

REPORT ON FOURTH FIDAWOG WORKSHOP HELD IN KISUMU, 16 to 20 August 1999

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Summary of proceedings

In the earlier FIDAWOG workshops, the need was identified for training in reporting. During the second FIDAWOG workshop in Arusha in May 1998, two sessions were held to provide initial training in data presentation and reporting. The sessions took the form of critical evaluation of manuscripts submitted to international journals (Beyer *et al.* 1999). The responses of participants during that workshop showed a lack of experience in presentation and thus more intensive training was scheduled for future workshops. At the third workshop in Jinja (Tweddle & Cowx 1999), advice was given on improvements to presentations given but there was no formal training component. Instead, this was planned for the fourth workshop.

The FIDAWOG workshop held at the Tom Mboya Labour College in Kisumu was the fourth stock assessment workshop held under the LVFRP programme. There were two main objectives; training in paper and report writing and presentation, and presentation of research results collected to date.

As the editor of an international fisheries journal (*Fisheries Management and Ecology*), author/editor of many fisheries books, and convenor of biennial international fisheries conferences, Dr I.G. Cowx has considerable experience in presentation skills and production of papers and reports. Dr Cowx prepared a detailed manual on techniques (Cowx 1999) which was used as the basis for the fourth FIDAWOG workshop. This manual provides guidance on the methods of structuring reports and papers, and covers key issues associated with style and formatting of text, figures and tables.

The project researchers presented their research findings during the fourth workshop, over a period of five days. After each presentation, detailed constructive criticisms were given to allow the presenter to improve his/her paper for publication in this workshop report. No formal agenda was developed for this workshop as the amount of time to be spent on developing each presentation could not be predicted. Sessions were, however, put aside for more formal training on the requirements of scientific journals, systematic methods for developing and writing papers, and the different requirements of papers, reports and verbal presentations. These formal lessons were repeatedly reinforced during the critique of each scientist's presentation.

The meeting was held in a very positive atmosphere. The nervousness and defensiveness which were apparent in earlier project workshop presentations by some of the more inexperienced researchers are now much less apparent. There was a genuine feeling of greater confidence and a strong desire to learn more about research techniques and development of presentations. As those researchers presenting first would be likely to make more mistakes than those presenting later, the order of presenting was determined at the beginning of the week by ballot. Criticism by everyone in the workshop was encouraged.

Suggestions were accepted without resentment and by the end of the week researchers (with the benefit of experience from observing their colleagues' contributions) were able to identify weaknesses in their own presentations. The success of this workshop can be gauged by the attendance of several non-project researchers from KMFRI who were as keen to learn as were those from the project. The number of KMFRI staff attending increased as the workshop progressed.

During breaks between sessions, in the evenings, and on Saturday morning following the workshop, participating scientists worked on their papers with the assistance of Dr Cowx and Mr Tweddle to prepare them for publication in this workshop report.

Considerable research progress has been made since the March/April third FIDAWOG workshop. The various programmes continued smoothly and there was progress in data analysis. Trends are becoming apparent in the data and prospects of producing high quality papers for publication in the international arena are very good. The researchers were given guidance, not only for further analysis of their data but also for collaboration and teamwork from now on. The future direction of the project research programme and the role of each person/sub-project in the overall framework of the LVFRP objectives is now well established and understood by the scientists in the various fields of investigation.

Objectives of the next FIDAWOG workshop(s) to be held early in 2000

By the end of 1999, a full year's data collection with the standardised research gears will be available and a full analysis of the scientific programme will be possible. The next workshop will, therefore, be the most important project stock assessment activity to date. The intention will be to produce a comprehensive project scientific report and to finalise the process of developing scientific papers for submission to international journals. The Lake Victoria Fisheries Organisation is holding an international conference on the future of Lake Victoria in Jinja in the middle of the year. The researchers of the LVFRP have been encouraged to be major contributors to this conference and provide a valuable insight about the status of Lake Victoria fisheries to a wider international audience.

It is proposed that the next FIDAWOG workshop will combine a revision of the stock assessment techniques introduced in the second FAO/DANIDA/LVFRP stock assessment workshop in Arusha with the use of techniques to produce comprehensive papers and recommendations for management of the resources. The timing has yet to be decided and the workshop may be held as one long event or as two separate meetings; one to evaluate the data and guide researchers on the way forward with analysis and the second to finalise presentations and manuscripts.

The first phase of the workshop will be the training component. Experts in stock assessment modelling will be invited to act as facilitators in the workshop, operating under the short-term technical assistance (STTA) programme. The researchers will collate their data and carry out primary analysis under the guidance of the LTTA Survey Biologist to use in the training programme.

The second phase of the workshop will complete the analysis of the data by the participants followed by presentation of the results and redrafting of scientific papers. Emphasis will be put on collaboration and teamwork. The data being collected in the different countries and different research fields will be compared and combined to produce comprehensive papers. The researchers will be assisted in these activities by STTAs and the LTTA Survey Biologist.

The activities in the workshop(s) will be scheduled over three weeks, one week of training in techniques, one week of analysis and writing up, and the final week for presentations and completion of papers. Depending on availability of STTAs and demands of other programmes, the workshop may be held over three weeks or split into two separate periods. The training component is provisionally scheduled for February, with the rest of the activities following as soon as possible afterwards.

Progress in research programmes reported in the fourth FIDAWOG workshop

Trawl research

Objectives

- To provide spatial and temporal distributions of major fish species in the demersal zone of Lake Victoria.
- To identify the key environmental factors responsible for the distribution and abundance observed.
- To provide quantitative assessment of the stock dynamics of *Lates niloticus* (L.) and *Oreochromis niloticus* (L.) in the demersal zone of Lake Victoria.

Progress

All three countries have been carrying out regular monthly trawl surveys with the standardised fishing gear. Composite length frequencies were presented in the workshop by each country. There is a suggestion of movement of modes in some of the Nile perch, *L. niloticus*, data, but without a full year's results a detailed analysis would be premature. Furthermore, there is an obvious shift in catch composition with the implementation of the new trawl nets in November 1998. This net appears to be more efficient, especially for younger fish, and has necessitated a reorganisation of the data into two periods.

Considerable differences were found in the size distribution of Nile perch between countries and regions within countries. Nile perch in Kenyan waters was characterised by a population dominated by small fish, with few larger (>50 cm) specimens (Getabu & Nyaundi 1999). This is in contrast to the situation in the 1980s when many larger fish were caught (Asila & Ogari 1988). Although a similar pattern was observed in Uganda (Okaromon, Muhoozi & Bassa 1999) and Tanzania (Mkumbo & Ezekiel 1999), the trends were less obvious and regional differences were found. There appears to be a negative relationship between proportion of larger fish in the area and the fishing intensity, with heavily fished regions in Kenya, the Mwanza region of Tanzania and the Entebbe region of Uganda all exhibiting populations with fewer larger individuals. This was corroborated by the estimates of total mortality which were higher in heavily fished regions. The Kenyan data also show a much higher mortality than was recorded in the mid 1980s by Asila & Ogari (1988).

Although Nile perch dominated the catches, *O. niloticus* and other species also contributed extensively to catches, especially in Kenyan waters. This has been partially attributed to the presence of water hyacinth, *Eichhornia crassipes* (Mart.) Solms, which may act as refuge cover for other species.

Variation in catch rates were found between regions of the lake of differing depths. There was a greater abundance of fish in areas between 10m and 30 m deep, and a decline in deeper waters. This was linked to the presence of thermal and oxygen stratification of the water column, which renders the deeper water inaccessible at certain times of the year. However, as the thermocline breaks down, it is apparent the fish move in to exploit the zones. The lower density of fish in shallow waters was due to reduced gear efficiency in shallower waters.

The limnological programme being run in conjunction with the trawl programme in Uganda and Kenya is currently being developed in collaboration with Canadian researchers using SEABIRD profilers to cover all three countries. Kenyan data were presented by Mr Kenyanya, which highlighted the impact of thermal stratification and eutrophication of fish distribution and abundance. A detailed information database is being developed showing clear relationships between limnological parameters and fish catches.

Multidepth, multimesh, monofilament gillnet surveys

Objectives

- To provide spatial and temporal distribution of major fish species in the inshore waters of Lake Victoria.
- To identify the key environmental factors responsible for the distribution and abundance observed.
- To provide quantitative assessment of the stock dynamics of Nile perch and *O. niloticus* in open and inshore waters of Lake Victoria.
- To provide a cross check for the biomass and size distribution assessments obtained from trawl surveys.

Progress

Successful trials were carried out and a technical report produced for the project on the gillnet programme (Tweddle, Ridgway & Asila 1999). During the next FIDAWOG workshop, data will be presented on the results of several months sampling.

Hydroacoustic surveys

Objectives

- To estimate the spatial and temporal distribution of fish in Lake Victoria.
- To estimate acoustic abundance and biomass indices of fish stocks.
- To examine the species and size composition, and the distribution of fish taxa by area and by depth.
- To determine how limnological parameters influence species distribution and catches in bottom trawl surveys.

Progress

The lakewide survey was in operation at the same time as the FIDAWOG meeting, thus no documentation is included in this workshop report. The survey was successfully concluded and a preliminary report has been submitted by the STTA Hydroacoustics Expert (MacLennan 1999). Data are now being analysed. The frame trawl was used extensively during the survey to verify fish traces.

Catch assessment and frame surveys

Objectives

- To evaluate fully the fishing capacity of the artisanal and commercial subsectors of the fishing industry.
- To assess the fishing mortality of the major commercial species around the lake.
- To assess trends in fish landings from the lake.
- To assist the Fisheries Departments and research institutes in setting up a standardised catch assessment survey throughout the lake.

Progress

The Kenyan surveys resulted in the presentation of a complete review of catch and effort data from the catch assessment survey conducted by KMFRI since the 1970s. The paper by Mr A. Othina demonstrates, using biomass dynamic models, that the Kenyan fisheries are very heavily exploited. Gillnet effort is now well in excess of that which would yield the highest economic returns, while the mosquito net fishery for *Rastrineobola argentea* (Pellegrin) also appears to have exceeded desirable limits.

The data have so far been analysed for the whole of the Kenyan waters without differentiation into different zones. As Kenyan waters are clearly divided into the shallow, almost enclosed Nyanza Gulf, and open deeper waters outside the gulf, a more detailed analysis is now underway to compare the fisheries in the different areas.

The MSc programme of Mr Asila investigates gillnet selectivity. Gillnets are the most important gear in the Nile perch fishery. Mr Asila is now in the process of writing up his thesis. The preliminary results show that gillnets of 127 mm (5") mesh yield greatest profits. As earlier studies by Schindler *et al.* (1998) also suggest that a fishery based on a minimum 127 mm mesh would yield highest catches, a clear recommendation can be made for the Nile perch gillnet fishery. Whatever the management strategy eventually developed for the lake, the 127 mm minimum mesh size recommendation should be endorsed and enacted. Efforts should also be made to reduce gillnet effort in Kenya.

In Uganda and Tanzania, weaknesses in the catch assessment survey systems prevent detailed recommendations being made at this stage. There has, however, been progress in both countries. In Uganda, Mr L. Muhoozi's preliminary survey of catches from a selection of fishing beaches has revealed marked differences in catches depending on boat size. The larger boats which are able to fish further offshore use bigger meshed nets and catch larger mature Nile perch, whereas the inshore boats catch much smaller fish, with potentially greater damage to the fish stocks. Mr L. Muhoozi has now started his PhD studies, the long term aim of which is to develop a sustainable catch assessment survey system.

The available data on the Tanzanian fishery were presented by Mrs O. Mkumbo. These show the same basic catch trends found in Kenya, with regional differences in fishing intensity. The data are, however, limited in quality and more detailed investigations are underway at a selection of beaches in each of the three regions to assess what the different gears are catching by species, by weight and by size distribution. The results obtained to date were presented by Mr P. Nsinda. The data will be linked with information on total effort in the different regions when comprehensive frame survey results are eventually obtained.

Ecological surveys

Objectives

- To obtain the quantitative data on the paths in the lake's food web leading to fish production which are necessary to develop realistic, functioning ecosystem models. These include fish stock biomass, growth and mortality rates, plankton abundance, macrobenthos and food of the major commercial fish species.

Progress

Information on the ecology of key species is necessary to understand the impact of fishing pressure on the population dynamics and for ecological modelling of the fishery. Data are being collected on growth, feeding and reproduction of the key species. In this workshop, several papers were presented on food and reproduction of *O. niloticus*, growth of *L. niloticus*, plankton composition and density in the water column and in fish stomachs, and the relationships between them, and preliminary data on *Caridina nilotica* (Roux) dynamics. These papers suggest the age of maturity in the three major commercial species has declined over the past decade. The importance of larger zooplankton, especially Cladocera, in the diet of *R. argentea* and juvenile Nile perch was established, and ontogenic shifts in the diet of Nile perch from *Caridina* to fish were found.

Immediately after the workshop, a two-week workshop was held in Nairobi on ecological modelling. It was attended by key researchers from the LVFRP from each country. Reports from those attending are awaited.

The river fisheries programme is now well underway. Monthly surveys are being carried out on three rivers, covering biodiversity in general and detailed ecology of those species of importance in the river fishery. Catch data recorders are in place in the lower reaches where important fisheries operate.

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