding in both countries on the status of the Kapenta fishery at the lake.

In Zambia Kapenta operators have become actively involved in management, as they are represented in zonal committees and will be represented at the Fisheries Management Board.

In Zimbabwe the redistribution of Kapenta permits is the major management issue as a result of the implementation of the Zimbabwean Government policy on equitable distribution and access to the country's resources. The redistribution of access rights has been a complicated and conflicting matter. The project has tried to facilitate this process through bringing the stakeholders (DNPWLM, KPA and co-operatives) together at workshops to resolve the conflicts within the Kapenta industry and between DNPWLM and the Kapenta industry.

The project succeeded in facilitating an agreement between DNPWLM and KPA concerning equitable distribution of Kapenta fishing unit (Agreed minutes from workshop on conflict resolution, 12 November 1991). However, the agreement from this workshop was never implemented by the Ministry of Environment and Tourism/DNPWLM.

In May 1995 the Kapenta operators were informed by DNPWLM, that they would not have their licenses renewed by the end of the year. In September 1995 DNPWLM and KPA met in order to find a solution to the problem concerning reallocation of Kapenta fishing permits, the project provided the facilitator. The meeting reached an agreement and DNPWLM and KPA submitted a joint proposal to the Minister of Environment and Tourism. KPA never got any feedback from the Minister on the proposal. On the contrary the Ministry in December 1995 invited indigenous people to apply for Kapenta permits in the newspapers.

KPA raised a court case against DNPWLM in order to be able to continue their operation by the end of the year. In January 1997 KPA had meetings with the Minister in order to resolve the problem through negotiation (the 1995 proposal). However, the Ministry decided not to go into renegotiation, but to have the reallocation issue decided by the Supreme Court. The Zimbabwean Kapenta fishing industry has for several years been in a state of uncertainty and with absolutely no trust between KPA and DNPWLM.

Assessment of proposed management rationale

The rationale for joint management was based on the fact, that the Kapenta stock in Lake Kariba is one single stock, and joint management is required to secure sustainability of the resource.

The biological rationale was a need to control the total fishing effort in the lake in order to prevent overexploitation of the Kapenta fishery, the MSY rationale.

The economic or more correct the bio-economic rationale was to determine the economic optimum to be obtained in the Kapenta fishery, the MEY rationale and to determine the number of licenses in accordance hereto.

The political rationale was that Governments of Zambia and Zimbabwe would accept and adopt the management plan, elaborated by the project and the established joint management committee.

The socio-economic rationale was to improve/establish dialogue with Kapenta operators.

The rationale for the project seemed very relevant, when the project was initiated in line with traditional wisdom. However, it seems as if there has not been any major change in the rationales for the project, as research results have challenged especially the biological and bio-economic rationales. The rationale for elaborating a joint management plan changed towards an economic viability of the Kapenta industry by controlling the number of licenses. However, the project never really realized the implication of the change in rationale, as it continued to be a mainly biological research project, without giving higher priority to economic research.

Assessment of realism

Establishing a joint management committee and elaborating a master plan is a major and difficult task, which requires substantial effort from the project and close co-operation and support from governments, as the project as such has no power to make sure that the joint management plan is going to be implemented. This is the responsibility of the two governments, and therefore the achievements of one of the project's primary objectives has become dependent on factors outside the control of the project. Furthermore, it seems rather ambitious to elaborate a joint management plan as both Zambia and Zimbabwe are scrambling to manage their national Kapenta industry.

The project apparently underestimated the importance of having clear policies and management plans in both countries as the backbone for a joint management plan. The present expectations to have the Joint Protocol signed seem unrealistic, until both countries have worked out their management strategy, and it has been approved by government and accepted by the Kapenta operators.

In Zambia there is a large potential in the plan, and the integrated management approach seems realistic. Furthermore, the plan is generally supported by DoF, District Councils and Kapenta operators. However, it is to a large extent dependent on the commitment of a few key persons, especially in the implementation phase, as government alone is unable to fulfill the expectations from especially inshore fishermen.

In Zimbabwe the situation is much more complicated, and it will most likely take years, before an agreement is reached in Zimbabwe. When the project was initiated, there was a major concern to protect the Kapenta fishery from over-exploitation, mainly by controlling effort on both sides, which can only be done on a joint basis, and therefore the establishment of a joint

management plan was a necessity, and both countries would benefit hereof. However, as the biological research undermines the biological rationale for a joint management plan, it is not that important to have a joint management plan in the perspective of the sustainability of the Kapenta stocks, although it seems logic, that fishing effort cannot be increased in infinity.

The establishment of the joint committee seems to be a realistic approach to ensure exchange of information and coordination of research activities and monitoring in order to follow the development in the Kapenta stocks and the economic performance of the industry on a joint basis. With regard to management the committee should emphasize the need for taking a precautionary approach towards increased fishing effort and for monitoring the development, and if biological or economic problems arise, the committee can facilitate management discussion between the two countries.

In a retrospect the project seems to have underestimated the importance of obtaining political acceptance for the plan and should perhaps right from the outset have emphasised the political aspects more in the preparation phase. However, this was difficult to foresee, and further the planning was undertaken in close collaboration with DoF and DNPWLM.

Assessment of potential impact

Establishment of a joint management committee will probably better monitoring and research, which again might improve management. An agreement of a joint management plan is likely to reduce the autonomy of each of the countries, which might lead to decisions which could be in contradiction with national policies, e.g. on the number of licences or other national policies. A factor, which might contribute to the explanation of the rather long consideration phase within the two countries.

Analysis of the achievements

Various drafts have been presented on the Protocol. From the outset it was the purpose to establish a "Technical Committee", which should be given management power of the Kapenta fishery, and its decisions should be implemented by the two governments. However, it has not been possible to reach such an agreement. The role of the "Technical Committee" in the Protocol presented for consideration of the two governments is advisory, and decisions have to be taken unanimously, and the government shall as appropriate seek the adoption hereof.

The result hereof is, that the "Technical Committee" will not be given decision making power. Thus, the role of the committee will only be exchange of information and coordination of research, monitoring and perhaps enforcement, whereas management de facto will continue to be a national matter.

The major achievements for the Kapenta industry in Zambia is that the plan might lead to a reduction in Kapenta theft. According to the management plan 60% of all Kapenta licence fees and levies should be kept within the zonal committee. As the plan is not yet gazetted, DoF is unable to allocate the 60% of the licence fees to the zonal committee. At the district level the Zonal committees in Sinazongewe and Sinazeze have made an agreement, that 40% of the Kapenta levies are given to the Zonal committees, which is a promising start, and the expectation is, that the 60% will be reached within a period of time. The funds allocated to the

Zonal committees will contribute to the development of infrastructure in the fishing villages to the benefit of especially inshore fishermen.

No achievements have been made concerning Kapenta management in Zimbabwe. On the contrary Kapenta management has led to a major conflict between the Ministry of Environment and Tourism/DNPWLM and especially the KPA. The conflict arose from the governments indigenization policy, which demands reallocation of access rights.

Several meetings/workshops were held between DNPWLM and Kapenta operators. Within the time of the project two agreements (in 1991 and 1995) have been made between DNPWLM and KPA on how to reallocate Kapenta permits. However, there has not been any political will to gazette these agreements. Even though, the team assesses the agreements to be fair for both parties, the negotiations which have lead to the agreements have been a giving and taking on both sides. The KPA has particularly in the 1995 agreement given as much as it probably could in order to keep the support from its members (25% of all permits for companies operating more than 6 rigs will be surrendered).

The Ministry has not been willing to implement the negotiated agreements. Furthermore, it is not clearly understood by the government that Kapenta management primarily is a matter of conflict resolution. Apparently government don't realize, that the present conflict can only be solved through dialogue and negotiation with the user-groups (the Kapenta operators). As long as the government neglects to stick to the agreement, it is not possible to implement a management system in the Kapenta fishery.

Recommendations

The establishment of the Technical Committee should be the responsibility of the two governments. However, it is recommended, that NORAD provide temporary assistance to set up the Technical Committee, e.g. facilitate the first couple of meetings.

The team recommends, that project activities concerning Kapenta management in Zimbabwe are terminated, as long as there is no political willingness to elaborate a management plan in collaboration with the Kapenta operators.





Terms of Reference

**for
a Review of**

**Zambia/Zimbabwe SADC Fisheries Project
Lake Kariba**

1. Background

A proposal for a joint Zambia/Zimbabwe project to coordinate fisheries research and development activities on Lake Kariba was presented by SADCC at the SADCC Annual Consultation in 1983. In 1985 a DANIDA/NORAD appointed mission made an appraisal of the Project that resulted in a revised project proposal. In March 1989, after a one year pre-project phase sponsored by the donors, a comprehensive Draft Project Proposal was presented to DANIDA and NORAD with an envisaged duration of 10 years. In October 1989 each donor granted the amount of NOK 25 mill. for the first phase of the main project, planned to last five years. The final Project Document was accepted in May 1990 and in January 1991 the project was officially started. NORAD was given the executing responsibility on behalf of both donors. If one includes the pre-phase, which commenced with the appointment of a Coordinator and the two Project Co-managers in March 1988, the Project has now been in operation for nearly nine years.

Total donor contribution, including the pre-project and technical assistance, so far amounts to NOK 55,072,000.

The Governmental agencies responsible for the project are in Zambia Department of Fisheries (DoF) under the Ministry of Agriculture, Food, and Fisheries and in Zimbabwe Department of National Parks and Wildlife Management (DNPWLM) under the Ministry of Environment and Tourism. Project direction and leadership are the responsibility of a joint Project Steering Committee with members from both Departments and research divisions and meetings are held twice a year. Daily project management is provided by the Project Co-ordinator and two Project Co-managers, one from each country. The Project Co-managers are also members of the Steering Committee. After the Project Co-ordinator left the Project in May 1995, the day to day operation of the Project was passed to the two Project Co-managers and a Project secretariat made up of representatives from the two countries.

The project is divided into two sub-projects:

- the Kapenta Fishery Sub-Project, and
- the Artisanal Fishery Sub-Project.

The development and immediate objectives of the two sub-projects are as agreed in the Project Document and later amendments as follows:

- 1) The yield of Kapenta from Lake Kariba is ecologically sustainable and economically maximized.

A strategy for joint sustainable management of the Kapenta fishery is in operation.
Target groups: Staff of DoF and Lake Kariba Fisheries Research Institute (LKFRRI).

- 2) Exploitation of the resources of Lake Kariba by artisanal fishermen is at a maximum sustainable yield.

A strategy for development and sustainable management of inshore stocks is in operation. Target groups: Artisanal fishing communities, DoF and DNPWLM.

To achieve these objectives both sub-projects were intended to follow a three-pronged course which includes:

- a) upgrading of fisheries research infrastructure and training of technical staff at all levels,
- b) implementation of biological and socio-economic research programmes on Lake Kariba fisheries as a basis for the development of appropriate fisheries management systems, and
- c) development and adoption of (joint) fisheries management systems.

Under these headings several project activities have been planned and implemented as described in the annual work-plans, budgets, and reviews.

A mid-term independent project review of the first phase was carried out in October/ November 1993. The main conclusions were that both (a) and (b) were well under way. It was recommended that the project should start moving to (c), i.e. from a "research mode" to a "management mode" in order to reach the development objectives. By "management mode" the review team understood a situation where biologists and social scientists work together within a framework for regulation of the fisheries.

2. Objectives

The present external review, at the termination of the first phase, was agreed at the Annual Project Meeting in January 1996. The purpose is to review the project performance and status, and to provide guidance for the decision makers in the governments of Zambia and Zimbabwe, and SADC, on the one hand and Norway and Denmark, on the other concerning a possible continuation of project activities nationally and/or bilaterally. A phasing-out period of selected components should also be considered.

3. Scope and limitations

The main objective of the review shall be to assess to what extent the project has achieved the objectives described above. In addition the review shall include an assessment of the achievements with a view to a possible future need for a continuation of activities under the administration of the present project and if so, which components. If a continuation is recommended, the

recommendation should indicate whether focus and objectives should be redefined and rewritten and include a prioritized list of activities or components. Considerations of present and possible alternative institutional and administrative set-ups shall also be included.

Assessment of achievements should refer to the role of all the relevant actors such as project personnel, government officials in Zambia and Zimbabwe, the Kapenta operators, the inshore fisherfolks, etc. The effects of the project should be assessed with regard to relevant target groups such as the industrial (Kapenta) fisheries (e.g. individual and national income, contribution to national nutrition), the inshore fisherfolk and the lakeshore population (e.g. individual and national income and their own nutrition) and the population at large in Zambia and Zimbabwe (e.g. nutrition).

The assessment of achievements should also include the effects of the various project instruments such as research data concerning the fisheries resources, infrastructure and equipment provided to the project, trained personnel, implementation of data from social studies, implementation of lakeshore planning, etc.

Finally, the assessment should cover effects of the project on private and public organizations involved in the management of the fisheries resources and their capabilities regarding the achievement of the project objectives.

The review shall include as explanatory factors, environmental, biological, socio-cultural including gender, economic, institutional and administrative variables and in addition pay attention to the policies of recipient countries when evaluating the management system and its effect on the target groups and other stakeholders of relevance. The team is free to include any other explanatory factors.

When reviewing the achievements, the project may be considered a process whereby (1) research (biological as well as socio-economic etc.) is done as a result of specified need for data on which to build and operate a management system and (2) research data are distributed from the project to the government agencies/organizations responsible for the management of the fisheries resources used by these agencies/organizations in the implementation of fisheries management system.

The team should include any indications they might be informed of of impact of the project in other parts of the SADC region.

The work shall comprise i.a. the following:

3.1 Effectiveness

This should be an assessment of the effectiveness of the project, including explanations why planned objectives have not been reached, planned activities have not taken place, etc. The assessment should cover both input in terms of infrastructure and equipment, and human resources. Focus should be the effects on the immediate target group (the staff of Dof and LKFRI) and the ultimate target group (the Kapenta operators and the inshore fisherfolk). Moreover, the

assessment should cover relations between actors or organizations in the two countries and between research organizations and the fishing communities within each country.

The focus of this exercise should be the development and establishment of a joint fisheries management system for the Kapenta fisheries and the preparation, design, and implementation of a community-based management system for the inshore fisheries in both countries.

3.2 Impact

The review should include the impact (negative and positive) of all planned and unexpected effects on the target groups, the immediate target groups (the staff of Dof and LKFRI) and the ultimate target groups (the Kapenta operators and the inshore fisherfolk). If men and women within any institution or group differ with respect to the impact of the project this should be highlighted.

3.3 Relevance

The team should attempt to answer whether the project still is justified with respect to local and national development priorities in the two countries. Again the comments should refer to the target groups and the various actors or organizations of the project.

3.4 Sustainability

The team should assess whether the positive effects of the project are likely to continue if external financing will discontinue. In this exercise the team should consider the project as a composite of separate activities or components. In case it is recommended that certain activities or components continue, it should be suggested which activities, if any, could be the responsibility of either country, and which, if any, should be joint efforts.

The assessment of any future need for a phasing-out period with respect to external financing should take as point of departure a brief historic review of the efficiency of the project's administration in terms of productivity and progress and a brief assessment of the sustainability of the present project in terms of institutional and financial capacity.

With respect to the question of joint activities and/or separate activities in Zimbabwe and Zambia, the team should consider the likely contributions of each government in terms of qualified basic staff, technical staff, and research and monitoring staff/institutions - whether based locally or in the two capitals - as well as infrastructure and equipment, for securing long-term sustainability.

Given that the concept of Logical Framework Analysis was explicitly introduced for design, planning and implementation of the project, the review should include an assessment whether this has in any way restricted modifications of the project as new experience and knowledge were gained.

4. Team, methodology, time frame and mode of work

4.1 The team

A team of 4 independent consultants was selected with a view to their qualifications regarding biological, socio-cultural, economic and management knowledge within the field of fisheries development, their representation with regards to donor countries as well as recipient countries, and the gender aspect.

The consultants are:

- Eyolf Jul-Larsen, teamleader
- Paul van Zwieten
- Florence Luzia Bukali da Graça
- Jesper Raakjær Nielsen

The team was considered to have insufficient capacity in the field of biology and consultation with external sources was permitted to be included in the budget.

4.2 The methodology

The review shall be based on desk research and interviews with key persons as follows:

The team leader will select documentation and prepare a briefing for the remainder of the team prior to departure. This will be based on document searches and discussions with key persons in Bergen (CMI and UoB) and Oslo (NORAD).

The team will select further documentation and consult with key persons at the Embassy of Norway in Zimbabwe and other donor offices and with cooperating organizations as relevant.

In the above searches the team shall make use of available archives, documents, reports, plans, budgets, minutes etc.

The team shall interview representatives of the target groups and other stakeholders in the project, other beneficiaries, informants, and project related personnel at all levels in both Zambia and Zimbabwe, third country advisors and consultants when relevant, and personnel at the Norwegian Embassy in Harare and NORAD Oslo. In addition, SADC Inland Fisheries Sector Coordinating Unit, Malawi, shall be given the opportunity to have consultations with the team.

4.3 Mode of work

The assignment shall include a visit to Oslo and Bergen for the team leader before departure to the field as indicated above, and field visits in Zambia and Zimbabwe for the whole team.

The team leader has the overall responsibility for the budget and the selection of organizations to visit and persons to interview.

The consolidation and finalization of the report is the responsibility of the team leader and other members of the team are expected to contribute to the writing of the report.

By signing the contract, each team member agrees to the methodology and mode of work as indicated here.

4.4 Time frame

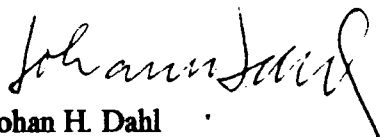
The review shall be completed within a period of 6 weeks for the team leader and 4 weeks for the rest of the team. The review will take place during the months of April and May 1997 with field work in Zambia and Zimbabwe from 20 April to 16 May.

5. Reporting

At the end of the work in the field the team shall have a debriefing, presenting a draft summary of the report to the Steering Committee, SADC and the donors.

The final report shall be forwarded to the Norwegian Embassies in Harare and Lusaka, NORAD/Oslo, Ministry of Foreign Affairs, Copenhagen, SADC/Lilongwe, Department of Fisheries, Chilanga, Lusaka, and Department of National Parks and Wildlife Management, Harare, not later than three weeks thereafter.

Harare, 20 March 1997



Johan H. Dahl
Ambassador

Appendix 5

Project Reports Produced by CASS (As at 19/8/1996)

A reconciliation of Project Reports produced by CASS with those listed in the Contract Document. Please note that in some cases report titles have changed. The status gives author, title and production date.

8.1 Women's Roles in Fish Marketing - Zambia and Zimbabwe (January 1996)

Status: Done: Hachongela Patricia, "The Role of Women in Fish Marketing on Lake Kariba", March 1996. 19 pp

8.2 Analysis of Gender Specific Impacts of the Fisheries Management/Resettlement Programme - Zambia (March 1996).

Status: Done: Hachongela Patricia, "A Gender Analysis of Participation in Planning and the Effects of Village Regrouping on the Lake Kariba Shoreline (Zambia)", November 1995. 15 pp

8.3 Analysis of User-Rights on the Zambezi River and Lake Kariba - What Lessons have been learnt? - (August 1995)

Status: Done: Malasha Isaac, "Changing User Rights on the Northern Shores of Lake Kariba", June 1995. 9 pp

8.4 An Analysis of the Fisheries Management/Resettlement Programme on the Northern Shores of Lake Kariba - (January 1996).

Status: Done: Malasha Isaac, "In search of a New Management Regime on the Northern Shores of Lake Kariba", February 1996. 31 pp

8.5 The Socio-Cultural Characteristics of Fishing Households on the Zambian Side of Lake Kariba - (July 1996).

Status: Pending: Malasha Isaac, The paper is being incorporated into the M.Phil thesis.

8.6 Management of Lake Kariba Inshore Fishery; Problems, Experiences and Opportunities - (April 1995).

Status: Done: Nyikahadzoi Kefasi, "Lake Kariba Inshore Management: Experiences, Problems and Opportunities", June 1995. 23 pp

8.7 Externalities in the Lake Kariba Inshore Fishery; Causes and Solutions - (August 1995).

Status: Done: Nyikahadzoi Kefasi, "Externalities in Lake Kariba inshore fishery", August 1995. 23 pp

8.8 Co-Management: An Approach Addressing Institutional Failures - Dilemmas and Opportunities - (December 1995).

Status: Done: Nyikahadzoi Kefasi, "Towards a New Management Regime in Kariba Inshore Fishery", December 1995. 16 pp (Also see below under Additional Reports, item 2)

8.9 Institutional Conflicts in the Eastern Basin: Implications for the Management of the Artisanal Fishery - (April 1995).

Status: Done: Muriritirwa Wellington, "Institutional Conflicts in the Eastern Basin Artisanal Fishery", July 1995.

8.10 A Socio-Economic and Political Cost-Benefit Analysis of Changes in Natural Resource Management Regimes: Lake Kariba Recreational Park - (July 1995).

Status: Done: Muriritirwa Wellington, "A Preliminary Observations of Management Regulations and Prevailing Fishing Practices in the Eastern basin", October 1995. 20 pp

8.11 Lake Kariba Eastern Basin Artisanal Fisheries - Current Management and Developmental Issues and Perspectives - (November 1995).

Status: Pending: Muriritirwa Wellington. The paper is being incorporated into the M.Phil thesis.

8.12 A Synthesis and Analysis of Frame Surveys and Socio-economic Data: By Camp-Locality-Concession - for Zimbabwe by May 1995 and for Zambia (December 1995).

Status: Pending: Zambia: Activity suspended.
Zimbabwe: Activity included on Mr Jackson's Contract which is not yet signed.

8.13 Nesting Community-based Fisheries Management Initiatives within District Planning - Dilemmas and Opportunities - (August 1995).

Status: Done: Jackson Jeremy, "Creating Common Pools in a Lake Planning for Community Based Management of the Inshore Fishery", August 1995. 23 pp

8.14 A report/reaction to the project on where to integrate relevant aspects of the socio-economic findings and analyses into the Lake-Shore Combination Master Planning Initiative - (May 1995).

Status: Done: Jackson Jeremy and Marshall W. Murphree, "Comments on the Draft Inception Report for the Kariba Lakeshore combination Master Planning Initiative (as directed by SI 42 OF 94)", May 1995. 27 pp plus appendices.

8.15 M.Phil Theses.

Each M.Phil Thesis will be submitted, with appropriate acknowledgements, as project reports on their completion.

status: Nyikahadzoi Kefasi, "A Socio Economic Evaluation of Management Techniques used for Controlling Fishing Effort in the Lake Kariba Gill Net Fishery on the Zimbabwean Side". 171 pp

Muriritirwa Wellington, "The Dynamics of Institutional Change in Natural Resource Management Regimes and their Impact on Resource Use Patterns". 158 pp

First drafts of these M.Phil Theses are being submitted for comments.

Hachongela Patricia, "A Comparative Analysis of Gender Relations/Differentials of the Zambian and Zimbabwean Shoreline among the Artisanal Fishing Households of Lake Kariba"

Malasha Isaac, "The Socio-economic Characteristics of Artisanal Fishing Households on the Zambian side of Lake Kariba"

Drafts of these M.Phil Theses will be ready in three months time.

Additional Reports:

1. Jackson J.C (ed) Workshop Report, "Research Initiatives on Fisheries Co-Management in Central and Southern Africa", July 1996.
2. Hachongela P, Malasha I, Muriritirwa W, Nyikahadzoi K, and Jackson J.C, "An Analysis of emerging Co-management Arrangements - the Zambian and Zimbabwean Inshore Fisheries", July 1996 (Draft Report). 71pp
3. Malasha I. "Fishermens' Response to the Regrouping Exercise on Lake Kariba (Zambia)". August 1996. 17 pp. Paper prepared for the project newsletter.