



# **IAMSLIC**

**INTERNATIONAL ASSOCIATION OF  
AQUATIC AND MARINE SCIENCE  
LIBRARIES AND INFORMATION CENTRES**

**Proceedings of the 3<sup>RD</sup> Africa Regional Group  
Conference and Workshop  
LILONGWE - MALAWI  
10<sup>th</sup> – 13<sup>th</sup> September 2007**

**Organized by  
Africa Regional Group of IAMSLIC  
(AFRIAMSLIC)**

**In collaboration with**

**BUNDA College of Agriculture  
Lilongwe-Malawi**

# IAMSLIC

**International Association of Aquatic and Marine Science  
Libraries and Information Centres**

**Proceedings of the 3rd Africa Regional Group Conference  
MALAWI 10<sup>th</sup> – 13<sup>th</sup> September 2007**

**Theme**

**Managing Resources in Aquatic and Marine Science Libraries**

**Venue**

**Riverside Hotel - Lilongwe**

**Edited by  
Richard Y. Kofie  
&  
Sematror K. Yiborku**

**Sponsored by**



**CTA, FAO & IAMSLIC**

**AFRIAMSLIC Excursion to Senga Bay, Lake Malawi, 12 September 2007**



***Back*** Alice Endra, Elizabeth Birabwa-Aliro, Geoffrey Salanje, Edna Nyika, Olive Mahuqa, Mac-Anthony Cobbleah  
***Middle*** Eric Mumbone, Miife Tsumwe, Margie Shaw, Monica Morrison, Verañ Jose, Candice Roux, Jsegorius Agola, Jan Pettman  
***Front*** Emeilia Klorfor Elotey, Francis Maguza-Tembo, Austin Mthetiwa, A Mpofoza (Bus Driver), Marian Jagge, Jean Collins

## PREFACE

Welcome to the Proceedings of the 3<sup>rd</sup> Conference of the Africa Regional Group of the International Association of Aquatic and Marine Science Libraries and Information Centres (AFRIAMSLIC), held in Lilongwe, Malawi, September 10<sup>th</sup> -13<sup>th</sup> 2007. This year's conference was hosted by the Bunda College of Agriculture, with the assistance of colleagues from other institutions in Lilongwe.

**“Managing Resources in Aquatic and Marine Science Libraries”** was the theme for this year's conference. The venue for the conference was the Riverside Hotel.

The objectives of the conference were to:

- facilitate access to aquatic and marine science information through the provision of Scientific and Technical Information (STI) services, and
- strengthen aquatic and marine science information and infrastructure through effective networking and collaborative activities within the sector.

Twenty-four (24) delegates participated in this year's conference from Botswana, Ghana, Kenya, Namibia, Nigeria, South Africa, Malawi, Tanzania, Uganda, Italy, and the United Kingdom. Eight (8) important personalities from various institutions in Malawi were invited as special guests to this important conference.

AFRIAMSLIC was honoured by having the Honourable B. Kutsaira, Member of Parliament and Deputy Minister of Agriculture and Food Security to deliver the Keynote Address. The Welcome Statement was given by Professor George Kanyama-Phiri, Principal, Bunda College of Agriculture. All papers presented during the conference were very interesting and educative.

We appreciate the support of the **Technical Centre for Agricultural and Rural Co-operation (CTA)** in sponsoring six (6) delegates this year. We acknowledge the support of the **Food and Agriculture Organization (FAO)** in sponsoring some of our delegates which enabled some members of some Regional Groups of **IAMSLIC** to attend AFRIAMSLIC Conference for the first time. We are very grateful to **IAMSLIC** for sponsoring some of our local delegates which enabled members to share ideas and discuss issues of common interests in the continent.

We are hopeful that after reading this 3<sup>rd</sup> **AFRIAMSLIC proceedings**, you will be refreshed with new ideas.

**Marian A. Jigge**  
Conference Convener  
Past Chairperson, AFRIAMSLIC

December 2007

## **ACKNOWLEDGEMENT**

On behalf of AFRIAMSLIC, my thanks go to all those who have been involved in the preparation for this conference. In this regard, I will like to express our profound gratitude to Prof. George Kanyama-Phiri, Principal of Bunda College for hosting this conference.

Our special thanks go to Geoffrey Salanje, College Librarian, Bunda College and his committee for the tremendous effort put together for the success of the conference.

We are grateful to Dr Richard Y. Kofie and Mr Semator K. Yiborku of the Institute of Scientific and Technical Information (INSTI-CSIR) and the Head Office of the Council for Scientific and Industrial Research(CSIR) respectively, for once again accepting the honourous responsibility of compiling, editing and preparing the conference proceedings.

Finally, I am grateful to colleagues who supported me in diverse ways during my tenure of office as Chairperson of AFRIAMSLIC.

**Marian Jiagge**

## TABLE OF CONTENTS

	Page
Preface .....	3
Acknowledgement .....	4
List of Acronyms .....	7
Communique .....	10
Introductory remarks of the out-going Chairperson of AFRIAMSLIC .....	
<i>Marian Jiagge</i>	
Welcome remarks by the Principal of Bunda College...	12
<i>Prof George Kanyama-Phiri</i>	
Key note address by MP & Deputy Minister of Agriculture & Food Security	15
<i>Hon. Binton Kutsaira</i>	
1. Electronic Information Management in Aquaculture and Fisheries Science in Tazania: Oppotrunities and Challenges. ....	17
<i>Edna A. Nyika</i>	
2. The Impact of Information on Aquaculture and Fisheries in Namibia .....	22
<i>Eric Mumbore</i>	
3. Canvassing for participation in Aquatic Commons Repository Project: Experience from Nigeria .....	24
<i>M.O. Ibeun</i>	
4. The role of the Library in a marine environment: Practical examples of problems and good practices.....	30
<i>Alieya Haider</i>	
5. The digital divide in a digital age: Challenges of sourcing fisheries information in sub-sahara Africa.....	32
<i>E.K.W. Kaund &amp; M. Limuwa</i>	
6. One-stop Information shop for Aquaculture and Fisheries in Malawi.....	40
<i>Daniel Sikawa &amp; Fanuel Kapute</i>	

7. Managing resources in Aquatic and Marine Science Libraries: The Africa repository for electronic publications – experiences and the way forward. ....	44
<i>Josette Confait</i>	
8. The potential contribution of personal collections to regional biodiversity knowledge: Planning digitization work at the University of Botswana’s Okavango Research Centre Library .....	49
<i>Monica Morrison</i>	
9. The present status of document delivery in Kenya .....	55
<i>Isedorius Ochola Agola</i>	
10. Fisheries and aquaculture information provision in Ghana... 59	
<i>Marian Jiagge</i>	
11. The challenges of using electronic information resources in fisheries and aquaculture by research scientists in Ghana.....	65
<i>Mac-Anthony Cobblah</i>	
12. Workshop on the Development of the Aquatic Commons: Open access to inland fisheries and aquaculture information.....	67
13. Annex 1.....	70
14. Appendix I .....	73
15. Appendix II .....	77

## **LIST OF ACRONYMS**

AC	Aquatic Commons
AFRIAMSLIC	Africa Regional Group of the International Association of Aquatic and Marine Science Libraries and Information Centres
AFRILIB	Africa's Library Holdings
AFRIDIR	African Directory of Aquatic Scientists
AGORA	Access to Global Online Research in Agriculture
ASFA	Aquatic Sciences and Fisheries Abstract
CD-ROM	Compact Disk Read Only Memory
CTA	The Technical Centre for Agricultural and Rural Cooperation
EAMFRO	East African Marine and Freshwater Organization
FAO	Food and Agriculture Organisation
FCLA	Florida Center for Library Automation
GIS	Geographic Information Systems
HINARI	Health InterNetwork Access to Research Initiative
IAMSLIC	International Association of Aquatic and Marine Science Libraries and Information Centres
MALICO	Malawi Library and Information Consortium
NATMIRC	National Marine and Information Research Centre
NIFFR	National Institute for Freshwater Fisheries Research
NEPAD	New Partnership for Africa's Development



ODINAFRICA	Ocean Data Information Network for Africa
OAI	Open Archives Initiative
PERI	Programme for the Enhancement of Research Information
SAIAB	South Africa Institute of Aquatic Biodiversity
SADC	Success Attitude Development Centre
SDI	Selective Dissemination of Information
STI	Scientific and Technical Information
TAFIRI	Tanzania Fisheries Research Institute
TZNODC	Tanzania National Oceanographic Data Centre
TEEAL	The Essential Electronic Agricultural Library

## COMMUNIQUE

We the participants of the 3<sup>rd</sup> Africa Regional Group of the International Association of the Aquatic and Marine Science Libraries and Information Centres (AFRIAMSLIC) Conference held in Lilongwe, Malawi, 10<sup>th</sup> – 13<sup>th</sup> September 2007, under the theme, “**Managing Resources in Aquatic and Marine Science Libraries**”, have observed that in order to improve management of information resources in aquatic and marine science libraries there is a need to:

1. Integrate awareness raising activities in library services for the benefit of stakeholders, including librarians.
2. Strengthen communication among AFRIAMSLIC members and encourage new members to join the group.
3. Promote skill development and encourage sharing of expertise among librarians, for example in copyright and legislation; GIS; multimedia management; digitization; archives management; communication and outreach.
4. Provide training and skill development for scientists on how to access and use electronic and multimedia resources.
5. Manage and update the Directory of Fisheries and Aquaculture Information Resources in Africa and encourage members to contribute to the African Directory of Aquatic Scientists (AFRIDIR).
6. Advocate for qualified library staff with specialized subject skills to manage the Aquatic and Marine Science Libraries and Information Centres.
7. Advocate for Broadband access for Aquatic and Marine Science libraries and information centres to enhance exploitation of E-resources, improve storage, access and dissemination, and speed of delivery (upload and download).
8. Strengthen relationships between library/information staff and stakeholders, including scientists, policy and decision makers, and grass-root communities through outreach programs and activities.
9. Re-package, disseminate and publicize information and services offered by the Libraries/Information Centres to meet the varying needs of stakeholders.

Finally, the Conference witnessed the handing over of the office of Chairperson from **Ms. Marian Jiagge, Librarian of Water Research Institute, Ghana to Ms. Edna Nyika, Information Manager of Institute of Marine Sciences, Tanzania.**

---

Issued in Lilongwe, Malawi on 13<sup>th</sup> September 2007

**Ms. Edna Nyika**  
Chairperson

**Ms. Marian Jiagge**  
Out-going Chairperson

**Mr. Geoffrey Salanje**  
Conference Host

## **INTRODUCTORY REMARKS OF THE OUT-GOING CHAIRPERSON OF AFRIAMSLIC**

**Marian Jiagge**

---

- The Deputy Minister of Agriculture and Livestock Development, Hon. B. Kutsaira (MP)
- Principal, Bunda College of Agriculture, Professor G.Y.Kanyama-Phiri,
- Vice-Principal, Dr Emmanuel Kaunda.
- Registrar, Mrs Mary Wasiri,
- Colleague Librarians/Information Specialists,
- Distinguished Invited Guests,
- Ladies and Gentlemen

We are indeed privileged to be here in Lilongwe to participate in the 3<sup>rd</sup> Africa Regional Group of the International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC) Conference with the theme “AFRIAMSLIC: Managing Resources in Aquatic and Marine Science Libraries”.

This conference promises to be very exciting as there will be country reports, work group presentations, as well as paper, and poster presentations.

I am happy to say; we have in our midst, a few of our colleagues from other regional groups of IAMSLIC joining for the first time to participate in our Regional Group Conference. Whilst here, they will take the opportunity to conduct a one-day training workshop on access to electronic information in aquaculture and fisheries science.

To our local participants, I say this is a good opportunity for us to meet as colleagues, to talk to each other, and deliberate on issues confronting us in our chosen profession.

At the end of this conference, our expectations are to strengthen aquatic and marine science information and infrastructure through effective networking and collaborative activities within the sector.

We are very honoured to have the Deputy Minister of Agriculture and Livestock Development to grace the occasion. We say; thank you for taking time off your busy schedule to join us.

We acknowledge the support of IAMSLIC for our local participants and the Technical Centre for Agriculture and Rural Co-operation (CTA), Netherlands, for sponsoring our foreign participants. We are grateful to the Fishcode Project of the Food and Agriculture Organization (FAO) for sponsoring some of our participants.

Finally, we are most grateful to the Principal, Bunda College of Agriculture for hosting this conference. We will surely get back to our various countries with sweet memories of Malawi.

Thank you.

## WELCOMING REMARKS

### **Prof. George Kanyama-Phiri**

Principal of Bunda College

---

- Master of Ceremonies, College Librarian, Bunda College - Mr. Geoffrey Salanje,
- Guest of Honour, Deputy Minister of Agriculture and Food Security - Hon. Bintony Kutsaira, MP
- Outgoing Chairperson, International Association for Marine Science Libraries and Information Centres - African Region – Mrs. Marian Jiagge
- The Incoming Chairperson, International Association for Marine Science Libraries and Information Centres - African Region – Ms. Edna Nyika
- Director of Fisheries – Mr. Alexander Bulirani
- Distinguished foreign and local participants
- Head of Aquaculture and Fisheries Science Department, Bunda College – Mr. Daniel Sikawa
- Deans and Heads of Departments – Bunda College
- Invited guests,
- Ladies and Gentlemen

I would like to welcome, the Deputy Minister of Agriculture and Food Security Hon. Bintony Kutsaira, distinguished guests, and participants to Riverside Hotel.

It is a pleasure for the African Region of the International Association for Marine Science Libraries and Information Centres (AFRIAMSLIC) - to decide to hold its 3<sup>rd</sup> Conference in Malawi in general and to be hosted by Bunda College in particular. I feel honoured for Bunda College to be part and parcel of this international conference.

Honourable Deputy Minister, distinguished guests, participants, ladies and gentlemen, let me say something about Bunda College, one of the constituent colleges of the University of Malawi.

Bunda College of Agriculture has grown over the years from a small college, with a modest beginning of 35 students in borrowed premises at Dedza Secondary School to a reputable institution today. To date the college has three faculties, 12 departments including the Library, and a Centre for Agriculture Research and Development. It has a student population of over 750, about 50 of whom are pursuing postgraduate courses (including PhDs) in various fields. This development has become a reality because staffs at all levels have joined hands to uplift the academic standards of the college.

About 6 years ago the College established a second faculty – Faculty of Environmental Sciences. Among the Departments and Programmes are those in Aquaculture and Fisheries sciences. The College has a fully-fledged department with magnificent buildings and facilities to support the programmes it offers. The

department offers programmes to both Malawians and foreign students at both undergraduate and postgraduate degree levels. In the very near future, the department will start offering a PhD programme for the Eastern and Southern African region in aquaculture and fisheries sciences. I understand there is a workshop this Wednesday to be held at Bunda College. I hope the foreign delegates will have a chance to visit the department.

Our Library has been well endowed with literature and professional staffs, who have offered well-searched information for the enhancement of teaching, learning, research, and extension. Indeed the Library is the heart of learning. Bunda College library has always been a force to reckon with in terms of information provision both printed and electronic. That is why following an independent assessment done in 2005 on Bunda College's facilities, and teaching and learning materials, it was recommended that the college has every requirement on hand to start offering a PhD programme in aquaculture and fisheries science for the Eastern and Southern African region. The consultants looked at the materials available in the library especially the books, periodicals, databases, etc, in aquaculture and fisheries sciences information and how these were organized, sourced, and utilized.

Talking about electronic information, the library through the Internet is able to access full-text journal articles using resources provided by programmes/projects such as INASP's PERI project, FAO's AGORA, JSTOR, and World Health Organization's HINARI.

Honourable Deputy Minister, distinguished guests, let me inform you that we have a Vsat (very small aperture terminal) which has improved our Internet connection. With this connection the college boosted its Internet bandwidth from 14.4kbs to 512kbs downlink. Thanks to Malawi Libraries Consortium (MALICO) who initiated this Vsat project. This development does not substitute but complements the paper-based information and CD-ROM databases we receive from organizations such as FAO, CTA, and IAMSLIC.

Turning to the conference, as I have already stated, it is a great pleasure for Bunda College to host this conference. It has taken our Librarian only 6 years since he joined AFRIAMSLIC to bring the conference to Malawi. He has attended and presented papers in all the previous conferences held in Accra, Ghana. As that is not enough, he had attended and presented papers at IAMSLIC (International Association for Marine Science Libraries and Information Centres) annual conferences held in Rome, Italy and Portland, Oregon in 2005 and 2006 respectively. I wonder if he is also not presenting another paper at 2007 IAMSLIC conference to be held in Sarasota, Florida! The Guest of Honour, distinguished ladies and gentlemen, I think this is not a mean achievement for Bunda College.

I understand that one of the objectives of the conference is to facilitate access to aquatic and marine science information through the provision of Scientific and Technical Information (STI) services. This is important for our scientists to have timely access to up-to-date scientific information. In this dynamic world a researcher, academician or librarian worth his/her salt always endeavours to look for up-to-date, quality and relevant information in his/her work. As professionals, particularly in our sectors, we have to invest in life-long learning and current information. We have to take up innovations and reach out into the unknown! We scientists rely heavily on you Librarians and Information Specialists for access to scientific information. It is my hope that through this conference you would be able to share knowledge, experiences, and new ideas on how best you could satisfy users' information needs.

Once again, I would like to thank AFRIAMSLIC for choosing Bunda College to host this important conference mainly because of the reputation of its library and staff.

It is now my singular honour to invite the Deputy Minister of Agriculture and Food Security to open the workshop.

I thank you and May God Bless you all.



## **KEY NOTE ADDRESS BY DEPUTY MINISTER OF AGRICULTURE & FOOD SECURITY, HON. BINTON KUTSAIRA, MP**

---

- Director of Ceremonies
- The Principal of Bunda College
- The Vice Principal, Associate Professor
- The Registrar
- The Chairperson – AFRIAMSLIC (Outgoing)
- The Chairperson – Incoming
- Distinguished International and National Delegates
- Ladies and Gentlemen
- Members of the **Press**

I feel greatly honoured to officially open the **3<sup>rd</sup> Conference of the African Region for the International Association of Aquatic and Marine Science Libraries and Information Centres (AFRIAMSLIC)**. I am informed that the conference has brought delegates from Botswana, Ghana, Kenya, Namibia, Nigeria, South Africa, Tanzania, Uganda, Italy, United Kingdom and the host, Malawi. Let me welcome all foreign delegates to Malawi – The Warm Heart of Africa. I ask all of you to relax and feel at home.

Ladies and gentlemen, Malawi is a land-locked country, which has 29,000 square kilometres of water surface. The four major lakes are Lake Malawi, Lake Chiuta, Lake Chilwa, and Lake Malombe. Some of the major rivers are Shire, Linthipe, Bua, South and North Rukuru, Dwangwa, Songwe and Ruo.

Lake Malawi yields about 30,000 tonnes of fish annually from waters controlled by Malawi and 25% of this is caught by the commercial sector.

The country depends on fish as an important protein source for nutritional requirements. Fish contributes up to 70% of the animal protein consumed. Aquaculture contributes 0.1 – 0.2 per cent of the total supply.

The sector has a great impact on the socio-economic life of the people. One important feature is the presence of a large number of endemic fish species, not found anywhere else in the world. The vast diversity of species has made the Lake Malawi National Park as a World Heritage Site. As Librarians and Information officers, you should be aware of the scientific literature that has been published about Lake Malawi and its Fisheries, including several books demonstrating beautiful fish, found in the lake. Out of these the most significant monographs on the tropical inland waterways was a research done at Monkey Bay.

The famous Chambo is a species undoubtedly the best for the Malawian dish. Experience has shown that all visitors who come to Malawi always remember Lake Malawi and the Chambo.

Scientific evidence has shown that fish plays an important role in the prevention and management of human diseases such as heart disorders, neurological diseases, and mood swings. Another aspect that makes fishery resources important is their self-renewable character. Unlike mineral resources, fishery resources have unlimited duration if well managed.

Ladies and Gentlemen I am aware that as Librarians and Information Specialists, especially in aquaculture, fisheries and marine science information, you have an important role, of contributing to the management of fish stock, which would result, in reversing the decline in fishery resources. Scientists, decision makers, even politicians rely on you, to obtain relevant accurate information. This conference is therefore important because it is where you meet and share knowledge, experiences, and innovation in your profession.

Ladies and Gentlemen, Malawi has made tremendous strides in the provision of information using various technologies. The School of Library Sciences at the Mzuzu University provides members of staff with the needed skills required to transfer our fisheries information heritage to a digital environment, and to access, and validate the electronic information on the Malawi fisheries.

I know that you are all anxious to get down to the serious scientific work that you came here to undertake. I will be happy to be briefed at the end of the Conference on the way forward. I challenge you to address the issues that affect us, and those employed in the sector either directly or indirectly.

It is now my pleasure and honour to declare the 3<sup>rd</sup> Conference of the African Region for the International association of Aquatic and Marine Science Libraries and Information Centres officially opened.

**THANK YOU FOR YOUR ATTENTION AND MAY GOD BLESS YOU ALL.**

# **ELECTRONIC INFORMATION MANAGEMENT IN AQUACULTURE AND FISHERIES SCIENCE IN TANZANIA: OPPORTUNITIES AND CHALLENGES**

**Edna A. Nyika**

University of Dar es Salaam  
Institute of Marine Sciences  
P.O.Box 668  
Zanzibar, Tanzania  
[Email: nyika@ims.udsm.ac.tz](mailto:nyika@ims.udsm.ac.tz)

---

## **Abstract**

This paper discusses aquatic and fisheries electronic information management and access in Tanzania. It provides information on the background of aquatic and fisheries information collection, processing and dissemination from the late 80s to date. The paper discusses how connecting organizational, national, regional and international goals with information opportunities and possibilities in strengthening capacities of organizations and people to work together, have improved the contribution of information to development problems. The author provides six main issues that could boost access to aquatic information for development in Tanzania. The areas discussed are publishing of research findings in both local, regional and international journals; sharing generated information resources (through advocacy and outreach efforts); access to electronic knowledge; e-repositories and electronic archiving of scientific articles (both personal and institutional); and lastly networking.

## **Introduction**

The United Republic of Tanzania is located in eastern Africa between longitude 29° and 41° East, Latitude 1° and 12° south. It is the largest among the East African countries (i.e. Kenya, Uganda and Tanzania). Tanzania has a spectacular landscape of mainly three physiographic regions namely the Islands and the coastal plains to the east; the inland saucer-shaped plateau; and the highlands. The Great Rift Valley that runs from north-east of Africa through central Tanzania is another landmark that adds to the scenic view of the country. The country has the largest concentration of wild animals. It also has pristine sandy beaches and Africa's highest and snow-capped mountain, Mt. Kilimanjaro.

## **Natural resources**

Tanzania is endowed with significant natural resources, which include forests and woodlands, wild animals, rivers, lakes and wetlands. These resources play major roles in the economy in terms of the social and economic goods and services, which they provide. The depletion of these resources will negatively undermine the ecological sustainability of economic activity.

### **Fish resources and distribution**

Tanzania is a coastal state endowed with both marine and inland fisheries potential. The marine water covers 64,000 square km<sup>2</sup> which includes the Indian Ocean and the exclusive economic zone which covers 223,000 km<sup>2</sup>. The fresh water includes the riparian shared waters of East African great lakes namely Lake Victoria, Tanganyika and Nyasa. The country has also other small natural and man made lakes, river systems and many wetlands with fish potential. These water bodies cover 58,000 km<sup>2</sup>. The country has a coastline of about 800 km declared as its Exclusion Economic Zone but largely, has not yet been exploited. The present annual fish catch is about 350,000 metric tons.

The fisheries sector currently employs about 80,000. The artisanal fishermen produce about 90% of the total fish catch in the country; only 10% is derived from industrial fishing. Most of the fish caught is consumed locally while Nile perch; sardines and prawns are for exports. Fish contributes about one third or 30% of the total intake of animal protein in Tanzanian. The contribution of the sector to GDP for the past five years has been between 1.6 and 3.1%.

Although fisheries are renewable resources, they can become limited through over exploitation. Therefore, they have to be conserved, managed, and developed on sustainable basis. The present fisheries policy has clearly addressed the problems faced by the sector and the actions to be undertaken. The major focus is on the promotion of sustainable exploitation, effective protection of the aquatic environment, and marketing of fish resources to provide the intended national socio-economic development.

The private sector, the community, non-governmental organizations, and other non-state actors have a useful role to play in the development, management, and sustainable utilization of the fisheries resources. Due to their diverse experience, expertise, and capacity in the sector, their active support and involvement would enhance investment; improve business and general management in the fishing industry.

### **Institutions dealing with Fisheries and Aquatic Science in Tanzania**

#### ***1. Tanzania Fisheries Research Institute (TAFIRI).***

Research activities are carried out on both fresh and marine waters. The institute conducts research in fishery resources, and disseminates the findings for fishery development, and sustainable management of the resources.

## ***2. Mbegani Fisheries Development Centre***

The Centre conducts diploma courses in Fisheries, which include: boat building, fish processing, marketing, and quality control, marine mechanics, and marine engineering. Other customized courses are organised.

## ***3. University of Dar es Salaam***

The University has faculties and departments that carry out activities related to the fisheries sector. These are:

- Faculty of Aquatic Sciences and Technology (FAST) - conducts training (BSc. MSc. and PhD) and research in aquatic sciences
- Institute of Marine Sciences - conducts training and research in all fields related to marine and aquatic sciences
- Department of Zoology - conducts training in fisheries.

## ***4. Division of Fisheries, Ministry of Natural Resources and Tourism***

## ***5. Zanzibar Department of Fisheries and Coastal Products***

### **Aquatic and fisheries Information Management in Tanzania**

The provision of affordable access to scientific and technical research information is recognized worldwide as an essential element in promoting national development. Institutional libraries and Information Centres in Tanzania have a crucial role of providing information for effective aquaculture and fisheries management in terms of teaching, learning, decision making, conducting research, and outreach.

### **Aquatic and Fisheries Information needs**

Aquatic and fisheries information needs vary between institutions. For example, information needs from IMS academics and students will vary from those of members of staff of the Division of Fisheries or TAFIRI to some extent. However these institutions have helped each other in meeting information needs.

*Table 1. Institutional/users information needs*

<b>Institution</b>	<b>Information needs</b>	
UDSM	Teaching/Research/ Advise/ Learning	Teaching, learning, and research materials to impart knowledge and skills to enable students pass exams, and academic staff to develop their careers
TAFIRI/ Fisheries Division /Depart. of Fisheries Zanzibar	Research	Past research activities, on-going research projects, prospects for research funding, and advise decision makers within the Ministry of Natural Resources and Tourism, and the Government as a whole
Decision Makers	Making policy,	Contribution of fishing industry, coastal

	legislation	tourism, water transport to the national economy
Fishermen/Fish farmers	Fishing and fish farming	Modern fish farming methods, markets for the fish, fish feeds, fish landings, weather forecast, modern fish gears and methods etc.
Boat men	Shipping and fishing	Daily weather forecast, new ship equipment
Tourism industry	Tourist attraction	New tourist attraction

### **Efforts on information sharing**

One key source of new knowledge is scientific journals which unfortunately have become increasingly unaffordable to many in developing countries. This is due to escalating costs, depreciating local currencies, and shrinking higher education research and library budgets. The University of Dar es Salaam, for example, has a population of 10,000 students. The main libraries have been forced to cut their subscriptions to more than 250 scientific journals over the past five years. During this period, the total cost of these journal subscriptions has more than doubled; increasing by 21.6 per cent every year, compared to an annual inflation rate of 7.4 per cent. Over the same five-year period, the number of free journals received by the library has fallen by more than half.

As a result, a large proportion of the library's budget is now being used to support a smaller number of journals, leaving just a little for books and other library materials. Such a situation is typical of that faced by many academic libraries in the developing world.

Resource sharing among academic and institutional libraries in Tanzania has increasingly become the main source of library material acquisition. Aquatic and marine science libraries in Tanzania share information through a mutual understanding among them in an exchange program established under Tanzania Library Information Management Association.

### **Opportunities**

Aquatic and marine sciences institutions in Tanzania are mostly donor funded. In most of the projects, there is a component for information management and capacity building. Through these, libraries acquire library materials, equipment and improve capacity through training of librarians. For example there have been several training programs for the librarians funded by ODINAFRICA in the program established by IMS on national network and outreach. Librarians from all coastal zone management related institutions have been trained by IMS information Manager on how to collect, manage, and disseminate library materials. Electronic resource management training course was also held for the libraries.

Many institutions have acquired computers thereby providing their libraries with easier access to electronic materials. For the libraries without access to the internet, such service is provided by document delivery system.

### **Challenges**

The greatest challenge is the lack of awareness about available electronic resources. Even more challenging is how to spread this awareness and encourage scientist to use the resources acquired.

Dependence on development partners for funding activities that aim at managing aquatic and fisheries information management is another challenge. Institutions are getting support from partners such as Sida SAREC, IOC, FAO, UNDP and UNEP through various projects. The problem however lies in the fact that when the projects and support come to an end, whole programs cease to function.

### **Future Plans**

Institutions working on aquatic and fisheries information management in Tanzania in collaboration with the Tanzania National Oceanographic Data Centre (TZNODC) are in the process of establishing an open repository for all the research reports which are produced in Tanzania, on Tanzania. These reports have been kept as grey literature for so many years to the extent that no one has access to it. This program includes creation of Tanzania Aquatic and Fisheries Portal where all data will be deposited and broadcasted worldwide. This measure will allow international exposure of research conducted within Tanzania.

### **Conclusion**

Access to electronic resources in Tanzania is increasingly enhancing access to current information in the field of aquatic and fisheries sciences. More effort however, is needed in acquiring tools that will lead to further improvement, and the development of electronic institutional repository to increase wider access of Tanzanian aquatic and fisheries sciences research findings.

### **Reference:**

1. [http://www.ifsemex.org/program/Hooman\\_Momen\\_p5.pdf](http://www.ifsemex.org/program/Hooman_Momen_p5.pdf);
2. Onatola, A. Access to scientific information in Nigeria: a librarian's viewpoint, 2004; <http://www.SciDev.net>
3. Hanard, S. Self-archiving as a fast track to open access 2003; <http://www.SciDev.net>

# **THE IMPACT OF INFORMATION ON AQUACULTURE AND FISHERIES IN NAMIBIA**

## **Eric Mumbore**

Ministry of Education in collaboration with  
Ministry of Fisheries.  
NATMIRC Library  
Swakopmund, Namibia

---

## **Introduction**

The National Marine and Information Research Centre (NATMIRC Library) is based in Swakopmund, which is one of Namibia's coastal towns and one of Africa's best holiday destinations.

## **NATMIRC Library**

NATMIRC Library is the only fisheries scientific library in the country.

## **Staff**

Since its creation in 1992, the library had a qualified librarian who according to the Namibian Library and Service Act is employed by the Ministry of Education but serves the Ministry of Fisheries.

NATMIRC Library has 4 staff members which are the librarian, library assistant, stores clerk and a work hand.

## **Journals**

Most of the important marine scientific literature is published in journals. The journal collection consists of between 150 - 200 journal titles.

## **E-Journals**

Access to free journal articles includes Google Advanced Scholar Search, AGRIS, Pubmed, and High Wire Press. Access to these is made possible via links at NATMIRC Library site. The collection at NATMIRC is mostly influenced by scientists.

## **Books**

The books collection at NATMIRC has also been built up by titles proposed by the scientists and by the receipts of gifts. Currently around 2,000 documents i.e. books, symposium, proceedings and reports etc are all available in the library.

Among the collections are maps, periodicals, magazines, fishing news, reference materials, etc which are all available for loan strictly to staff and library users. The library also undertakes inter-library loans and article requests with sister institutions in South Africa, especially the Gilchrist Library in Cape Town.



### **Internet Access**

Broadband will probably be introduced in Namibia sometime between now and 2009. In the meantime, internet access at NATMIRC depends on 128 kbit line, which is slow and insufficient to supply the whole NATMIRC staff. Besides, an increasing number of full-text articles accessible free of charge via open access initiatives are difficult to open.

### **Positive aspects of information on fisheries in Namibia**

Dissemination of information (Scientific results) has revolutionized notions and perceptions that the sea represented a source of inexhaustible resources. This has brought about awareness of the need for conservation and sustainable management of marine resources.

Information has augmented conservation by promoting participation of local communities in resource management by improving the community's undertaking and attitude towards marine resources.

It is important to note that the local communities have come to know the existing marine resources through published scientific papers, journals and ecological books. This information has also brought knowledge to the people of what is in their waters i.e. starting from the tiny organisms that they do not see with their naked eyes, to large mammals, etc.

In conclusion, due to information dissemination on aquaculture and fisheries in Namibia, most communities practice fish farming in order to enhance their incomes as well as the socio-economic development of the country.

## **CANVASSING FOR PARTICIPATION IN AQUATIC COMMONS REPOSITORY PROJECT: EXPERIENCE FROM NIGERIA**

**M.O. Ibeun**

National Institute for Freshwater Fisheries Research  
P.M.B. 6006,  
New Bussa, Niger State, Nigeria  
E-mail: [moibeun@yahoo.com](mailto:moibeun@yahoo.com).

---

### **Abstract**

Lack of awareness and access to published information are still major problems in developing countries even with the advent of electronic technology. The paper acknowledges the efforts of developing partners such as FAO through the different agencies at improving information dissemination in developing countries. The on-going project on Aquatic Commons which is extended to some developing countries is another attempt to carry the region along. The paper identified three types of publishing in Nigeria namely; Institutional/Associational, Journal Publishing and Commercial Publishing. For broad-base participation in the Aquatic Commons Project, these groups must be the focus. The first group was addressed through a seminar presentation while the second group was sent an abridged version of the seminar with an appeal to participate. The third group was left out because of the profit motive which presupposes that they may not be interested. The discussion revealed that institutions and associations are willing to participate in the project because they see the project as a means of publicity for their. The will, benefits and threats to participating in the project are highlighted.

### **Introduction**

Librarians and scientists have identified lack of access to published information from developing countries as a major constraint to information sharing. However, one is tempted to believe that the greatest problem is the lack of awareness of what is even available. This is so because you can only access what you know is in existence. With modern technology such as electronic system, these problems still persist in most developing countries. The immediate result is that most publications emanating from the region are not captured by international information systems such as ASFA, CAB, AGRIS, ABAFR etc, and are therefore lost within a short time after publication. The efforts of development partners in the provision of support for several projects are attempts to ameliorate these problems. These projects include the Aquatic Sciences and Fisheries Abstracts (ASFA), the Fisheries Information Data and Statistics Unit (FIDI) the project on improved access to fisheries and aquaculture information in Africa, ASFA and ABAFR CD-ROMs, ASFA journals, and FAO Technical Reports on CD-ROM. The on-going project on Aquatic Commons extended to developing countries is another attempt to carry the developing countries along. National Institute for Freshwater Fisheries Research (NIFFR) New Bussa, Nigeria is one of the privileged institutions to be invited to participate in the project.

The objective of this paper is to share the author's experience at having a broad-based participation of relevant institutions/associations and publishers within the country in the project.

### **Origin of Aquatic Commons Repository**

The current thinking in information provision is to accelerate information dissemination through the creation of Institutional Repository (IRS) of full-text digitally. The idea is to provide stewardship and global access to the digital assets of institutions and organizations. It is in this spirit that the International Association of Marine Science Libraries and Information Centres (IAMSLIC) initiated the Aquatic Commons Project in 2006 to provide a central portal to the literature in Marine and Aquatic Sciences. While database like ASFA contains titles, authors, and abstracts of articles, the Aquatic Commons Project will go a step further to include the full text of the articles on the website of the Aquatic Commons. The Project is broad-based, drawing membership from researchers, research institutions, ASFA, CSA, FAO Fisheries Library, and Florid Center for Library Automation (FCLA).

### **Publishing in Nigeria**

Participation in the project should be broad-based and to achieve this requires capturing publications in the discipline. There is therefore, the need to examine the mode of publishing in Nigeria. Publishing in Nigeria during the colonial era, was by the colonial masters in their home countries. However, over five decades ago, indigenous publishing has become established and by the 70s had taken over from foreign publishers. As at that time, the awareness of the need for a home grown style publishing suitable to local need had grown in the country. Any foreign publisher interested in publishing in Nigeria today goes into partnership with an indigenous publisher. One may ask why people publish. Many do it for financial gain, others for reorganization, while others publish to enhance promotion in their careers. As a result of these motives, there are different types of publications and publishers. Each motive has its type of publishers thereby affecting the willingness to surrender publications for inclusion in the Aquatic Commons Project.

- **Institutional/Association Publishing**

These are publications emanating from institutions or professional bodies. In most cases they produce grey literature such as proceedings, technical reports and journals etc. The shortcoming of this group is that, their marketing or dissemination strategies are not well structured. They see the reason to publish to fulfill government policy of justifying their funding. This group wants publicity and the Aquatic Commons Project may not have any problem in gaining their support.

-

- **Journal Publishing**

Journal publishing in developed countries is done by reputable publishers like Blackwell, Elsevier, Springer, Oxford University Press, Academic Press, Wellington etc. Products of these reputable publishers are subject to peer review. The situation is not the same in developing countries. Reputable indigenous publishers are not keen at journal publications. As a result of this gap, articles sent to foreign publishers have a high rate of rejection. This has led to many individuals, institutions, and university departments floating journals. In turn this has led to emergence of many journals particularly in Nigeria which could not be sustained. Added to this is the fact that their marketing strategy is very poor.

It is difficult to find a catalogue containing publications such as produced by Blackwell, Elsevier etc. The implication of this is that most of these publications from developing countries are not internationally visible. Besides, it is difficult to know when an issue is published. It is true that efforts are being made to make these publications visible by inputting to ASFA, CAB, AGRIS, AGORA etc. However, these efforts are not religiously carried out hence many publications are still left out. Even at this level of effort, only bibliographic details plus the abstracts that are visible and not the full-text. One of the ways to solve this problem in the aquatic sciences literature is participation in the Aquatic Commons Project. Unfortunately because of the loss in financial gains that is needed to be ploughed back to sustain the journals, this group of publishers may not be interested in the project.

- **Commercial Publishing**

This group of publishers is out to make profit. Examples include the University Press and the Onibenoje Press. It is becoming a tradition for universities to have their own publishing outfit. Since the motive is commercial, the marketing strategy is well structured. However, because of the poor reading habit of our society, this group of publishers concentrates on text books for the educational institutions. They hardly go for specialized books like fisheries unless the author can fund the publications. The advantage of commercial publishers is that manuscripts are subjected to editorial work. This group will be difficult to attract to the Aquatic Commons Project for the fact that they are not seriously involved in publishing aquatic literature. For this reason no invitation was made to this category of publishers to participate in the Aquatic Commons Project.

### **Strategies for broad based participation**

From the pattern of publishing in Nigeria, there are two probable candidates for the Aquatic Common Projects. In an attempt to carry the institutions/associations along, a seminar titled **“Participation in Aquatic Commons Repository: Advantages to Fisheries Institutions, Scientists and Publishers”** was held. The paper was presented at NIFFR and NIOMR, the two major fisheries institutions in Nigeria. An abridged paper was sent to the President of Fisheries Society. The paper discussed the

projects NIFFR Library had participated in previously, and drawing out the advantages. Such projects mentioned include the ASFA, the Improved Access to inland Fisheries and Aquaculture Information organized by FAO, FIDI and SAIAB, and IAMSLIC 239.50. The aim was to prepare the potential candidates' mind about the advantages that the Aquatic Commons Project could offer. The paper explained the concept of Aquatic Commons, its general and specific objectives, expected advantages, and expected roles of participating institutions.

For the floating journals, an abridged version of the seminar paper explaining the concept and its advantages was circulated by e-mail. Appendix 1 at the end of this paper is a summary of the e-mail circulated.

The result of these efforts is that NIFFR, NIOMR and Fisheries Society of Nigeria indicated interest to participate in the Project. Only one of the seven identified journals showed interest. This development is positive and it is hoped that when the Project takes off more institutions and publishers will be willing to participate.

### **The prospects of Aquatic Commons Repository**

These are the driving forces behind the project.

- Improving access to fisheries and aquaculture management information.
- Ensuring equal participation by developing countries.
- Enhancing the sharing of knowledge and lesson learned.
- Serving as a motivator for scientists in fisheries and other aquatic sciences to publish their findings.
- Creating international awareness for literature from developing countries.
- Creating avenues to link entries in ASFA, ABAFR to the full-text.
- Creating free and open access to information for all.
- Enhancing the use and validation of research results, and avoid costly and wasteful duplication of efforts.
- Ensuring the preservation of information and its availability for future generation.
- Fostering effective bibliographic control of aquatic sciences literature.

### **Benefits of Aquatic Commons Repository**

- Participation in Aquatic Commons will greatly improve dissemination of documents produced in national institutions of developing countries which are highly elusive.
- The website will be a means of publicity for the work of the institution, scientists and publishers.
- The impact factor of work of institutions, and individual scientists will become measurable which hitherto was difficult to achieve with particular reference to developing countries.

- The project will be able to produce CD-Rom of submissions from a given country or region for dissemination to rural areas.
- There will be an increase in the sales of publications of institutions, societies and publishers.
- It will be a cheap way of publishing for organizations in developing countries which have no funds for producing multiple copies. Once the perfect copy is ready, it can be sent for inclusion on the website of the Aquatic Commons from where users can download.

### **Possible threat to the Aquatic Commons Repository**

#### ***Loss of copyright***

Questions arising from the seminar presentation on the project suggested that, potential participants have the fear of losing the copyright to their articles and publications. They are not sure whether copyright agreement will be needed between IAMSLIC, and National Institutions or Scientists. They are not sure of who will be acknowledged or cited, the website or the author?

#### ***Safety of their document***

Authors are not too sure of the safety of their documents.

#### ***Loss of financial benefits***

While government institutions see participation in the Aquatic Commons Project as means of publicity, publishers of journals see it as a threat to their financial gain. The question asked is that if information is power, should it be free?

#### ***Access to the Website***

In developed countries access to websites through the Internet facilities is relatively cheap. This is not the case for now in some developing countries. In most institutions VISAT is being used to access internet. This is very costly to maintain, and frequency of breakdown is high. This has created fear that some of them may not have access to the website of the Aquatic commons.

### **Emerging business acumen with digital publishing in Nigeria**

After the seminar at NIOMR, my attention was drawn to a publication captioned, '*How to earn money from your book without investing a kobo....guaranteed*'. The concept Obazu-Ojeagbase (2007) was putting across was about online publishing. To him the author will be able to follow the sales of his book online from wherever he may be in the world provided he could login to the customized website which will be created for the author once he/she accepts his/her work to be digitally published. Steps to be taken by prospective authors have been elucidated in a website ([www.theonlinepublisher.info](http://www.theonlinepublisher.info)), where the author can register. A one day seminar has been slated to further discuss the subject. The threat to the Aquatic Commons Project

is that those publishing aquatic sciences and fisheries articles in Nigeria for profit or to sustain their publications will likely subscribe to this emerging initiative.

### **Conclusion**

The Aquatic Commons Project is a welcome strategy for rapidly disseminating fisheries information utilizing modern technology. Like any new initiative, threats expressed above are expected. Some of the threats will be eliminated when the project starts functioning. For the project to accommodate journal articles, consideration can be given to back issues to enable publishers realize financial returns from their investment. Also of relevance is the realization that, people with business interests are waiting to maximize the potentials of commercial digitalization of publications. This will seriously affect the participation of organizations which are profit inclined.

### **References**

**Obazu-Ojeagbase, S.** (2007) How to earn money from your book without investing a kobo.....guaranteed! *Success Digest* Tuesday, August 14<sup>th</sup> 2007. Success Attitude Development Centre (SADC), Lagos.

#### ***Box 1***

You will remember that, I have earlier informed you that we are covering your journal(s) in Aquatic Sciences and Fisheries Database coordinated by FAO and published by Cambridge Scientific Abstracts (CSA) in cooperation with four United Nation Agencies. This coverage has made it possible to view the titles and abstracts of your past issues since 2003 internationally on CSA website. I am bringing to your notice another project, which will harmonize aquatic publications throughout the world. The attached brief explains what the project is about. Your journal/proceedings have been chosen because most of your articles are in the area of aquatic sciences. Generally, your fear as a publisher will be that your participation will adversely affect your sales since you need funding to sustain the production of your journals or proceedings. I am pleading that you give the inclusion of your journals or proceedings a trial because the inclusion will create international awareness for your publications and authors subscribing articles.

Sir, a way of striking a compromise is to put a limit on how many months/years an issue can be in circulation before the full-text can be included in the project. For example, you may say an issue can only be inputted into the project after one year of its publication. This period would have allowed you to recover the cost of production with some profit. To put this in control, your terms of agreement could be that you would submit a pdf copy of issues to be included. I am advocating for your participation because most of our works in Nigeria are not internationally known and this is the way we can create the awareness. This awareness will enhance citation of Nigerian authors, and will further beef-up their level of citation in Science Citation Index – an instrument of measuring impact studies for authors in the sciences. You should please read the brief attached. If you want any clarification, you should please feel free to contact me.

# **THE ROLE OF THE LIBRARY IN A MARINE ENVIRONMENT: PRACTICAL EXAMPLES OF PROBLEMS AND GOOD PRACTICES**

## **Alieya Haider**

Marine and Coastal Management  
Gilchrist Library  
Capetown  
South Africa

---

### **Introduction**

Information has become an important commodity in a rapid changing technological world and corporate environment. This has to a large extent, shifted the focus of the library. The challenge however is how to transmit information to users in any organization in a most effective format, more conveniently and fast enough. This makes the role of the librarian much more integral to the whole organization. The library thus becomes the nexus of packaging and housing valuable internal publications, current global fishery data and all information around hot topics in the marine and fishing industry.

### **Challenges in the light of limited budgets**

With information being regarded as a commodity, librarians must sell their library to their institutions. Many librarians have come to accept the notion that when it comes to budget cuts in institutions, libraries are the first to suffer. There is therefore the need for the librarian to do an assessment of his or her library's present state.

### **Plan of Action**

- Operate your library like a business.
- Your trump card is a dynamic business plan.
- Draft a concise but detailed budget for the current year. Outline your library's operational budget, service contracts, attendance of conferences and workshops, staff training etc.
- Be sure to include realistic time frames for achievable goals.
- List the costing of every library project to be undertaken for the current year which should include:
  - A library mission statement that is coherent with the mission of the parent institute.
  - The range of subjects covered by the centre must be clearly defined in this mission statement.
  - Clarify your commitments to serve specific user-groups.
- Include statistics with graphs indicating parameters of high level of library usage within the organization.
- Include statistics of visiting users. Statistics are a sure way to sell your library.
- Outline and define your center's role as a local, national or regional facility.



- Highlight co-operative agreements with other centers and institutions.
- Your business plan speaks volumes; therefore your institution will immediately see that you really mean business.

### **Some Good Library Practices**

- Have a clear defined library policy.
- Engage actively with the scientific community
- Check fishery related database and websites of marine science libraries to keep abreast with what's what and who's who in the fisheries/marine science world.

### ***Establish a Library Advisory Committee***

- To ensure that the library reflects the needs of the users.
- Act as support group to lobby for funds when needed.
- **Communicate** with staff.
- Regular debriefing sessions to keep everyone abreast.
- Staff training is key to the development in the library.
- Keep a record of positive comments from users.

### **Some Challenges/Problems**

- Donations can be problematic. Libraries are seen as a dumping ground for unwanted materials. Be firm and selective.
- The library will never satisfy every information need. Referral service is a good practice when you are at your wits' end.
- Know when to give up. It is not a crime if you have tried your best.
- You will always be faced with this scenario:
  - If it is a good book, it is out of stock. If it an excellent book, it is out of print.
  - If one issue of a journal is missing, 35 people would want that issue.

In conclusion, librarians must be of good temperament, have the necessary skills and expertise to face the emerging challenges in the library environment.

# THE DIGITAL DIVIDE IN A DIGITAL AGE: CHALLENGES OF SOURCING FISHERIES INFORMATION IN SUB-SAHARAN AFRICA

E.K.W. Kaunda<sup>1\*</sup> & M. Limuwa<sup>1</sup>

<sup>1</sup>Aquaculture and Fisheries Science Department,  
University of Malawi,  
Bunda College, P.O. Box 219,  
Lilongwe, Malawi,  
[\\*ekaunda@bunda.unima.mw](mailto:ekaunda@bunda.unima.mw)

---

## Abstract

A study to determine the type of literature (journal articles or otherwise) that is used by Aquaculture and Fisheries Master of Science students at Bunda College, University of Malawi, as well as problems that students face in identifying and sourcing information, was undertaken in September 2007. The study took the form of a thorough examination of the Master of Science degree theses in the fisheries and related fields of students that have recently graduated and/or about to graduate as well as administering a questionnaire to current students/staff in fisheries and related fields.

From a sample of ten theses that were examined, between 14- 65 % (mean 34%) of the cited references came from refereed journals while the rest came from books, grey literature, and/or conference proceedings. Out of the 300 refereed journal articles cited in the theses, 16 % were published between 1950-1979, while close to 70 % were published between 1980-1999, and only 14 % from 2000-2007.

Out of those who completed a questionnaire, more than 50 % indicated that identifying the article related to their work was the major problem, while 38% had problems with sourcing the identified journal article. On the other hand, ninety two (92%) percent used the internet to identify the article that is related to their work, while 63 % used books/document. Eighty-four (84%) percent sourced the identified articles from the internet while 46 % sourced from books/documents. Respondents mentioned lack of subscription to journals, slow internet, and old books as some of the problems to sourcing information for research.

While the samples reported herein were relatively small to make meaningful inferences, results nevertheless point to the fact that while the digital age provides access to recent and updated information, a problem still exist in developing countries such as Malawi, for researchers to identify and even source information. This could be the reason why most of the journal articles that are used by students are a decade old. It is recommended that the institutional budgetary allocations towards subscription to journals should be increased. At the same time, ways should be sought to link different libraries/societies for information searches and/or retrieval.

**Key words:** Fisheries, Aquaculture, Theses, Journal Articles, Information searches, Information retrieval

## **Introduction**

The fish sector makes a vital contribution to meeting the food and nutrition security needs of 200 million Africans and provides income for over 10 million engaged in the production, processing and trade in this industry. Moreover, fish has become a leading export commodity, trade in fish products has increased substantially over the past two decades, and Africa fish exports were valued at US\$ 2.7 billion in 2001 (NEPAD 2005).

Currently, Africa produces 7.31 million tons of fish each year. Of this, 4.81 million tons is from marine fisheries, and 2.5 million tons from inland fisheries. While catches from capture fisheries rose steadily throughout the 1980s and 1990s they have stagnated since then, reaching about 6.85 million tons in 2002. Aquaculture on the other hand has risen, but slowly, and only in Egypt has growth achieved rates of increase seen in the other parts of the world, rising from 85, 000 tons in 1997 to over 400,000 tons in 2004. The stagnation of fisheries production combined with human population growth mean that per capita consumption of fish in Africa is low and has stagnated. In fact for Sub Saharan Africa specifically, the per capita consumption has fallen in the past twenty years (NEPAD 2005).

The decrease in fish per capita consumption for the Sub Saharan Africa should be a cause for concern for the region and Africa as a whole. Fisheries are providing direct employment and revenue to approximately 2.6 million fishers and fish farmers. In addition, fisheries bring many social and economic benefits including food self-sufficiency, food security, improved nutrition, economic growth, and diversification of exports. Relatively, poor people benefit from fisheries as in several African countries; small-scale fisheries contribute at least 80 percent of the total fish production (Nomura, 2005).

The decreased per capita fish consumption is coupled by the unbalanced fisheries production status in African inland fisheries (NEPAD 2005). Only few countries, Egypt and Uganda contribute significantly to inland fisheries production in Africa. Worse still, other inland fisheries are collapsing e.g. Chambo fisheries from Lake Malombe (Bulirani *et al.*, 1999). Unfortunately, this status quo is coupled with the lack of important information at national and regional levels to provide sound and appropriate decision-making in managing the fisheries, considering that management of fisheries is science based.

The University environment in Africa is slowly changing. There is renewed recognition of the role that universities play as drivers of national development. Their transformation has included much investment in terms of electronic infrastructure and connectivity as well as attention to e-learning and related approaches as key tools to

enhance the quality of higher education and make it more accessible. University libraries are an important part of this transformation, with the potential to become leaders and standard-bearers of what can be done with the new Information Communication and Technology (ICTs) (Rosenberg, 2005). Postgraduate studies are seen as the possible avenues to generate information useful for policy formulation and improving sustainable livelihoods. Under these premises Bunda College, a constituent College of the University of Malawi introduced 11 MSc. Programmes ([www.bunda.unima.mw/programmes.htm](http://www.bunda.unima.mw/programmes.htm)) including MSc. in Aquaculture and Fisheries Science that was mounted in 2001. Since 2001, about 14 students have graduated ([www.bunda.unima.mw/aqua/Aqua\\_Introduction.htm](http://www.bunda.unima.mw/aqua/Aqua_Introduction.htm)), however, anecdotal reports points to the use of poor literature in research /theses. It was against this background that this study was conducted to investigate whether the digital facilities that are available have improved quality of research at Bunda College. At the same time, the study sought to determine the problems that were faced in terms of literature identification, searches as well as sourcing.

### **Materials and methods**

Ten (10) Master of Science degree theses in fisheries and related fields were thoroughly examined in terms type of reference quoted, whether journal or otherwise, the year in which the article was published. Only theses that were completed within the past 3 years or those students that were almost ready to graduate were examined.

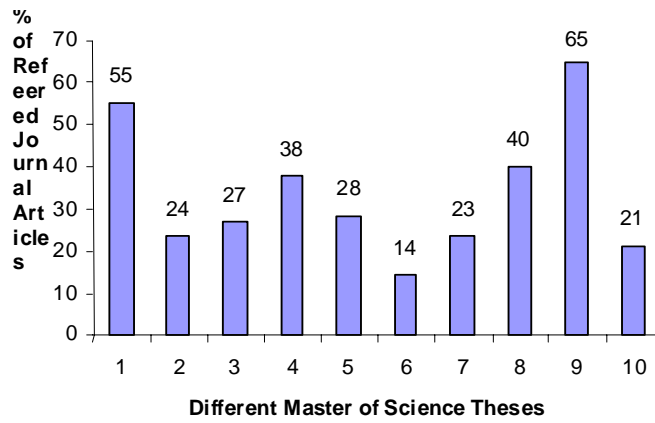
A simple questionnaire was administered to 14 MSc. students and academic staff in the field of fisheries at Bunda College. The questionnaire sought to find out how respondents were able to identify, search and source literature and their associated problems. As there are relatively few MSc. students and staff (approx. 30) at Bunda College, the sample represented about 50 per cent of the fisheries science population at Bunda College.

Statistical Package for Social Scientists (SPSS) version 15 and Excel 2003 computer packages were used to obtain percentages and frequencies.

### **Results and discussion**

#### **Type of literature that was cited in theses**

A review of the theses showed that there was a great variation in proportion of journal articles to other types of literature in each of the 10 theses. On average, 34 % (range 14-65%) cited refereed journal articles (Figure 1). The rest came from books, conference proceedings, grey and other forms of literature.



*Figure 1: Percentage of refereed journal articles in the different Master of Science theses at Bunda College.*

Students cited literature from as far back as 1950s to as recent as 2007 (Figures 2 & 3). However most of the cited refereed journal articles were published between 1980-1999 (69%) (Figure 2).

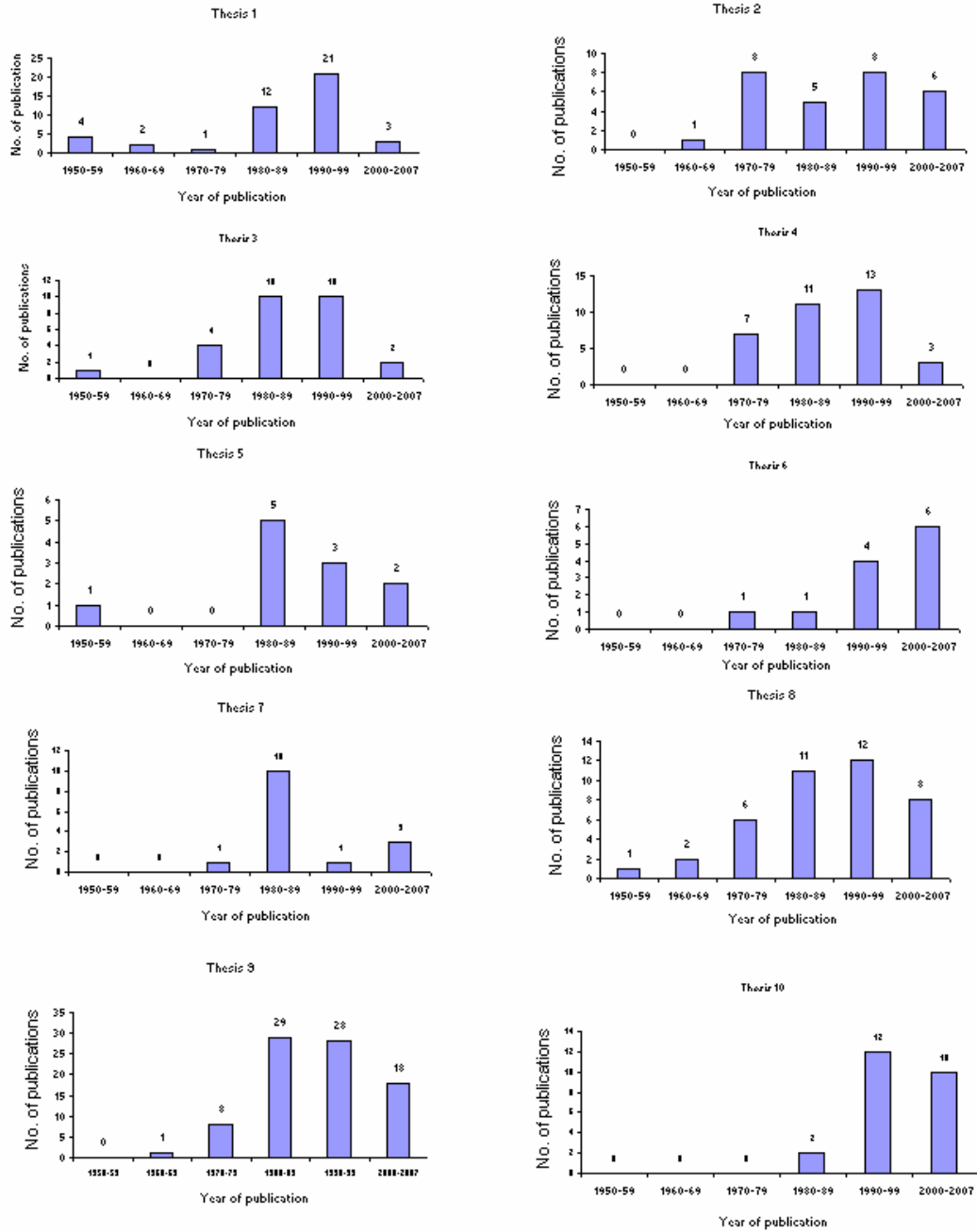
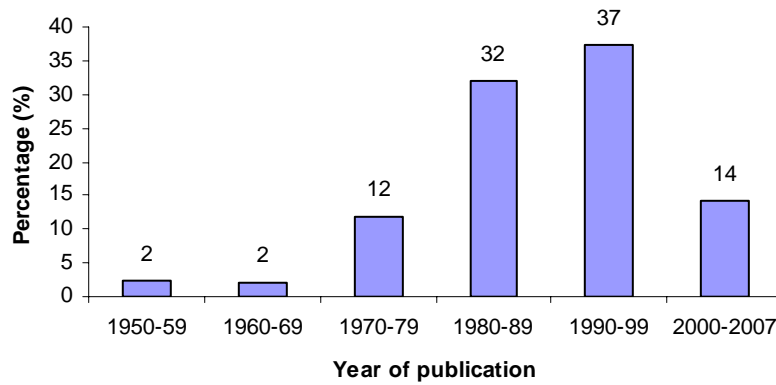


Figure 2: Summary of number refereed journal articles in the different years that were cited in the 10 MSc. theses at Bunda College.



*Figure 3: Percentage of refereed journal articles in the different Master of Science theses at Bunda College, from 1950s to 2007.*

A number of reasons may explain why most of the cited journal articles were from 1980-1999. First, it is possible that the period depicts a period of active research that was conducted in Malawi. Secondly, this could mean that the type of research that the students undertook was one or two decades behind. Lastly, this could simply imply that students cannot easily access the latest information even when the digital facilities are available.

#### ***Identification, searching and sourcing information***

The results in Table 1 show that more than 50 % of the respondents stated identification of articles related to their work was the number one problem while 38% identified sourcing of journal articles to be their major problem.

*Table 1: Types of problems in information searching.*

<b>Answers</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Identification of an article that is related to my research or work?	7	53.8
Sourcing the article after I have identified the article	5	38.5
Other (specify)	1	7.7

Results of the study also showed that 92% used internet to identify required article while 63% used books or other documents. On the other hand, 84 % used internet to source identified articles.

Forty six (46 %) of the respondents used AGORA while 30 % and 23 % used TEEAL and JSTOR, respectively (Table 2). However, while respondents mentioned using these online databases, and online journals, they mentioned that databases such as AGORA are too slow to download and databases such as JSTOR only provide abstracts, while full text articles require subscription for downloading. Respondents recommended the following, in order to improve information access: Subscribe to

journals directly other than through subsidized sites like AGORA; creation of links with other institutions to improve information access, and improve internet speed/bandwidth as well as subscription to more journals.

The problems stated above arise against availability of such programmes as the PERI programme which offers access to over 14,000 journal titles from 11 publishers plus approximately 20 databases, with country licences available in countries like: Ethiopia, Ghana, Kenya, Malawi, Mozambique, Tanzania, Uganda, Zambia and Zimbabwe (Rosenberg, 2005), as well as Open Access (OA) publishing (under which a publisher allows unrestricted and unlimited fee-free and copyright free access to online content) which is supposed to improve the journals' visibility (Ouya, 2006).

*Table 2: Number and percentage of respondents that used the various databases*

Database type	Frequency	Percentage (%)
AGORA	6	46.2
JSTOR	3	23.2
TEAL	4	30.8
NISC	1	7.7
FAO	1	7.7
AJOL	1	7.7

### Summary and Conclusions

In general, Master of Science degree students at Bunda College use refereed journals that are a decade or two behind. It is likely that this is due to problems that are faced in identifying as well as accessing journal as found in the survey, despite availability of digital facilities. It is recommended that the institution should increase allocation to the library for subscription to journals so that appropriate journals are accessed. In addition, ways should be sought on how to link institutions for library services that can assist not only in sourcing identified articles, but even in identification of the appropriate articles.

### References

**Bulirani, A.E., Banda, M.C., Palsson, O.K., Weyl, O.L.F., Kanyerere, G.Z., Manase, M.M. & Sipawe, R.D. (1999),** *Fish stocks and fisheries of Malawian waters: resource report*, Fisheries Research Unit, Fisheries Department, Government of Malawi.

**NEPAD 2005.** NEPAD Action Pan for the development of African fisheries and aquaculture. New Partnership for Africa's Development (NEPAD), Johannesburg, South Africa.

**Nomura, I. 2005.** Opening speech at the NEPAD Fish for All Summit Abuja, Nigeria 25 August 2005. In **NEPAD. 2005.** NEPAD Action Pan for the development



of African fisheries and aquaculture. New Partnership for Africa's Development (NEPAD), Johannesburg, South Africa.

**Ouya, D. 2006.** Open Access survey of African-published journals *INASP infobrief 7*, INASP, Oxford, UK.

**Rosenberg, D. 2005.** Towards the digital library: findings of an investigation to establish the current status of university libraries in Africa. INASP, Oxford, UK.

[www.bunda.unima.mw/aqua/Aqua\\_Introduction.htm](http://www.bunda.unima.mw/aqua/Aqua_Introduction.htm) accessed October 2007

[www.bunda.unima.mw/programmes.htm](http://www.bunda.unima.mw/programmes.htm) accessed October 2007.

# ONE-STOP INFORMATION SHOP FOR AQUACULTURE AND FISHERIES IN MALAWI

**Daniel Sikawa & Fanuel Kapute,**

Dept. of Aquaculture and Fisheries Science,

Faculty of Environmental Sciences,

Bunda College, PO Box 219,

Lilongwe, MALAWI

[Edsikawa@bunda.unima.mw](mailto:Edsikawa@bunda.unima.mw),

[fkapute@bunda.unima.mw](mailto:fkapute@bunda.unima.mw)

---

## Introduction

Malawi is endowed with the highest diversity of fish species in the world. There are known to be more than 1000 fish species. About 25% of the country is covered by water, creating a great potential for the development of aquaculture. There exists an extensive network of perennial rivers, streams, and lakes including Lake Malawi.

Fish used to provide about 70% of dietary animal protein to Malawi's population in the past. This has however been reduced to about 30% because of the declining catches. Fish is the cheapest source of animal protein to Malawi where more than 90% of the population live in rural areas and over 60% live on less than a dollar a day.

## Malawi Fisheries

Fisheries in Malawi is divided into two major sectors. These are Capture fisheries and Aquaculture. The capture fisheries contribute about 4% to the country's GDP and provide over 300,000 jobs. Major water bodies include Lakes Malawi, Malombe, Chilwa, Chiuta and the Shire River. However, fish stocks are on the decline and catches have dwindled from 70,000 to about 8,000 tons lately.

Aquaculture in Malawi started in the 1950s but is still underdeveloped in comparison to Capture fisheries. It is estimated that there are about 4050 practicing small scale fish farmers operating a total of 9050 fish ponds with an average pond size of 150 m<sup>2</sup>. Total production from aquaculture is 800 tons. Among the species cultured are *Tilapia rendali*, *Oreochromis shiranus*, *Oreochromis karongae*, *Clarias gariepinus*, and *Cyprinus carpio* (common carp). The latter, exotic to Malawi was introduced from Israel in 1976.

## Challenges

The fisheries sector in Malawi faces several challenges and these include,

- inadequate fisheries/aquaculture extension staff;
- the lack of trained fisheries field personnel;
- the lack of incentives for field staff;
- unreliable fisheries/aquaculture data (the result of poor communication (poor mobility) and inadequate financial resources;
- non utilization of fisheries and aquaculture data;
- inability of scientists and investors to access, timely fisheries and aquaculture information;
- poor research-extension-public information flow; and
- poor access to internet services.

### **Need for consolidation of Fisheries and Aquaculture information**

There is a large but scattered stock of information (raw printed matter) on aquaculture and fisheries in Malawi. These are found in the repositories of the Department of Fisheries (DoF), and NGOs. It is noted that there is much information on Malawian aquaculture and fisheries found outside Malawi and on the internet. This information is often difficult to access due to inadequate internet services (which is sometimes slow and expensive). Added to these is the fact that very important aquaculture and fisheries research outputs and publications cannot be accessed for free.

### **Fisheries and Aquaculture information in ONE BOX?**

The question now is whether we can collect and put all the relevant information into a single box for ease of access? The answer is positive, for we cannot afford to lose forever, valuable information that is currently found in shelves and other repositories. Compiled information constituted into what could be referred to as a MEGA INFORMATION HOUSE, can ease access for several stakeholders including fisheries and aquaculture researchers and investors. Electronic information is easy and fast to access through the internet and other accessories such as DVDs. This can be accomplished through the process of digitization, and this is where Libraries can play a great role.

### **The Process**

There is the need for a country-wide or national data collection on aquaculture and fisheries in Malawi. This information can be compiled and analyzed into one major database called ONE-STOP AQUACULTURE & FISHERIES INFORMATION Shop. Here, all raw (printed material) can be manually entered and stored into the computer, DVDs, and other storage media. Information can be posted on the web and can be freely accessed or through subscription.

### **Opportunities**

Several opportunities exist for facilitating the creation of this major database. Existing institutions, agencies and projects have databases that could constitute the base of the Shop. These include:

- Existing fisheries and aquaculture research and development projects.
- Overseas Development Assistance (ODA),
- Water Hyacinth Project,
- FDP, HIPC, ICEIDA
- JICA-Malawi Aqua Project,
- FAO-UNDP Project, DoF/MAGFAD, etc.
- Involvement of NGOs in fisheries and aquaculture development. e.g.
  - COMPASS-USAID.
  - WVI, CARD, Oxfam etc.

### **Strengths**

- Availability of trained staff and research institutions such as University of Malawi
- Availability of trained staff, and electronic equipment in libraries in Malawi
- Trained staff at Bunda College library in digitization, computer science and internet
- Qualified fisheries and aquaculture staff from the Department of Aquaculture and Fisheries Science at Bunda College

- Free access to raw data in offices of the Malawi Department of Fisheries, NGOs etc.
- Well trained staff in Geographical Information Systems (GIS) at Bunda College, Malawi Department of Fisheries and other institutions in Malawi.

### **Conclusion**

Information is power and has to be maximized for development. With advancement in technology, the use of electronic media is becoming popular by the day. Malawi cannot afford to underutilize its stock pile of rich and diverse data/information on aquaculture and fisheries. Our libraries can play a greater role in consolidating this vital information into a single bag for easy and quick access. The solution will lie in the establishment of a One-Stop Information Shop.

# **MANAGING RESOURCES IN AQUATIC AND MARINE SCIENCE LIBRARIES: THE AFRICA REPOSITORY FOR ELECTRONIC PUBLICATIONS - EXPERIENCES AND WAY FORWARD**

**Josette Confait**

Seychelles Fishing Authority

---

## **Introduction**

An institutional repository is a publicly accessible repository where the work published by authors affiliated with an institution is posted online, using special software known as Open Archives Initiative (OAI). In OceanDocs the software used is DSAPCE due to its ability of metadata exchange capability with the Odinafrica catalogue. The works can be searched and harvested; examples of harvesters in OceanDocs are Google scholar, OAIster, AVANO.

Repositories are becoming one of the promising ways of archiving and protecting documents via the Internet. They also make widely available via the open access initiative, documents to a larger audience.

This new technology, which provides free online access to digital documents, is constantly changing, and new information on building and running such service is emerging all the time. The service offers to the members of the African community, the management and dissemination of digital materials created by an institution.

The project proposal to develop an e-repository project for Africa was submitted to the government of Flanders in 2003 by IOC of UNESCO. The project commenced in August 2005.

The development of the technical infrastructure of the OdinPubAfrica repository was done by the Limburg University (now University of Hasselt). It was at different stages adapted so as to meet the regional requirements.

## **Objective of the project**

The ultimate objective of the project is to make available material that cannot be obtained through the traditional printing process. The mission is also to support the research community in Africa in providing free and better access to materials produced by the African community. The main goals are:

- Creation of a repository for marine science and oceanography in Africa;
- Collecting publications in electronic format from different partners in Africa;
- Enhancing the visibility of the authors and institutes;

- Making scientific publications of OdinAfrica institutes more easily and freely accessible;
- Facilitate publishing of research findings and hereby promoting research and increasing access by African scientists to the international research forum; and
- Provide long term preservation of the digital publications.

### **Partners in the project**

The success of the project depends on the participation of various institutions. Fifteen marine centres (as listed below) within the Odinafrica participating institutes are partners in the project. The participants have all been trained on the different aspects of the project and on specific skills in order to further develop and train others at their local centres.

- Seychelles Fishing Authority – Seychelles
- Albion Fisheries Research Centre – Mauritius
- Nigerian Institute for Oceanography & Marine Research - Nigeria
- Institut Halieutique et des Sciences Marines- Madagascar
- Instituto Nacional de Hidreografia e Navegacao - Mozambique
- Institute of Marine Sciences Library - Tanzania
- Bibliothèque de l'INSTM -Tunisia
- Centre de Gestion Intégrée du Littoral et de l'Environnement Marin et Côtier de l'Université de Lomé -Togo
- Service de la Documentation et de l'Information Scientifique - Mauritania
- National Institute of Oceanography and Fisheries - Egypt
- National Marine Information and Research Centre - Namibia
- Bureau de documentation et des statistiques - Sénégal
- Kenya Marine and Fisheries Research Institute - Kenya
- Université Mohammed V – Agdal, Faculté des Sciences - Morocco
- Marine Fisheries Research Division – Ghana.

Among them two regional coordinators are selected with their roles to manage, supervise, support the development of the collection, and promote the services of OceanDocs.

The role of each partner has been to provide a service that may change the way communication is perpetuated thus leading to new services offered alongside the traditional library chores.

### **Targeted Results**

A repository enhances the image of an Information Centre by strengthening the status of its research output. The service will in the long term help an organisation cut the

high cost of printing and mailing of publications, and contribute to economic development in Africa.

The process of degradation is often accelerated by poor environmental conditions such as excessive light, fluctuations in relative humidity and temperature, dust, both gaseous and particulate. Others are biological enemies, which are fungus and various animal and insect species. Digital introduction will help store the memory of an organisation for future generations.

The authors will benefit from the enhancement the repository will have on their research and thus enhance their professional visibility. It will make their research work more accessible to a wider audience and hence generate more citations.

The target is also to help those publications, especially what is known as ‘grey literature’ that cannot make it to commercial printers to find a place for their accessibility.

It also contributes to the creation of extra services through electronic journals.

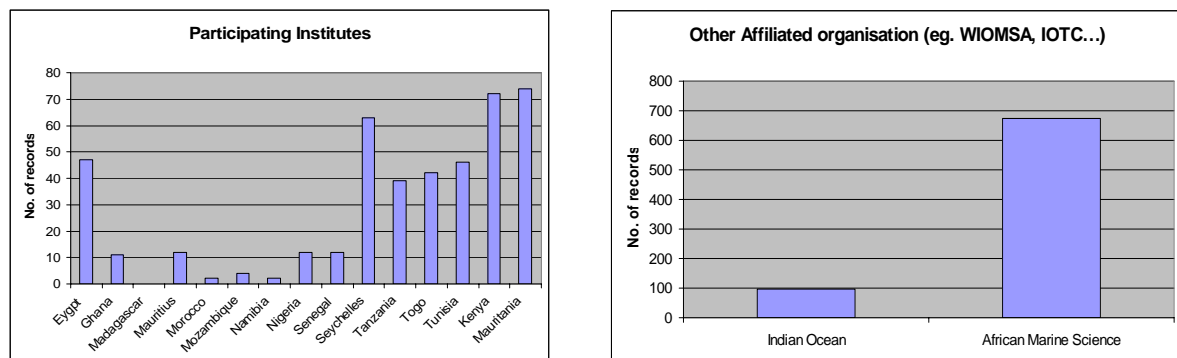
### Status of OceanDocs

The collection process commenced rather slowly due to certain constraints faced within the local administration. Some of the constraints that the project is still facing include the constant changing of information staff by some countries, thereby delaying their participation.

Another constraint is that there is insufficient support from both scientists and management. Thus, Scientists are sometimes hesitant to hand in their documents. In other cases the Internet capacities of the institutions are either too slow or constantly breaking down.

The following figures give an account of the number of publications in OceanDocs.

Fig. 1. Publications in OceanDocs



Looking towards the future

The project aims at offering African research the opportunity to expand to a wider audience and be more visible to the international community. Though there have been some setbacks, it is necessary to overcome these in order to achieve acceptable standards. The challenges that confront the project presently are ;

- To further support, and enhance the development of the electronic platform ;
- To continue with the collection and preservation of scientific publications and documentations from remaining OdiAfrica institutes, as well as affiliated organisations like COI, IFREMER, IOTC, etc; and
- To expand the scope of the project further.

There have been several regional projects of great importance where results have been obtained but unfortunately little has remained as far as documentation is concerned. The project will therefore explore the opportunity to work in collaboration with these organisations for a coordinated approach towards sharing their databases.

The project will also develop strategies for member states which have universities and various research institutes and are not yet involved in any OdiAfrica affiliation.

### **Development of Content**

During its developing stages not all the 15 trained participants have started their repository collection due to certain constraints faced. Efforts will be made to help those countries with adequate research outputs that are willing to contribute to the project to kick start their tasks. With regards to poor or no internet facilities, this will be done via CD-ROMs or through other facilities.

To further add value and content growth, older publications with significant research outputs will be collected. This will help preserve the historical memory of the African communities.

### **Linkages with other programmes**

Strategies will be developed to link Oceandocs with relevant databases like AFRILIB (African Library) INMAGIC, ASFA-ISIS.

### **Creation of electronic journals**

A journal platform is being created to incorporate the above to the website. Several journals have been identified and other possible ones will be incorporated.

### **Conclusion**

The creation of an African repository for an institute and for each researcher is a very important task in the present world of scientific communication. Materials are to be permanently preserved and available. It has been proven that materials in an open



access environment are cited more, thus are of great importance to the visibility of scientific work of an individual, institution and hence an entire country. Information resources are expensive and demanding in terms of management, space and expertise. In line with this, the project offers the benefit of sharing the resources which is a cost-effective component in the provision of information.

Librarians play a critical role in helping to facilitate the development of digital services by applying special acquired skills, as well as making effective use of available resources. This presents an opportunity for librarians to move from the traditional services to new digital publishing technology. In a rapidly evolving electronic environment, collecting and preserving the African memory will surely add positive bonuses to the future generations of our continent. In all new initiatives, there is an element of education, awareness, marketing, and keeping in touch with new developments.

In this context, it is essential that librarians get the motivation they deserve as they are the key partners in making the digital technology work.

# THE POTENTIAL CONTRIBUTION OF PERSONAL COLLECTIONS TO REGIONAL BIODIVERSITY KNOWLEDGE: PLANNING DIGITIZATION WORK AT THE UNIVERSITY OF BOTSWANA'S OKAVANGO RESEARCH CENTRE LIBRARY

**Monica Morrison**

Senior Librarian,  
Harry Oppenheimer Okavango Research Centre,  
University of Botswana,  
Maun, Botswana,  
[mmorrison@orc.ub.bw](mailto:mmorrison@orc.ub.bw)

---

## Introduction

Monitoring biodiversity requires sustained attention over time. Governments, usually responsible for this type of activity are faced with limited resources and often capture data with limited contextual information. Academic field research can supplement this data, but is often time limited and carried out by people without continuous access to a region or natural area. Attempts to involve local people in monitoring of the natural resources that surround them and support their livelihoods are meeting with some success.<sup>1</sup> Nevertheless, there are many blank spaces in the continually evolving picture of landscape and habitat of naturally significant areas.

Underused, and often not integrated with current data, are data from documentary resources such as books, government reports, field notes and archival materials of previous researchers<sup>2</sup>, possibly because of inaccessibility and the time consuming nature of desk research. Technological tools have the potential to make this knowledge more available for inclusion in the overall ecological story of a region. This paper discusses the potential of recreating biodiversity knowledge from three personal research collections from the Okavango Delta region in northern Botswana through digitization of selected materials.

## Background

The Okavango Delta, a Ramsar wetland of international importance, has been a focus of Government of Botswana policy since proposed use of upstream waters in the 1980s provoked strong reaction from conservationists. A vital source of water in an arid environment, and a tourism destination with high aesthetic appeal, the Delta in its relatively pristine state has also become recognized as a significant biodiversity resource in a world of increasingly threatened habitats.

---

<sup>1</sup> DANIELSEN, F., BURGESS, N. & BALMFORD, A. (2005) Monitoring Matters: Examining the Potential of Locally-based Approaches. *Biodiversity and Conservation*, 14, 2507-2542.

<sup>2</sup> HAMANDAWANA, H., ECKARDT, F. & CHANDA, R. (2005) Linking archival and remotely sensed data for long-term environmental monitoring. *International Journal of Applied Earth Observation and Geoinformation*, 7, 284-298.

The University of Botswana's Harry Oppenheimer Okavango Research Centre (HOORC) was established in 1994 to develop research programmes based on national and regional needs to understand the natural and social environment of the Delta and to lay the planning foundation for the wise use of its resources. HOORC is the designated repository for data and information to support the Government of Botswana Okavango Delta Management Plan.

The library at HOORC began with the donation of the collection of a government official and natural history enthusiast, Peter Smith, and has over the past several years, added to its resources the San (bushmen) peoples manuscript and film collection of the late Dr Hans Joachim Heinz, and the books, reports and papers of the late Dr Richard Bell, a southern African ecologist and specialist in wildlife monitoring. These materials are considered a potentially rich source of biodiversity information.

HOORC hosts the GEF funded project, *Building Local Capacity for the Conservation and Sustainable Use of Biodiversity in the Okavango Delta* (BIOKAVANGO), which supports elaboration and implementation of the Okavango Delta Management Plan (ODMP) through lifting barriers to mainstreaming biodiversity conservation objectives. One of these barriers is weak management of knowledge needed to guide decision making. One of the project's approaches to addressing this issue is support for the development of systems to preserve and access the content of HOORC's library collections – in particular, the historical materials in its special collections.

### **The Researchers and their Collections**

Peter Alexander Smith was born in 1931, in Salisbury, Rhodesia (now Harare, Zimbabwe). He joined the Commonwealth Development Corporation in 1953 and relocated to Maun, Botswana in 1958. For 38 years he worked in various positions for the Bechuanaland and subsequently, Botswana governments, mainly in the areas of tsetse fly and invasive aquatic plant control. Through working in these positions, in and around the Okavango Delta, he became recognized for his knowledge of the ecology and botany of the area. After retirement in 1991 he remained active as an independent consultant as well as an Honorary Research Fellow of the Okavango Research Centre. He received an MBE from the British Queen and a Presidential Certificate of Honour from President Sir Quett Masire. He died suddenly on 20th May, 1999 and his collection of drafts, correspondence, off-prints, newspaper cuttings, articles, manuscripts, typescript notes, photos, maps and film was donated to HOORC by his family. The materials cover a wide range of topics: ecology, hydrology, limnology, geography, botany, biology, linguistics, philology, anthropology, history and culture.

Several separate projects examined and reorganized portions of the collection before Gemma Bentley, Senior Archivist at the University of Botswana, created a finding aid

for the collection in 2005<sup>3</sup>, and identified as the most potentially valuable series within collection:

- Annotated aerial photos
- Annotated 50,000 series maps recording details of field trips, observations, local geographical names.
- Historic photos and film, images of specimens, and the Delta.
- Transcripts of a few oral history interviews.
- Correspondence that details the frictions and tensions between different government projects and divisions.

Dr Hans Joachim Heinz lived and worked in the Okavango Delta region for more than 30 years until his untimely death in 2000. Heinz, a parasitologist, came in 1961 to study the biology of the Bushman in Okwa valley south of the Delta. He married a San woman, and afterward obtained a degree in anthropology. His work focused on documenting the culture and indigenous knowledge of Bushmen in the Okavango Delta and northern Kalahari. His books, papers, films and slides were transferred formally to HOORC's library in December 2006, and remain to be inventoried, although volunteers from the San organization, Kuru, prepared lists of the films and slides in 2007. The films and slides have captured the most attention from researchers who knew Dr Heinz and his work, as they document traditional San activities, including harvesting of wildlife and veld resources. The films were co-produced with a German research institute, which makes copies available over the web at a cost.

Dr Richard Bell worked as a wildlife biologist throughout southern Africa for 30 years. He moved to Maun from Zambia in 1993, worked on a project with Department of Wildlife and National Parks, and then set up his own consulting company before ending his days prematurely in Maun in 2003. Bell was renowned for his knowledge of wildlife monitoring techniques. His collection of books, research reports, photographs and notebooks come from all stages of his work in Malawi, Kenya, Zimbabwe, Zambia Botswana, Tanzania, and Mozambique. The materials were donated to HOORC's library in 2007 and are awaiting a full inventory. Bell was a voracious reader and collector of research materials. Only a brief glimpse at materials in his collection reveals that he was deeply interested in the philosophy of conservation and had worked extensively with development of community wildlife management schemes. He was known for his detailed notetaking, and his collections contain approximately 20 hard covered notebooks filled with minutes of meetings and observations.

All three researchers were recognized as knowledge specialists in the ecology and ethnology of the Okavango Delta region and were constantly sought out by local people for their insight, and for the content of their diverse collections. All three died

---

<sup>3</sup> BENTLEY, GEMMA. 2006. *Finding Aid for Peter Smith Archives*. Gaborone: University of Botswana Library Services, 2006.

early, leaving a representation of their knowledge in the form of their collections of books, papers, images and notes, but without finding aids that could assist researchers in reconstructing the special knowledge of the collectors.

### **Identification of significant biodiversity materials for digitization**

To identify the materials of potential use to HOORC's current biodiversity work, and therefore candidates for early digitization, the library has relied on the insight and observations of other researchers – from HOORC and from the extended research community -- who knew the three collectors. For the Smith collection, the approximately 45, 50,000 series maps recording details of field trips, observations, and local geographical names -- that are no longer included on government maps but that are still used -- offer original content of both biodiversity significance and a manageable body of material for digitization. Dr Heinz' collection of approximately 900 colour slides documenting bushman subsistence activities and customs has already attracted attention from local researchers. Dr Bell's detailed notebooks have been pointed out by biologists as an original resource likely to provide insight to the researcher's understanding of wildlife monitoring. From the point of view of supporting biodiversity conservation work, the materials offer original data, in context, about animal populations and vegetation patterns (Smith), and about use and management of natural resources in the Okavango Delta region (Heinz and Bell).

From the point of view of library digitization methodology, the materials identified meet criteria set by library specialists<sup>4</sup>:

- Intrinsic value: the materials and content are original and not found elsewhere in the world.
- Increased access: digitization will significantly increase the access to these materials, now stored in a remote location in a library environment with limited opening hours.
- Increased use by an identifiable constituency: the digitized materials will be of significant value to researchers and planners in the Okavango region.
- Goals met by digitizing: preservation of fragile materials, improved intellectual control through indexes and linking of related materials, added functionality – especially to study materials in context.
- No existing equivalent material.
- Rights and permissions: ownership by HOORC obtained for all three collections; consultative process established for use of San materials.
- Technology adequate to meet goals: selection and acquisition of scanning and storage underway.
- Adequate expertise and infrastructure: University of Botswana Library Services commitment, specialist archival advice available.

---

<sup>4</sup> HAZEN, DAN, HORRELL, JEFFREY , and MERRILL-OLDHAM, JAN. [\*Selecting Research Collections for Digitization\*](#). CLIR, 1998.

- Possibility of redefinition of project to narrow scope or recast objectives: sub-collections selected with this in mind.

### **Planning for digitization**

One of the products of the Okavango Delta Management Plan project, set up by the Botswana government to ensure wise management of the Ramsar site, was ODIS, a Geographic Information System (GIS) designed to capture data about the Delta and allow production of thematic maps to support management activities. The system allows for inclusion of documentary resources such as full text of reports but this facility has been little used in a dynamic way to link document content to primary monitoring data, or – for that matter – to the library catalogue. A logical next step would be to link the digitized biodiversity materials to the system, allowing for geographic representation of the content of these materials, as well as access to the content from ODIS itself.

All three collections contain numerous government and consultants' reports that are being catalogued as individual items, as they are often referred to in bibliographies and requested for consultation. While a long term library strategy may look at digitizing these resources, depending on copyright issues, the current project should at a minimum plan on linking catalogue records for these items to relevant materials captured digitally for the project.

Planning for the digitization process requires pre-processing of original materials and ensuring that the materials, once captured digitally, have a permanently identifiable physical location. The Smith maps have been indexed and stored in map cases, but there are not yet formal inventories and finding aids for the Heinz and Bell collections. Creating these conditions is clearly a priority to move the digitization process forward.

The potential for recreating context for the digitized materials needs to be enhanced through ongoing consultation and interviews with local researchers who knew the collectors, and with people who are carrying out current biodiversity monitoring work. The HOORC library's position as a research hub and depository for ODMP related materials should support this activity.

### **Recapturing personal knowledge context through published information products**

The digitized collections will provide access to their specific content to researchers across a broad spectrum of research through browseable lists and searchable indexes but, in addition, the library plans to create web-based products that help provide a contextualized picture of the biodiversity resources of the Okavango Delta and let researchers see the region through the eyes of the collectors. Access to selected related materials, such as oral history interviews, excerpts from reports and manuscripts, digitized herbarium specimens, and interactive maps will be combined to

allow the online user to explore interactions among people, animals and the Delta's landscape.

Peter Smith's mapped observations of the constantly changing Delta can lead the researcher to accounts of water weed control programmes and to data about shifting human settlements. Heinz's pictures of wild plant harvesting can be linked to images of the plants from Smith's herbarium and to recorded interviews with San hunters and gatherers. A search of the content of Richard Bell's notebooks can lead to a link to a government report, or to a GIS image depicting patterns of wildebeest migration before and after erection of veterinary fences. In this way, we can attempt to recreate some of the learning experiences made possible by the collectors' presence in the local community.

### **Conclusion**

Digitization of unique materials created and collected by three researchers, acknowledged by their communities as reliable sources of knowledge, has the potential to enrich the overall ecological story of the Okavango Delta. The project to digitally capture and provide web-based access to selected materials from these research collections at HOORC's library will aim at recreating the biodiversity knowledge of the researchers to support current biodiversity conservation efforts.

**BENTLEY, GEMMA.** 2006. *Finding Aid for Peter Smith Archives*. Gaborone: University of Botswana Library Services, 2006.

**DANIELSEN, F., BURGESS, N. & BALMFORD, A.** (2005) Monitoring Matters: Examining the Potential of Locally-based Approaches. *Biodiversity and Conservation*, 14, 2507-2542.

**HAMANDAWANA, H., ECKARDT, F. & CHANDA, R.** (2005) Linking archival and remotely sensed data for long-term environmental monitoring. *International Journal of Applied Earth Observation and Geoinformation*, 7, 284-298.

**HAZEN, DAN, HORRELL, JEFFREY, and MERRILL-OLDHAM, JAN.**  
[Selecting Research Collections for Digitization](#). CLIR, 1998.

## THE PRESENT STATUS OF DOCUMENT DELIVERY IN KENYA

**Isedorius Ochola Agola**

Kenya Marine and Fisheries Research Institute,

P.O. Box 81651

Mombasa

e-mail: [iagolla@kmfri.co.ke](mailto:iagolla@kmfri.co.ke)

---

### **Abstract**

Guided by our vision “To be a one stop provider of user focused quality library services and develop collections in support of aquatic research and promotion of sustainable utilization of Marine and Freshwater resources”, the provision of documents, bibliographic searches, and compilation of current awareness product - KMFRI CURRENT, remains some of the core services we offer to Researchers/Scientists and relevant institutions. We have indeed moved from the era when we used to source for documents courtesy of former RECOSCIX-WIO and later ODINAFRICA most of which were hard copies, made storage very difficult. The library is now able to service 70% of the requests through its collection of which both RECOSCIX-WIO and ODINAFRICA played a part in building. Besides servicing requests from within, we have been able to also service requests from without mostly on investigational published papers by local scientists on request by other institutional bodies. Tribute to some of these must truly be given to IAMSLIC and AFRIAMSLIC for giving the Union list that plays an integral role in provision of documents. Besides that, the library has its own internal based databases, for example, ASFA, KENYAN WATERS and SAMAKI and also maintains directories, KENDIR, AFRIDIR and GLODIR. Collaboration with the following institutions has made it much easier to access documents that are not locally available, IAMSLIC, AFRIAMSLIC and ODINAFRICA. Online access to AGORA, HINARI, OARE, INASP and DOAJ have enabled the library to meet some of its requests and researchers have fully text access to the above-mentioned sites after being supplied with the ID and passwords to make use of the facility in their respective offices. We owe our success to the well-coordinated leadership and management of the AFRIAMSLIC through the parent umbrella IAMSLIC.



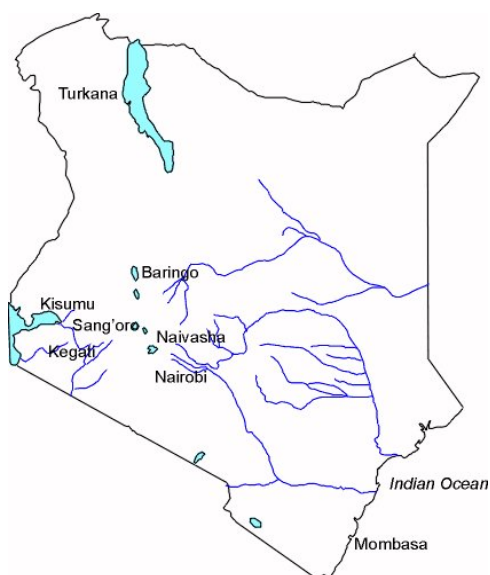
The Kenya Marine and Fisheries Research Institute came into being in 1978 after enactment of the Act of Parliament in 1978, following the collapse of the East African Community under which by then was East African Marine and Freshwater Organization, (EAMFRO)

Headquarters is based in Mombasa but has other seven Research centers spread over the country, i.e. Kisumu which serves as the Headquarters for inland stations, Sangoro, Kegati, Baringo, Nairobi, Naivasha, and Turkana. The library that is based at Mombasa has played an integral part in dissemination of information and provision of bibliographic literature to scientists and institution both within and without.

To enhance these services we maintain quite a number of directories. These include;

- AFRIDIR- a directory of Freshwater and Marine Scientists
- KENDIR- a directory of Freshwater and Marine Scientists but limited to KENYA
- GLODIR- a directory of both Freshwater and Marine Scientists which is global.

The library also maintains databases which go a long way in enabling it meet its obligation to users. The databases are ASFA, KENYA WATERS, and SAMAKI.



*Figure 1. Map showing KMFRI Research stations including Headquarters, Mombasa.*

The library handles approximately close to 230 document requests per month and the handling process below process is followed;

- Give MFN numbers to the requests according to how they have been received;
- Check the KMFRI holdings to confirm their availability;
- Direct the unavailable ones to IAMSLIC Union list for provision; and
- Check on the following sites on the web to download;
  - AGORA
  - HINARI
  - OARE
  - INASP
  - DOAJ

Finally on receipt of the documents for those on e-mail we forward/send the pdf copies for their work. For an inland station where use of computer is still not available we print and send them the same. For a station like Turkana, and Baringo it still takes some number of days for the documents to reach them as they are not easily accessible due to demographic reasons.

### Statistics of data and information supplied 2006-2007

*Table 1.* Request for citations and literature searches

	<b>Year</b>	<b>No. Searches</b>	<b>No. Abstracts</b>
Freshwater	2006-2007	20	1650
Marine	2006-2007	35	2560
<b>Total Requests</b>		<b>55</b>	<b>4210</b>

The period 2006-2007 freshwater and marine researchers requested for citations/references and the following abstracts were supplied

*Table 2.* Document delivery 2006

<b>Month</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sept</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
Marine	109	100	90	120	140	75	69	50	60	50	90	30
Freshwater	80	50	40	50	61	45	44	39	41	25	16	12
<b>Total No. Requests</b>	<b>189</b>	<b>150</b>	<b>130</b>	<b>170</b>	<b>201</b>	<b>120</b>	<b>113</b>	<b>89</b>	<b>101</b>	<b>75</b>	<b>106</b>	<b>42</b>

*Table 3.* Document delivery 2007

<b>Month</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>
Marine	100	90	89	115	120	70	80	30
Freshwater	90	50	40	35	70	30	40	15
<b>Total No. requests</b>	<b>190</b>	<b>140</b>	<b>129</b>	<b>150</b>	<b>190</b>	<b>100</b>	<b>120</b>	<b>45</b>

Tables 2 and 3 show the statistics for the documents supplied to freshwater and marine scientists from Kenya for the year 2006-2007

Tables 4. Datasets request- 19/09/2006-12/08/2007

Organization	CDA	FD	KESCOM	KWS	OSMAG	WIOLAB	WCS	WWF
No. Datasets	4	1	2	3	2	1	2	1

Sixteen (16) datasets were supplied to stakeholders as such as CDA, WCS, OSMAG, KWS, WIOLAB, Fisheries Department and KESCOM as shown below.

The following maps were digitized/scanned for the marine researchers as shown Table 5.

Tables 5. Maps digitization

	No. Maps
2006-2007	21

### Acknowledgements

I am grateful to AFRIAMSLIC for accepting my participation on behalf of Mr. Macharia who was held up with ASFA matters. I owe much gratitude to CTA for funding the trip to the conference and Mr. MacAntony Cobblah for his tireless efforts.

### References

1. Recoscix-Wio Report 1998 pg. 27-31
2. KMFRI Annual report 2006 pg. 7-8

# **FISHERIES AND AQUACULTURE INFORMATION PROVISION IN GHANA**

**MARIAN JIAGGE**

Water Research Institute  
Council for Scientific & Industrial Research  
Ghana  
[mjiagge@yahoo.com](mailto:mjiagge@yahoo.com)

---

## **Introduction**

Aquaculture plays an increasingly important role in the global economy because fisheries contribute significantly to poverty alleviation and food security. The importance of aquatic and marine science cannot therefore be over emphasized. It is the knowledge behind the production function of aquatic ecosystem for water, food and the environment. Without doubt every planning process that leads to an enhanced development of a nation must be based on reliable and adequate information.

Thus information resources in both printed and electronic format is essential in libraries and information centers. Facilities such as storage devices, organization, resource sharing, retrieval and management systems including human resource development are essential in providing access to scientific and technical literature in support of marine and aquatic institutions.

The fisheries sub-sector of agriculture in Ghana is based on resources from the marine, inland (freshwater) and lagoon environments and also from aquaculture sources. The Directorate of Fisheries of the Ministry of Food and Agriculture is responsible for policy formulation and implementation, management and control of the fishing industry under the general guidance and direction of a Minister of State for Fisheries and a Fisheries Commission. The Directorate has five operational divisions including the Marine Fisheries Research Division (MFRD) that undertakes research and monitoring of various aspects of fish and fisheries.

## **Functions of the Directorate of Fisheries**

Facilitate the function and implementation of appropriate policies in support of a sustainable fishing industry.

Ensure the implementation of the Fisheries Law and regulations.

Provide technical support to fishers, fish farmers, fish processors and trades on improved fisheries practices, efficient utilization and management of fisheries resources.

Playing a facilitating role in development of fisheries infrastructure, input acquisition for fishers, fish farmers, fish processors and traders.

Initiate, coordinate, monitor and evaluate national programmes and projects in the fishing industry.

To collaborate with international organizations in the study and management of shared fish stocks.

To generate socio-economic data and information as a basis for improving the human capacity for the fishing industry.

The legal basis for fisheries management in Ghana involved ordinances, laws and regulations. The current law on fisheries is the Fisheries Act 625 of 2002, which conforms to relevant sections of the FAO Code of Conduct for Responsible Fisheries. The Directorate of fisheries has also elaborated fishery management plans for marine and Lake Volta fisheries and is preparing fisheries Regulations to give effect to the Fisheries Act 625.

### **Fishing Industry**

The fishing industry comprises marine fisheries, freshwater fisheries and aquaculture. The marine fishing industry consists of three main sectors, namely, artisanal, inshore and industrial sectors. There are nearly 10,000 dugout canoes and about 123,000 fishermen in the marine artisanal sector. These operate from 304 landing centres in 1855 fishing villages. The inshore fleet consists of about 230 locally built wooden-hulled trawlers/purse seiners that operate from eight landing centres. The industrial sector is made up of large-sized trawlers, shrimpers, tuna baitboats(pole-and-line) and tuna purse-seiners that operate only from Tema and Takoradi. Only Ghanaian nationals are permitted to engage in artisanal and inshore fishing in Ghana. All tuna vessels are operated on joint-venture basis with Ghanaians having at least 50% shares as required by the Fisheries Act 625 of 2002.

Exploited resources in Ghana's marine waters include small pelagic, large pelagic species and demersal species. The fisheries are affected by the seasonal upwelling that occurs in Ghanaian coastal waters. The high biological activity that takes place in the sea during the upwelling periods (December-February and July-September) increases production of fish food and most marine fishes spawn during this period. The stocks become more readily available to the fishers for exploitation.

Fishing in Lake Volta contributes about 90% of the total inland fishery production in Ghana. About 80,000 fishers and 20,000 fish processors and traders are engaged in this fishery. Only planked canoes, numbering about 17,500 are used in the Lake Volta fisheries, thus the fishery is solely artisanal. Fish landings are dominated by cichlid species.

### **Aquaculture**

Fish farming is relatively new to Ghanaians but its practice is becoming widespread in many parts of the country. There are about 1,000 fish farmers and over 2000 ponds with a total surface area of about 350ha. Both extensive and semi-intensive cultures are practised involving tilapia and catfish species.

The development of fish farming in Ghana has been hampered by a number of problems which include weak extensive services, inadequate supply of good quality fingerlings, lack of knowledge of fish pond management and high cost of pond construction.

Government has taken some measures to accelerate the development of fish farming in Ghana. These include provision of a bulldozer, on hire purchase to some fishing associations, training of youth in areas with high aquaculture potential, to construct ponds for farmers and establishment of hatcheries to provide good quality fish fingerlings to fish farmers in some parts of the country.

### **Role of libraries and information centers in providing information for effective aquaculture and fisheries management**

Information resources in both printed and electronic format is essential in libraries and information centers. Facilities such as storage devices, organization, resource sharing, retrieval and management systems including human resource development are essential in providing access to scientific and technical literature in support of marine and aquatic institutions.

The Marine Fisheries Research Library of the MFRD was established in 1968 to perform the role of providing access to domestic and foreign literature in the fishery and related sectors of the economy.

The library currently houses approximately 8,676 books. The collection covers a wide range of subjects on hydrography, population dynamics, oceanography, marine biology, fishery statistics, fishing gear technology and stock assessment. It has a collection of grey literature, serials and maps. The collection also includes publications of international organizations concerned with fisheries and the marine environment such as FAO, UNEP, and UNESCO-IOC.

The MFRD library uses INMAGIC Software, a fully integrated library automation system which includes circulation, loans, acquisitions, cataloguing and retrieval of information. The library receives the Aquatic Biology, Aquaculture and Fisheries Resources (ABAFR) on CD-Rom which is distributed by the FAO.

### **ICT Use**

The use of ICT has made information resources accessible on-line in various forms. Quite a number of libraries and information centres have computers with Internet connectivity and as such have access to some electronic resources and services such as African Journals Online (AJOL), Access to Global Online Research in Agriculture, Online Access to Research in the Environment(OARE)

Information networks and other regional initiatives are undertaken in the form of national inter-library loans, publications exchange agreements, networking with aquatic and fisheries institutions in Africa.

### **ODINAFRICA**

Ocean Data and Information Network for Africa was established for the development and dissemination of marine and coastal information products responding to the needs of a wide variety of user groups using national and regional networks.

Ghana is a member of the ODINAFRICA project with the Marine Fisheries Research Division (MFRD) as the co-coordinating centre. ODINAFRICA aims at enabling all coastal member states of Africa to:

- get access to data available in other data centers,
- develop skills for manipulation of data,
- prepare data and information products,
- develop infrastructure for archival analysis, and
- disseminate the data and information products.

**Literature services** provided under the ODINAFRICA project includes:

1. Africa's Library Holdings(AFRILIB): a collective catalogue of library holdings in cooperating institutions.
2. Document Delivery(DD): provides document request services to partners of the project.
3. Africa's Publications(AFRIPUB): a catalogue of scientific journals, articles and monographs published by African Ocean Scientists.
4. Current Awareness Services(AFRICURRENT): an awareness tool based on user's profile of specific subject interests.
5. AFRIDIR: a directory of marine and freshwater professionals in Africa.

### **Development of Aquatic Commons**

The Aquatic Commons is an initiative to extend the resource sharing activities of the International Association of Aquatic and Marine Science Libraries and Information Centres (IAMSLIC). IAMSLIC currently has 375 members from 86 countries and regional groups in Africa, Europe, North and South America and the Pacific.

The Water Research Institute's Library is a participating member of IAMSLIC. The library is also a participating member of AFRIAMSLIC; the Africa Regional Group of IAMSLIC with the common aim of strengthening aquatic and marine science information and infrastructure through effective networking and collaborative activities within the sector.

The FAO FishCode Programme is supporting the Aquatic Commons as one of several Programme initiatives to improve information in support of implementation of the 1995 FAO Code of Conduct for Responsible Fisheries because:

- the lack of access to timely and accurate information has been identified by many countries as one of the constraints to implementation of the Code;
- fisheries and aquaculture information, particularly the practical and management aspects, does not easily find its way into mainstream commercial literature;
- the results of research and the development lessons learned are often lost because of inadequate opportunities to publish. It is precisely this unique, locally produced and difficult to obtain “grey literature” which the Aquatic Commons intends to capture.

The Aquatic Commons provides a model for digital resource sharing between stakeholders in the marine and aquatic information world. The model includes, repositories, harvesting functions, searchable database creation and integration with IAMSLIC’s Z39.50 Distributed Library and the Aquatic Sciences and Fisheries Abstracts database (ASFA).

**Aquatic Commons** digital repository was launched on 10<sup>th</sup> August 2007  
<http://aquacomm.fcla.edu>

The Aquatic Commons is implemented for IAMSLIC under contract with the Florida Center for Library Automation (FCLA) to:

- build content initially based on both digital and legacy documents in PDF format;
- support in particular IAMSLIC members that have limited technologies for electronic resource sharing.

#### **CTA’s Question-And-Answer Service**

Some libraries in Ghana have benefited largely from the documentation resources acquired by CTA since the inception of the QAS, including on-line access to international databases, provision of technical advice, contact addresses and bibliographies, and the provision of photocopies of papers in scientific journals and to a limited extent, the provision of non-CTA publications. A large amount of bibliographic information has been provided in the past, but the current emphasis is on providing information of a more practical nature.

Information plays an important and crucial role in aquaculture and fisheries research and development. The general lack of exchange of African fisheries information between countries, as well as its inadequate preservation for future generations has frequently been cited as a constraint to research. A better system for the dissemination and exchange of current African fisheries and aquaculture publications is therefore essential.



Several institutions are now planning to produce and disseminate their publications digitally which will improve the possibilities for dissemination and distribution of fisheries and aquaculture information.

### **References**

FAO(2004). Report of and papers presented at the Regional Workshop on Networking for Improved Access to Fisheries and Aquaculture Information in Africa, Grahamstown, South Africa, 3-7 November 2003. FAO: Rome

FAO FishCode(2007) <http://aquacomm.fcla.edu>

IAMSLIC(2007) Proceedings of the 32<sup>nd</sup> Annual Conference of IAMSLIC, held 8-12 October, 2006, Portland, Oregon, Florida: IAMSLIC

MOFA(2004). Information on Fisheries in Ghana. MOFA: Accra

# **THE CHALLENGES OF USING ELECTRONIC INFORMATION RESOURCES IN FISHERIES AND AQUACULTURE BY RESEARCH SCIENTISTS IN GHANA**

**Mac-Anthony Cobblah**

Ag. University Librarian  
Methodist University College Ghana  
P O Box DC940  
Dansoman – Accra  
Email : [mactony66@hotmail.com](mailto:mactony66@hotmail.com)

---

## **Introduction**

Research Scientists in Ghana face many challenges in harnessing web-based information resources. Information overload, misinformation, high fees, poorly designed navigation and loss of browsability among others hamper the use of the resources. In spite of the benefits of internet access and the availability of electronic publications in Ghana web-based information usage among Research Scientists is still low. The challenges that account for this situation are discussed in this paper.

Access to electronic resources has influenced and changed the way researchers and scholars conduct research and use libraries. Electronic databases and indexes allow library users to search a vast amount of information quickly.

Web-based information is available over the internet via a browser using the Hypertext Transfer Protocol (HTTP).

## **Challenges of researchers**

### ***Financial Concerns***

Many electronic publications have license agreements that severely limit how the information can be accessed. The cost of these databases are rather too high, most of the research libraries cannot afford the cost of subscription to these databases. As a result, the research scientists have limited or no access to quality databases and have to depend on the open access resources.

### ***Technical Challenges***

Technical infrastructures such as computers, internet connectivity, telephones, etc, are seriously lacking in most of the research institutions in Ghana. This makes it very difficult for scientists to have continuous access to electronic resources.

### ***Difficulties in accessing Electronic Resources***

The difficulty in identifying relevant and valid information on the web is counted as a serious drawback. Access to legitimate information is limited due to lack of knowledge of the modes of accessment.

The web is not limited to academics and researchers alone but is also available to private individuals, social groups, politicians and businesses. The sheer number of sites on the web makes it difficult to identify relevant information.

#### ***Problems with Web Site Navigation***

The vast number of web sites and different publisher structures/formats of websites apparently, makes the use of on-line databases some times very difficult.

#### ***Reliability of Electronic Resources***

Electronic publications experience technical difficulties, and thus access to electronic content can be temporarily lost. Compounding the problem is the fact that access to many electronic resources is rented rather than owned. Thus in the event that an institution cancels its subscription, access to back files is lost. Because of these challenges, scientists cannot rely completely on electronic resources.

#### ***Training/Expertise Challenge***

The Research Scientists also lack the skills and expertise in searching for electronic literature. This obviously poses a challenge for them in the effective use of these resources.

#### **Conclusion and Recommendations**

It is obvious that the web contains a plethora of information and there are certainly some challenges in accessing these rich resources. Librarians can help Research Scientists to overcome these challenges by becoming partners in literature searches and by their effective searching strategies.

Librarians can teach better information seeking techniques, including how to control libraries and how to evaluate information on the web. Librarians can also make scientists aware of tools that are available to assist the use of web-based resources.

The authorities of research institutions in Ghana should be encouraged to increase budget allocation to research libraries to facilitate the provision of the necessary technical infrastructure as well as subscription to electronic information.

## **DEVELOPMENT OF THE AQUATIC COMMONS: OPEN ACCESS TO INLAND FISHERIES AND AQUACULTURE INFORMATION**

One Day Workshop held at Bunda College of Agriculture, Lilongwe, 13<sup>th</sup> Sept. 2007  
in collaboration with the 3<sup>rd</sup> Afriamslic Conference 10-12<sup>th</sup> Sept.

### Summary of discussion on the Aquatic Commons repository

Chair: Elizabeth Birabwa. Rapporteur: Jean Collins

The discussion went around the table to identify main issues that had been raised during the Workshop and suggestions on how best to ensure African participation in the Aquatic Commons (AC) repository <http://aquacomm.fcla.edu>

### **The Aquatic Commons as an authoritative and high quality product**

Participants felt that AC should build a reputation as an authoritative repository (e.g. institutional documents), and high quality (e.g. well prepared and identifiable documents). In this way institutions and scientists, particularly in developing countries and where institutional alternatives are not available, would be proud to participate, endorse and promote AC. Users should preferably not be overwhelmed by weeding out garbage from the authentic.

Actions proposed were that:

- Guidelines should indicate minimum requirements of documents deposited – including identification fields as well as formats, optimum size etc.;
- Deposits should be monitored to exclude garbage and duplication; and
- Tips or links on ‘how to write and publish a scientific article’, ‘how to produce a good reference list’ would be an additional bonus.

### **Institutional ‘ownership’ and working in communities**

Several participants said that their institutions would be more likely to endorse and promote AC if they could see immediate benefits that can also be pointed out to funding agencies. Others said that they worked at national or regional levels with specific partners on particular projects – and it would be an advantage to highlight the collaboration.

Actions proposed were that:

- The Corporate Creator/Author field should be a hyperlink so that institutions can easily create a list of their publications;
- The AC should facilitate the production of joint CD ROM output, particularly for rural areas with no or slow Internet access, by agreement between institutional publishers e.g. by country, by sub-region; and
- National or regional projects or collaboration publishing on the same topic should be able to identify the distributed output – an existing AC field could be used to enter a project identifier.

### **Raising awareness**

The lack of awareness of information resources by stakeholders in general was raised by many participants. In fact, lack of awareness was regarded in some cases as more of a constraint than lack of access.

Actions proposed were:

- To link library WebPages to AC;
- To include AC in user orientation / training;
- IAMS LIC to produce a brochure for distribution at meetings, via associations and regional organizations, as well as for new and potential IAMS LIC members;
- IAMS LIC members to present AC at meetings of scientists etc. i.e. not always talking to ourselves;
- To ensure that our organizations *endorse* AC and encourage participation; and
- To include a page of sponsors / endorsing organizations etc. on the AC website.

### **Depositing born digital documents**

Many participants felt that the Library would be responsible for depositing documents rather than individual stakeholders. A major item for discussion was the many problems experienced by stakeholders in publishing fisheries and aquaculture information. These included everything from developing writing skills, particularly for scientific papers, knowing the most appropriate outlet in which to publish to reach their target audience and assistance with obtaining and citing references. Librarians could provide valuable assistance in all of these areas. It was felt that the AC would provide an opportunity to publish much information which cannot be shared at present due to lack of publishing opportunities. However, it is important that a level of quality is aimed for.

Actions proposed were:

- To provide guidelines / mentoring on the minimum requirements of documents to be deposited – a mini ‘guide for authors’ as well as digital formats etc.; and
- To provide guidelines to ensure that the institutions and scientists can create searchable PDF files – noting that there are many platforms and different software being used to create documents.

### **Digitizing legacy collections**

Participants from Uganda and Malawi pointed out the large volume of unique and valuable documents in various locations in their countries or sub-region. Access to this historical data and information is vital for the conservation of biodiversity, fisheries management and scientific research. There are also large historical collections in organizations with a past or present regional / global mandate e.g. FAO, South African Institute for Aquatic Biodiversity (SAIAB), Freshwater Biological Association UK (FBA). In many cases this information is no longer available in the

countries where the research was carried out and there is a need to digitize and repatriate it. This requires a longer term strategy and significant external funding – particularly where we know of large, dispersed and at risk collections that are not catalogued, easily accessible or adequately maintained.

Actions proposed were:

- To develop an IAMSLIC strategy to ‘rescue’ collections at risk, including a strategy to raise funds to digitize them; and
- To investigate the possibility of an offline data entry system for depositing legacy collections from Africa to alleviate Internet unreliability and costs.

There was also an issue about the name *Aquatic Commons* raised by two of the scientists. They felt that *Aquatic Information Commons* would be a more accurate name and less likely to confuse.

Although, it is very early days for the *Aquatic Commons*, it is good to have an opportunity to present the above issues that are relevant for the IAMSLIC members in Africa who attended the Workshop. Some of the issues are for referral to the AC Board, others require a long-term IAMSLIC strategy, and some are for the individual members to implement. FAO FishCode is concentrating its efforts on the institutions that publish mainly on inland fisheries and aquaculture. The list of participants in Annex 2 shows a prevalence of inland institutions.

The main issues resulting from a survey carried out in Nigeria by Moses Ibeun are attached as Annex 1. Unfortunately Dr. Ibeun was unable to attend the Workshop.

## ANNEX 1

### CANVASSING FOR PARTICIPATION IN THE AQUATIC COMMONS REPOSITORY: EXPERIENCE FROM NIGERIA

By M.O. Ibeun, NIFFR

#### THE BENEFITS OF THE AQUATIC COMMONS FOR NIGERIAN ORGANIZATIONS AND SCIENTISTS

- The Aquatic Commons will be a means of **publicizing** the work of participating institutions, scientists and publishers.
- Create greater awareness of Nigerian journals – and potential increased sales.
- Enhance citation of Nigerian authors.
- It is going to be a **cheap** way of publishing for organizations in Nigeria having no funds for producing multiple copies. Once the perfect copy is ready it can be sent for inclusion in the Aquatic Commons from where users can download.
- Ensure the preservation of Nigerian information and its availability for future generations.

#### GENERAL BENEFITS FOR DEVELOPING COUNTRIES

- Participation in the Aquatic Commons will greatly improve **dissemination** of documents produced in national institutions of developing countries which are highly elusive.
- The **impact factor** of work of institutions, and individual scientists will be measurable which hitherto was difficult to achieve with particular reference to developing countries.
- CD-ROMs of documents from a given country or region can be produced for **dissemination** to rural areas where there are no internet facilities.
- There is the potential for an **increase in the sales** of print publications of institutions, societies and publishers.
- Improved access to fisheries and aquaculture **management** information that is difficult to publish in scholarly journals.
- Serve as a motivator for scientists in fisheries and aquatic sciences to publish their findings
- Ensure equal participation of developing / developed countries and integration of their literature.
- Enhance the sharing of knowledge and lessons learned by providing free and open access information for all.

- Enhance the use and validation of research results and avoid costly and wasteful duplication of efforts.
- Provide an avenue to link entries in ASFA, ABAFR etc. to the full-text.
- Foster effective bibliographic control of aquatic sciences literature both regionally and internationally.

## **PERCEIVED THREATS IN NIGERIA TO THE AQUATIC COMMONS**

- **Loss of copyright**  
Would-be participants fear losing the copyright to their articles / publications. They are not sure whether a copyright agreement will be needed between IAMSLIC and National Institutions or Scientists. They are not sure of who will be acknowledged or cited.
- **Safety of their document**  
Authors are not too sure of the safety of their documents.
- **Loss of financial benefit**  
While government institutions see participation in the Aquatic Commons as a means of publicity, publishers of journals see it as a threat to their financial gain. The question asked is that, “if information is power should it be free?” For the Aquatic Commons to accommodate journal articles, consideration must be given for including back issues only to enable publishers to realize financial returns from their investment.
- **Access to the Aquatic Commons Website**  
In developed countries, access to websites through the Internet is relatively cheap. This is not the case for now in some developing countries. In most institutions VSAT is being used to access internet. This is very **costly** to maintain, frequency of **breakdown** is high. This has created fear that some of them may **not have access** to the website of the Aquatic Commons.
- **Emerging business acumen with digital publishing in Nigeria**  
“How to earn money from your book without investing kobo...guaranteed!”  
From a recent magazine article about earning money by publishing on the Internet

## **CONCLUSION**

- The advantages of the Aquatic Commons out-weighed the disadvantages.
- We need to ensure that Nigeria has a broad-based participation.



*Fig 1. Main publishers of fisheries and aquaculture information in Nigeria*

Organization	What they publish	Constraints	Participation in AC
National research institutions (NIFFR, NIOMR)	Grey literature: - conference proceedings - technical reports - in-house journals	Marketing and distribution strategy not well structured;  Publishing and distribution expensive	Yes
Societies / Associations  Fisheries Society of Nigeria Nigerian Association for Aquatic Sciences	Grey literature: - conference proceedings - journals  Nigerian Journal of Fisheries;  Journal of Aquatic Sciences		Yes
Universities and associated publishers	Journals e.g. Tropical Freshwater Biology  scientists prefer publishing in 'impact factor' journals (even though high rate of rejection)	Not well known internationally;  Poor marketing strategy;  Not commercially strong and often unsustainable	Possible – especially for back issues
Commercial Nigerian publishers	Journals	Most lack national and international visibility;  Irregular production	Commercial interests may prevent participation - only two of the seven journal publishers indicated interest

### **Motives for publishing**

- Recognition
- To enhance promotion particularly in the academic environment
- Visibility of organization
- Fulfillment of organizational mandate and government policy - to justify funding
- Livelihood

## APPENDIX 1

### 3<sup>RD</sup> AFRIAMSLIC CONFERENCE AND WORKSHOP 10<sup>TH</sup> – 13<sup>TH</sup> SEPTEMBER 2007, RIVERSIDE HOTEL, LILONGWE-MALAWI PROGRAMME

DATE	TIME	ACTIVITY	REMARKS
8 <sup>th</sup> – 9 <sup>th</sup> Sept 2007	08.00 – 6.00	Foreign delegates arrive	Local Organizing Committee
9 <sup>th</sup> Sept. 2007	14.00 -	Local delegates arrive	Local Organizing Committee
<b>Day 1:</b>  10 <sup>th</sup> Sept 2007	08.30 - 09.00  09.00 – 11.00  11.00 – 11.30  11.30 – 11.50  11.50 – 12.10	<ul style="list-style-type: none"> <li>▪ Registration</li> </ul> <p style="text-align: center;"><b>OPENING CEREMONY</b></p> <ul style="list-style-type: none"> <li>▪ Opening Prayer</li> <li>▪ Welcome by Local Host - Geoffrey Salanje</li> <li>▪ Introductory Remarks by AFRIAMSLIC Outgoing-Chairperson – Marian Jiagge</li> <li>▪ Welcome Address - Principal, Bunda College</li> <li>▪ Official Opening – Guest of Honour</li> <li>▪ Vote of thanks – Edna Nyika</li> <li>▪ Closing Prayer</li> <li>▪ Group Photograph</li> <li>▪ Refreshment</li> </ul> <p style="text-align: center;"><b>PAPER PRESENTATIONS: SESSION 1</b></p> <p><b>The digital divide in a digital age: Challenges of Sourcing Fisheries Information in Sub-Saharan Africa</b> by <i>Dr. Emmanuel Kaunda - Malawi</i></p>	<p>Conference Room</p> <p>Riverside Hotel staff</p> <p><b>Chairperson:</b> <i>Dr. Moses Ibeun</i></p> <p><b>Rapporteur:</b> <i>Margie Shaw</i></p> <p>Discussions</p> <p><b>One-Stop Info Shop For</b></p>

		<b>Aquaculture &amp; Fisheries In Malawi</b> by <i>Daniel Sikawa &amp; Fanuael Kapute</i>	
	12.10 – 12.30	Discussions	
	12.30 – 13.30	Lunch	
		<b>PAPER PRESENTATIONS: SESSION 2</b>	
	13.30 – 13.50	<b>Practical examples of good business practices in an Aquatic &amp; Marine Science Library</b> by <i>Aliya Haider - South Africa</i>	<b>Chairperson:</b> <i>Isedorius Agola</i> <b>Rapporteur:</b> <i>Alice Endra</i>
	13.50 – 14.00	Discussions	
	14.00 – 14.20	<b>Electronic Information in Aquaculture and Fisheries Science: Opportunities and Challenges</b> by <i>Edna Nyika – Tanzania</i>	
	14.20 – 14.30	Discussions	
	14.30-14.50	<b>Canvassing for Participation in Aquatic Commons Repository Project: Experience from Nigeria</b> by <i>M.O. Ibeun - Nigeria</i>	
	14.50 – 15.00	Discussions	
	15.00 – 15.30	Refreshment	Riverside Hotel staff
		<b>PAPER PRESENTATIONS: SESSION 3</b>	
	15.30 – 15.50	<b>NISC Aquatic Science Products –Journals and Databases</b> by <i>Candice Roux/ Aquatic Commons</i>	<b>Chairperson:</b> <i>Jean Collins</i> <b>Rapporteur:</b>

		<i>presentation.</i>	
	15.50 – 16.00	Discussions	
	16.00 – 16.20	<b>Biodiversity Knowledge Resources for the Okavango Delta</b> by <i>Monica Morrison – Botswana</i>	
	16.20 - 16.30	Discussions	
	16.30 – 16.50	<b>The Present Status of Document Delivery in Kenya</b> by <i>Isedorius Agola – Kenya</i>	
	16.50 – 17.00	Discussion	
<b>Day 2:</b> 11 <sup>th</sup> Sept 2007	08.45 – 09.00	Announcements	Local Organizing Committee
		<b>PAPER PRESENTATIONS: SESSION 4</b>	<b>Chairperson:</b> <i>Edna Nyika</i> <b>Rapporteur:</b> <i>Monica Morrison</i>
	09.00 – 09.20	<b>The Impact of Information Provision in Aquaculture and Fisheries Science in Namibia</b> by <i>Eric Mumbone – Namibia</i>	
	09.20 – 09.30	Discussions	
	09.30 – 09.40	<b>Poster Presentation</b> by <i>Margie Shaw</i>	
	9.40. – 10.00	Refreshments	Riverside Hotel staff
	10.00 – 12.30	Group Work	All participants
	12.30 – 13.30	<b>Lunch</b>	Riverside Hotel staff
	13.30 – 14.30	<b>AFRIAMSLIC Business Meeting</b>	<b>Chairperson:</b> <i>Marian Jiagge</i> <b>Rapporteur:</b> <i>Geoffrey Salanje</i>

	14.30 – 15.30	Presentation of Group <b><u>Report</u></b>	<b>Chairperson:</b> <i>Mac-Anthony Cobblah</i>
	15.30 – 15.45	Refreshment	Riverside Hotel staff
	15.45- 16.30	Presentation of Communique	<i>Mac Anthony Cobblah</i>
		Official Closing	Principal – Bunda College
<b>Day 3</b> 12 <sup>th</sup> Sept 2007	08.00 – 10.00	Visit to National Library Services and Lilongwe City	Local Organizing Committee
	08.00 – 15.00	An Excursion at Lake Malawi, Salima	
<b>Day 4</b> 13 <sup>th</sup> Sept 2007		Some Foreign Delegates leave	Local Organizing Committee
<b>Day 4</b> 13 <sup>th</sup> Sept 2007	08.00 – 10.00	Workshop at Bunda College	Jean Collins
	10.00 – 10.30	Refreshments	Bunda Catering staff
	10.30 – 12.00	Workshop continues	
	12.00 – 13.30	Lunch	Bunda Catering staff
	13.30 – 15.00	Workshop continues	
	15.00 – 15.30	Refreshments	Bunda Catering staff
	16.30 – 17.00	Workshop close	<i>Jean Collins &amp; Vice Principal</i>
<b>Day 5:</b> 14 <sup>th</sup> Sept 2007		Local participants and remaining foreign participants Depart	Local Organizing Committee

## **APPENDIX 2**

### **INVITED GUESTS FROM MALAWI WHO ATTENDED THE OPENING CEREMONY**

1. Hon. B. Kutsaira (Member of Parliament)  
Deputy Minister of Agriculture and Food Security
2. Professor G.Y. Kanyama – Phiri  
Principal, Bunda College  
of Agriculture
3. Dr. Emmanuel Kaunda  
Vice Principal,  
Bunda College of Agriculture
4. Mary Wasiri (Mrs.)  
Registrar, Bunda College
5. Margaret Ngwira (Mrs.)  
College Librarian – Kamuzu College  
of Nursing,  
University of Malawi
6. Gift A. Kadzamira (Mrs.)  
Director – Information Resource Centre,  
American Embassy
7. Mr. Harry Mbeya  
Librarian – Reserve Bank of Malawi
8. Mr. Gray Nyali  
Director - National Library Services

**LIST OF PARTICIPANTS –  
AFRIAMSLIC 3/AQUATIC COMMONS WORKSHOP**

1	Marian Jiagge CSIR-Water Research Institute P.O.Box M 32, Accra <u>Ghana</u> Email: <a href="mailto:mjiagge@yahoo.com">mjiagge@yahoo.com</a>	2	MacAnthony Cobblah Methodist University College P.O.Box DC 940 Accra. <u>Ghana</u> Email. <a href="mailto:mactony66@hotmail.com">mactony66@hotmail.com</a>
3	Geoffrey Salanje Bunda College of Agriculture Library P.O.Box 219, Linlongwe <u>Malawi.</u> Email: <a href="mailto:gsalanje@bunda.unima.mw">gsalanje@bunda.unima.mw</a>	4	Alieya Haider Marine and Coastal Management Gilchrist Library Foretrust Building Private Bag x2 Rogger Bay 8012 Capetown <u>South Africa</u> <u>Email:</u> <a href="mailto:ahaider@wcpe.gov.za">ahaider@wcpe.gov.za</a>
5	Edna Nyika University of Dar es Salaam Institute of Marine Sciences P.O.Box 668 Zanzibar <u>Tanzania</u> <u>Email:</u> <a href="mailto:nyika@ims.udsm.ac.tz">nyika@ims.udsm.ac.tz</a>	6	Monica Morrison Harry Oppenheimer Okavango Research Centre University of Botswana, Maun Botswana Email: <a href="mailto:morrison@arc.ub.bw">morrison@arc.ub.bw</a>
7	Margie Shaw South African Institute for Aquatic Biodiversity Private Bag 1015 Grahamstown 6140 <u>South Africa</u> Email: <a href="mailto:m.shaw@ru.ac.za">m.shaw@ru.ac.za</a>	8	Alice Endra National Fisheries Resources Research Institute P.O.Box 343 Jinja <u>Uganda</u> Email: <a href="mailto:aendra2000@yahoo.co.uk">aendra2000@yahoo.co.uk</a>
9	Eric Mumbone Ministry of Fisheries and Marine Resources Library Strand Street P.O.Box 912 Swakopmund <u>Namibia</u> Email: <a href="mailto:emumbone@gmail.com">emumbone@gmail.com</a>	10	Candice Roux National Inquiry Services Centre (NISC) 19 Worcester St. P.O.Box 377 Grahamstown <u>South Africa</u> Email: <a href="mailto:candice@nisc.co.za">candice@nisc.co.za</a>
11	Isedorius Agola Kenya Marine and Fisheries Research Institute P.o.Box 81651 Mombasa	12	Ian Pettman Freshwater Biological Association The Ferry Landing Far Sawrey, Ambleside

	Kenya <a href="mailto:iagolla@kmfri.co.ke">Email: iagolla@kmfri.co.ke</a>		Cumbria LA 22 OLP United Kingdom <a href="mailto:jpettman@fba.org.uk">Email: jpettman@fba.org.uk</a>
13	Jean Collins Food and Agriculture Organization (FAO) Rome Italy Email: <a href="mailto:jean.collins@fao.org">jean.collins@fao.org</a>	14	Elizabeth Birabwa Lake Victoria Fisheries Organization Plot No.2, Oboja Road Uganda <a href="mailto:eabirabwa@lvfo.org">Email: eabirabwa@lvfo.org</a>
15	Mike Thuruwe National Aquaculture Centre Library and Information Centre P.O. Box 44 Domasi Malawi Email: <a href="mailto:mthuruwe@hotmail.com">mthuruwe@hotmail.com</a>	16	Francis Maguza-Tembo Bunda College P.O. Box 219 Lilongwe Malawi Email: <a href="mailto:fmaguzatembo@yahoo.co.uk">fmaguzatembo@yahoo.co.uk</a>
17	Herbert Kathewera Bunda College P.O. Box 219 Lilongwe Malawi Email: <a href="mailto:kathewerah@bunda.unima.mw">kathewerah@bunda.unima.mw</a>	18	Verah Jose Bunda College P.O. Box 219 Lilongwe Malawi Email: <a href="mailto:vjose@bunda.unima.mw">vjose@bunda.unima.mw</a>
19	Austin Mthetiwa Bunda College P.O. Box 219 Lilongwe Malawi Email: <a href="mailto:amthetiwa@bunda.unima.mw">amthetiwa@bunda.unima.mw</a>	20	Olive Mahuka Bunda College P.O. Box 219 Lilongwe Malawi Email: <a href="mailto:onankhwere@yahoo.com">onankhwere@yahoo.com</a>
21	Emelia Clottey Methodist University College P.O.Box DC 940 Accra Ghana email: <a href="mailto:klorkoremely@hotmail.com">klorkoremely@hotmail.com</a>	22	Daniel Sikawa, Bunda College P.O. Box 219 Lilongwe Malawi Email: <a href="mailto:dsikawa@yahoo.com">dsikawa@yahoo.com</a>
23	Fanuel Kapute Bunda College P.O. Box 219 Lilongwe Malawi Email: <a href="mailto:fanuelkapute@yahoo.co.uk">fanuelkapute@yahoo.co.uk</a>	24	Dr Daud Kassam Bunda College P.O. Box 219 Lilongwe Malawi Email: <a href="mailto:dkassam@bunda.unima.mw">dkassam@bunda.unima.mw</a>



### Participants who only attended Aquatic Commons Workshop

1. Michael Dobson  
Freshwater Biological Association,  
UK.  
[mdobson@fba.org.uk](mailto:mdobson@fba.org.uk)
2. Jude M. Mathooko  
Eastern Africa Water  
Association Council  
Kenya.  
[mathookoj@yahoo.com](mailto:mathookoj@yahoo.com)
3. Mercy Kavumu  
Department of Fisheries,  
Lilongwe  
[kavumumercy@yahoo.com](mailto:kavumumercy@yahoo.com)
4. Maxon Ngochera  
Fisheries Research  
Institute, Monkey Bay  
[ngocheram@yahoo.com](mailto:ngocheram@yahoo.com)
5. B. Chilora  
Fisheries Research Institute  
Monkey Bay  
[bchilora@yahoo.com](mailto:bchilora@yahoo.com)
6. Grace Kulapani  
National Aquaculture  
Centre, Malawi.  
[gracekulapani@yahoo.co.uk](mailto:gracekulapani@yahoo.co.uk)
7. Essau Chisale  
Malawi College of Fisheries  
(Mangochi)  
essau\_ [chisale@yahoo.com](mailto:chisale@yahoo.com)
8. Moses Ibeun  
National Institute of Fresh-  
water Fisheries Research  
Nigeria  
[moibeun@yahoo.com](mailto:moibeun@yahoo.com)  
\*unable to participate but  
provided a paper for inclusion.

