

**SMART FISHING FOR INFORMATION:  
USING OPEN ACCESS AND FREE INFORMATION RESOURCES  
FOR FINDING AND PUBLISHING FISHERIES SCIENCE IN AFRICA**

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**Abstract:** In the past, fisheries and aquaculture researchers in Africa have been handicapped by poor access to current scientific literature and difficulties in getting published in visible outlets. Efforts in the past decade to improve access, awareness and use of information have flourished. We examine whether these efforts are reflected in the output of African fisheries scientists. We also explore the how the Open Access movement may be influencing the dissemination of African fisheries science.

**Keywords:** Open access, publishing, fisheries journals, Code of Conduct

#### Introduction

Fisheries and aquaculture researchers in Africa have been handicapped by poor access to current scientific literature and difficulties in getting published in visible outlets (FAO 2009, p.71-72). Various efforts over the past decade work to alleviate the issue of access. Open Access (OA) journals provide possible outlets for communication of research. Our studies of the African fisheries literature, the delivery system and the relevant journals titles are not intended to compare systems, databases or journal content nor as a bibliometric study. They are an attempt to assess where African affiliated fisheries researchers are publishing scholarly articles, how they are citing current scientific literature and which search systems are useful for discovery and communication. We try to evaluate whether access to peer review journals via 'philanthropic' services and the increase in OA is having an impact on previously expressed barriers to communicating African fisheries science and management.

In the following, we address two of the major information constraints in Africa as described in Information and Knowledge Sharing: FAO Fisheries Technical Guidelines for Responsible Fisheries. No. 12, 2009:  
Lack of awareness of and access to global information resources;  
Poor opportunities to publish and disseminate the results of research.

We intend this study to be a means for discussing successes to date as well further actions needed. IAMS LIC members continue to have a role in facilitating communication of their institution's research. We can work to enhance access, teach searching skills and promote relevant publishing options. We also have a responsibility to develop indicators of progress in addressing these constraints. Funders are interested in seeing the benefits of their investments and our institutions need to know the value of their funding of their libraries.

#### Terminology

Open Access (OA) means that information should be digital, online, free of charge, and free of most copyright and licensing restrictions. OA is a model for publishing scholarly peer reviewed journals that can be freely read as the publishing is funded through means other than library or personal subscriptions. Models include "author pay", "institution pays", and volunteer effort. The 2009 OA-barometer, a project funded by Nordbib, estimates that 20% of peer-reviewed articles across all disciplines are now freely available (Björk et al 2010; Laakso et al. 2011). Extensive background information can be found in Open Access Overview (Suber, 2010). New developments are covered by the OA Tracking Project, an effort using tagging, wiki software and social media to track OA activities.

Peer Review is the accepted practice for assuring the quality of scientific articles. Peers are considered those knowledgeable in a field who can ascertain whether an article submitted for publication is scientifically sound, addresses an issue or question of interest to the intended audience and communicates the problem, methods and findings in a coherent manner.

## Constraint 1: Lack of awareness of and access to global information resources

Awareness, access and use are linked. A breakdown of any of the three poses a constraint to the scientific process. Measuring each is challenging and we used several approaches. We reviewed what resources were available. We surveyed librarians on their awareness, access and use of available resources. We examined what African fisheries scientists were publishing and what they used in those publications.

### Access to Global Fisheries Information

Several programs to improve access to current scientific information have gained visibility and usage in Africa. Even so, problems persist. Internet connectivity remains uneven making downloading an article in PDF time-consuming and unappealing. Discovery is easier with Google, yet less effective as people refrain from going beyond what is easy and fast to access. The connectivity problem is geographically specific and must be dealt with at each institution. The lack of searching persistence is a global, human behavior issue that many librarians are addressing through teaching and consultation.

On the bright side, a wealth of scientific information in fisheries is much more affordable, and often free. Major sources of full text scientific information of interest to IAMSLIC members in Africa include:

- Research4Life (<http://www.research4life.org/>)
  - The most relevant, real time, full text resources for peer-reviewed, scientific fisheries information.
  - TEEAL (The Essential Electronic Agricultural Library) (<http://www.teeal.org/>)
- Selected articles and journals on agriculture delivered annually on hard drive and appropriate for fisheries institutions with problematic internet access and a focus on agriculture.
- JSTOR (<http://about.jstor.org/participate-jstor/libraries/african-access-initiative-0>)
  - Full text access to the archives of a wide range of scholarly journals, but with sparse coverage of fisheries and aquatic titles.
  - AJOL (<http://www.ajol.info/>)
  - The gateway to the largest collection of peer-reviewed, scholarly African journals with a mixture of OA and priced journals.
  - INASP PERii ([www.inasp.info/](http://www.inasp.info/)). Access to peer-reviewed, scientific information by individual publishers, making administration more cumbersome. Other aspects of PERii are more useful for fisheries scientists such as training on how to publish.
  - DOAJ (Directory of Open Access Journals) ([www.doaj.org](http://www.doaj.org))
  - The most complete portal to open access journals and global in coverage but does not include African fisheries journals.

Each has strengths and weaknesses in terms of coverage, ease of use, cost, and ease of administration. In our assessment the Research4Life Programme has the greatest coverage of fisheries and aquaculture journals, in particular AGORA that is provided via FAO and has been targeted at fisheries institutions.

### Awareness and Use of Research4Life/AGORA by Afriamslic Members

The Research4Life Programme of the United Nations ([www.research4life.org](http://www.research4life.org)) is the name given to HINARI, AGORA and OARE, the three programs that offer developing countries free or very low cost online access to publisher supplied science information. HINARI focuses on the medical and life sciences, AGORA on agricultural and OARE on the environmental literature. While other philanthropic programs provide access to commercial journals, the subject focus of the Research4Life systems makes these more relevant for fisheries.

Working collectively as Research4Life, the services will soon offer one point of registration for eligible institutions. For now, librarians must register for each service. Registration is available to institutions via their library so those fisheries researchers and managers working outside of an institutional context do not have access to AGORA. The onus is upon the library to register and ensure that their scientists are made aware and have access.

In July 2011, Research4Life and Serials Solutions, a business unit of ProQuest, announced that they are working together to implement a simple and unified search system for the entire Research4Life collection. This will make access to all fisheries relevant articles more efficient. Currently, a researcher must search all three systems due to

overlapping coverage. The implementation is happening country by county with Serial Solutions staff ‘adopting’ a country.

The 32 Afriamslic members, eligible for free access to AGORA, were surveyed in August 2011. Nine replies were received from members in Ghana, Kenya (2), Malawi, Mozambique, Nigeria (2), Tanzania and Uganda. 75% of those surveyed did not respond. Brief feedback was requested mainly on the use of AGORA, HINARI and OARE.

	Used by Libraries	Used weekly or more	Used monthly or less
AGORA	7	6	1
HINARI	2		
OARE	3		

Table 1: Survey of Afriamslic members

AGORA is recognized as an excellent resource by those Afriamslic members who responded. Usage is increasing according to survey respondents. There are some inconsistencies in coverage by some publishers. One example is Springer who blocks access to its publications in a country if an institution in that country takes out a subscription. The search interface is cumbersome because it takes multiple steps to get to the needed article. Internet speed remains a problem so downloads can be slow. Overall, Afriamslic users find that usage is expanding beyond the library to researchers throughout the participating institutions. AGORA is becoming a vital tool.

The low response could be an indicator of lack of awareness that then leads to lack of access and use. A more detailed study of who is registered for and using AGORA would increase our understanding of how well AGORA works for Afriamslic librarians and their users. If Afriamslic librarians are not providing access to this rich resource, then their scientists have not overcome this constraint. The new developments in Research4Life are proposed to improve the service. These changes could provide an excellent time to promote AGORA to all who would benefit.

#### Use of IAMSLIC Distributed Library

Another means of accessing information for Afriamslic members is the IAMSLIC Distributed Library. It is useful for getting material unavailable through AGORA or other full-text resources. The volume of activity by Afriamslic members is increasing. However, in 2010/11, only 7 of the 26 countries with Afriamslic members used the system. Table 2 shows the number of borrowing and lending requests by country. The lack of use probably reflects either uncertainty with how to use the system or lack of need to use it. But this pattern reinforces the question about awareness versus access versus use.

Countries	# Requests	# Supplied
Botswana	7	
Kenya	160	9
Namibia		5
Nigeria		6
South Africa	12	32
Tanzania	7	
Tunisia	13	

Table 2: Use of IAMSLIC Distributed Library in 2010/11

#### Impact of Expanded Access to Global Fisheries Information

Access to current scientific information has increased in the past decade. We attempted to discover if this increased access has resulted in changes in what African fisheries scientists use in their work. Using Aquatic Sciences and Fisheries Abstracts (ASFA), we searched the author affiliation field for those eligible in Africa for free access to AGORA and the descriptor field for “fisheries or aquaculture.” The results were limited to peer-reviewed publications as defined by ASFA because including all publication types provided a skewed picture of output given inconsistent input in terms of time and content. The references in the remaining articles were counted, sorted by type and year of publication. We compared 1995, 2000, 2005 and 2010. (A note: in 2000, there were 11 peer-reviewed articles but 2 of those were not available to the authors after extensive searching. We changed the number 9 given that the articles were not available, so virtually non-existent.)

Figure 1 reveals little in the way of a trend in either number of papers or increased usage of information. There are limits to ASFA so this data may not be complete. There can be time lags and discrepancies in coverage. It is also important to consider what ASFA considers to be peer-reviewed. We suggest that it is too early to tell if increased access to information will foster increased publication.

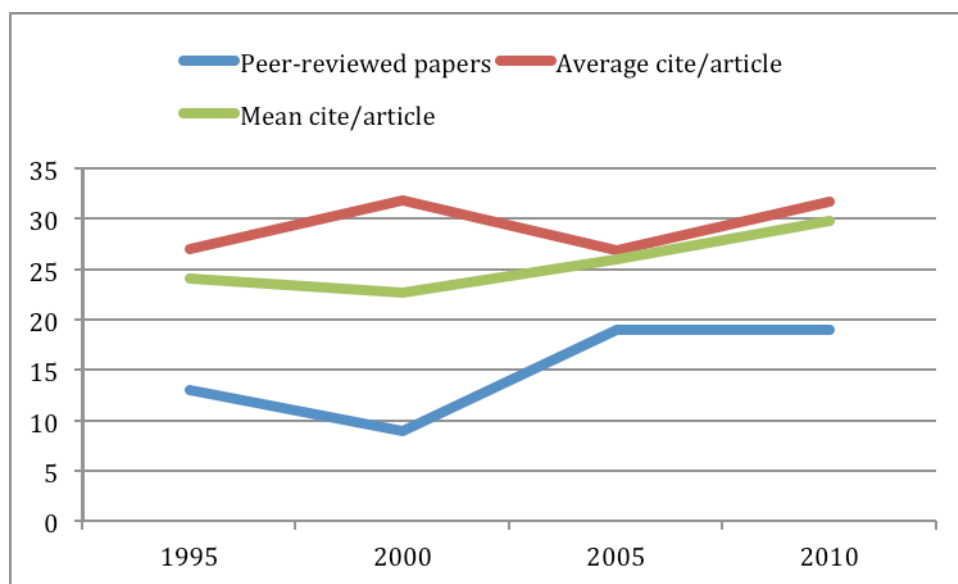


Figure 1: Trends in publishing

In Figure 2, we show the types of materials cited in the peer-reviewed articles. References were tagged in one of three categories: a scholarly article (any article that seemed to be from a reputable source), a book, or other (reports, newsletters and other grey literature including FAO publications). We show the data in 100% columns so the number of citations and number of articles are not relevant. Again, there is no apparent trend towards the use of more articles. The reliance on other types of information does not indicate poor scholarship. The grey literature is extremely important in fisheries science and especially in fisheries management where local reports, surveys and assessments are essential information and data sources.

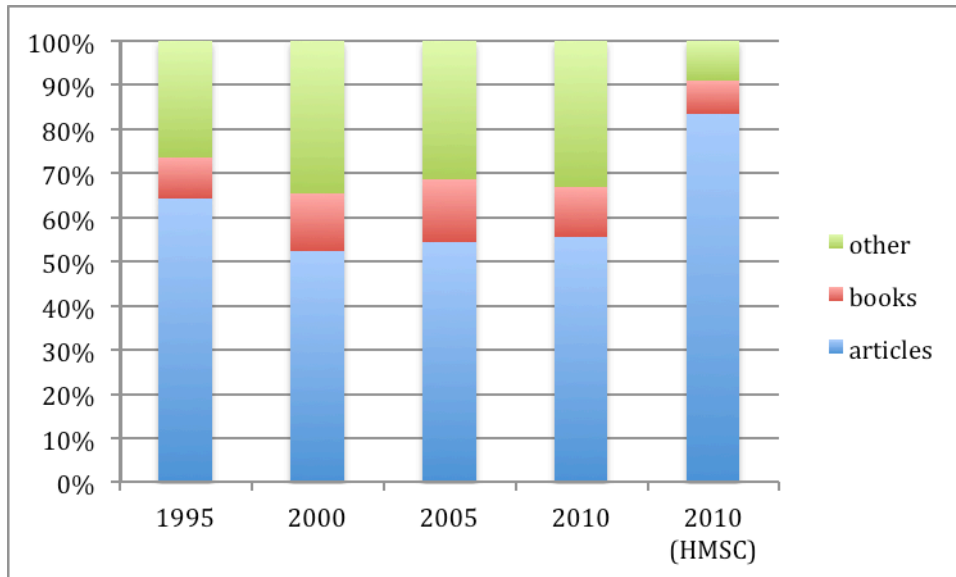


Figure 2: Types of materials cited

For comparison, we searched the same terms (fisheries or aquaculture) and used an author affiliation of one of the authors' institutions (Oregon State University's Hatfield Marine Science Center - HMSC). While the number of peer-reviewed articles for 2010 was comparable, the mix of types used by HMSC researchers reflect greater reliance on the peer-reviewed article.

Finally, we looked at the age of all references in the peer-reviewed articles. We divided the number of citations by the number of articles to get a clearer picture of trends. In general, Figure 3 shows a fairly consistent trend of use by year. The sharp drop in recent (0-3 years old) material cited reflects the publication process where a manuscript is submitted for review and then usually not published for months (or years). There is solid use of information published in the past ten years and then a trailing off. The occasional review article tends to skew the data, but these were in every group so the effect is shared. Again, the comparison with HMSC data shows similar patterns of cited references in terms of age.

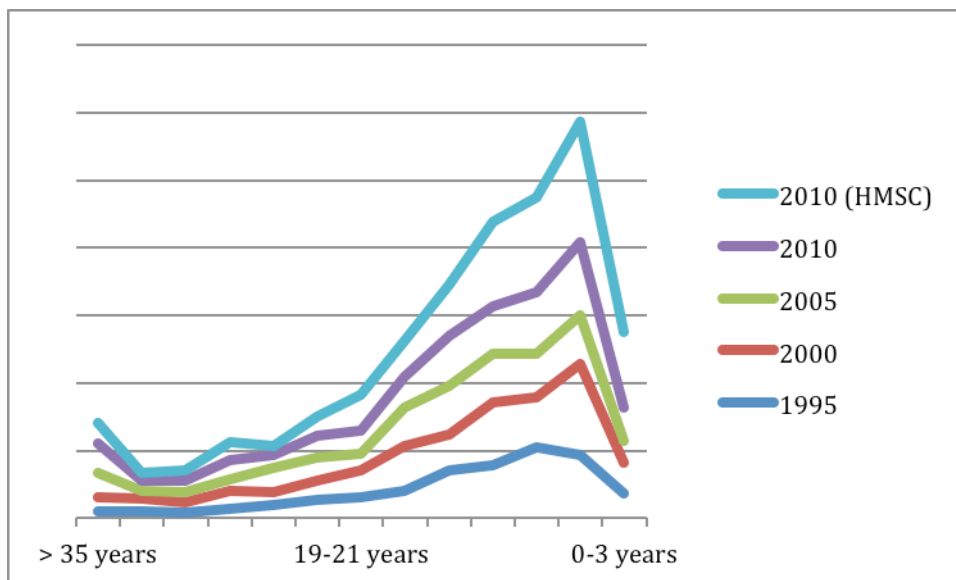


Figure 3: Age of material cited

It takes time to change habits, introducing new ways of discovering information and incorporating the newly found information into research and then synthesizing the results. The data presented above may reflect a lack in any of the areas of concern: awareness, access and use. So, we suggest that we continue to monitor where African researchers are publishing and what they are using. Both help librarians know which resources are important for their users. Also, it helps build the case for continued support of AGORA as a provider of access to the wealth of fisheries information.

#### Constraint 2: Poor opportunities to publish and disseminate the results of research

Poor opportunities to publish and disseminate the results of research have long been constraints for fisheries scientists in Africa. Several initiatives to assist authors aim to remedy this situation. African Journals Online (AJOL, 2011) provides a useful page of links to open resources and writing guides. The International Program for the Availability of Scientific Publications (INASP, 2011) supports the AuthorAid project that assists authors in developing countries improve their communication skills.

The reasons given by researchers for low acceptance rates of African fisheries articles in commercial high impact journals are many (Freeman & Robbins, 2006). Given our results from the first section, the challenge persists. It is interesting to see whether the increase in OA publishing is providing an effective outlet for their work. Measures of effectiveness include publishing in peer-reviewed, high quality and up-to-date journals that are relatively easy to find and not too remote from the general body of fisheries information. It is also relevant to note that the OA Barometer estimate of 20% varies across disciplines and we found no statistic on the percentage of fisheries science available as OA.

#### Publishing African fisheries research in OA journals

We searched using freely available search engines and systems that index OA scholarly journals to give an indication of where African fisheries research is being published beyond the traditionally defined sphere. From this small sample of articles published in 2010, we found that OA journals are publishing African fisheries research and that a very large percentage of the authors have an African affiliation. Unexpected results included the spread of articles across a large number of multidisciplinary journal titles and the limited number of 2010 articles in journals specific to fisheries or aquatic science. Articles on African fisheries published in 2010 appeared in over 40 different OA journal titles. The time lag in OA fisheries journals published in Africa appears to be a problem. For example, AJOL lists two OA journals in the fisheries/aquatic science categories but neither of them has a publication date

later than 2009. The OA fisheries articles retrieved in AJOL were published in 9 different journals in other subject categories and 94% have authors with an African institutional affiliation. See Appendix Table A2.

DOAJ is considered the primary index of OA journals and is global in coverage. Subject categories include Aquaculture and Fisheries with 18 journals and Oceanography with 31 journals. However, neither of the two African OA fisheries journals are covered by DOAJ. The fisheries articles retrieved were published in 17 different journals in other subject categories. Authors with an African institutional affiliation made up 83% of these. See Appendix Table A1.

Table 3 gives an idea of the problems with publishing in African fisheries journals. There are time lags in publishing, gaps in indexing, inconsistencies in coverage by databases and aggregators. In addition, very little is available as truly OA and none of them is covered by or linked from AGORA. Fortunately, HINARI provides access to the first two and highest impact African fisheries journals but less fortunately many AGORA users do not know this.

Journal	Open Access	DOAJ	Most recent issue in AJOL	Indexed in ASFA	Level of coverage in ASFA
African Journal of Aquatic Science (South Africa)	No	No	2011	Yes (2000-2011)	Core
African Journal of Marine Science (South Africa)	No	No	2011	Yes (2003-2011)	Priority
African Journal of Tropical Hydrobiology and Fisheries (Uganda)	Yes	No	2009 (not OA in AJOL)	Yes (1974-2001)	Selective
Journal of Aquatic Sciences (Nigeria)	No	No	2006	Yes (1986-2010)	Level not noted
Nigerian Journal of Fisheries (Nigeria)	No	No	2008	Yes (2003-2008)	Title not listed
Nigerian Journal Fisheries Science and Technology (Nigeria)	No	No	None	Yes (2009-2010)	Title not listed
Tropical Freshwater Biology (Nigeria)	No	No	2009	Yes (1988-2009)	Selective
Water SA (South Africa)	Yes	Yes	2011	Yes (1977-2011)	Selective
Western Indian Ocean Journal of Marine Science	Yes	No	2009	Yes (2002-2009)	Core

**Table 3: African fisheries journals**

#### Finding African fisheries research in OA journals

Table 2 in the Technical Guidelines 12 (FAO, 2009, pp. 86-97) lists various online fisheries information finding tools. We have further selected these to cover only those tools freely available and that retrieve mainly, or a significant proportion of, OA scholarly journal articles. We consider these tools the most relevant for fisheries and have grouped them in two clusters: journal aggregators, and search engines, repositories and harvesters. In terms of coverage, many systems cover predominantly English language sources and search interfaces are in English only. For the purposes of this study, we searched only in English.

As with all information searches it is preferable to have some knowledge of the tools:

What resources are covered?

How extensive is the coverage?

What is the depth of indexing?

How useful is the search interface?

It became apparent when searching freely available systems that there is little standardization, most require a degree of experimentation and manual intervention, and in some cases faith. Only those systems that retrieved significant recent African fisheries are described, although others were searched.

Using broad subject criteria and 2010 as the publication year, we analyzed search results from the selected tools for the availability of OA African fisheries articles. An indication of the percentage of authors with an African affiliation was noted. As was mentioned above, the spread of fisheries articles across a large number of



multidisciplinary journals is a feature of most searches. This dispersal of fisheries articles does not make it easier to discover and probably excludes their coverage by many subject specific databases.

#### Journal Aggregations

Several systems aggregate OA journal collections and provide a search interface to access their content. The most relevant systems for fisheries are DOAJ that covers only OA journals and AJOL that combines both OA and priced journals. Sample searches and analysis of the results from both systems is provided in the Appendix in Tables A1 & A2.

There are undoubtedly many journal aggregations that include articles about African fisheries, although to a lesser extent than those mentioned above. For example, BioOne was retrieved in the Google Scholar search. **BioOne** ([www.bioOne.org](http://www.bioOne.org)) provides an aggregation of high-impact bioscience research journals. Through participation in philanthropic programs such as HINARI, AGORA, OARE, and eIFL it also provides its content to over 2,500 institutions in the developing world at no cost. It includes few OA journals.

#### Free search engines, databases, repositories and harvesters

**Google Scholar** provides a search of scholarly literature across many disciplines and sources, including theses, books, abstracts and articles. Searching African fisheries and categorizing a small sample gives an indication of the spread of publishing sources and the proportion of articles available as OA. Categorizing the provider of an OA article is not so straightforward as the definition of what is a publisher becomes more fuzzy Appendix Table A3 breaks down the sources into broad groups with their percentage of OA and author affiliation if available.

In addition to publishers of commercial journals with no OA, Google Scholar also indexes OA journal aggregators and individual OA publishers. There are an increasing number of the latter including those producing collections of scholarly journals, some of direct but most of marginal relevance for fisheries. Two worth mentioning because of their potential for African authors are: **Bioline International** ([www.bioline.org.br/](http://www.bioline.org.br/)) is a not-for-profit scholarly publishing cooperative committed to providing open access to quality research journals published in developing countries. It includes active journals published in Egypt, Ghana, Kenya, Nigeria, Tanzania, Uganda. **BioMed Central** ([www.biomedcentral.com](http://www.biomedcentral.com)) currently publishes 220 peer-reviewed open access journals and provides free, immediate and permanent online access to the full text of all articles. Through its open access waiver fund it tries to ensure that scientific authors in low-income countries do not face financial barriers to publishing in open access journals.

There are, however, a number of OA publishers emerging whose main purpose may not be to promote, preserve, and make available scholarship but to exploit the author-pays OA model for their own profit. The large number of OA journal publishers with articles on African fisheries gives some cause for concern, not least the difficulty in discovering this information and the possibility that it may not be available in the long-term.

Another category of OA articles retrieved through Google Scholar is the author posted free copies of manuscripts on different types of web sites. In the early days the home pages of the authors or their departments was typical and often problematic in terms of longevity and authentication. Today digital copies are increasingly posted in institutional and subject-specific repositories.

The nine institutional repositories in the sample included two African university repositories, one in Botswana and one in Nigeria. Over 40% of the authors retrieved in the other 7 repositories, also mainly universities, had an African institutional affiliation. Fewer documents were retrieved from the subject repositories and grey literature is predominant in most. The two repositories specific to fisheries and the aquatic sciences, **Aquatic Commons** (<http://aquaticcommons.org>) and **OceanDocs** (<http://www.oceandocs.net/>) will be covered in more detail in other sessions of the conference and therefore not covered here. However, both are indexed by Google Scholar.

There are a number of other subject repositories relevant for fisheries and the two examples from the Google Scholar search are good. For fisheries economics, **RePEc (Research Papers in Economics)** (<http://repec.org/>) is a collaborative effort of hundreds of volunteers in 75 countries to enhance the dissemination of research in economics. The heart of the project is a decentralized database of working papers, journal articles and software components. For coverage of aquatic biology, fish in nutrition and health there is little to beat **PubMed Central** (<http://www.ncbi.nlm.nih.gov/pmc/>), a free full-text archive of biomedical and life sciences journal literature at the

U.S. National Institutes of Health's National Library of Medicine. The search for 2010 African fisheries retrieved 177 articles, all of which are available full text. This resource is growing in part due to the U.S. mandate that all those receiving funding from the U.S. National Institutes of Health must make their findings publicly available in PubMed Central. This model is interesting to monitor.

The general subject search we conducted resulted in massive numbers of hits and is not recommended. However, the breadth of coverage makes Google Scholar useful for more specific subject searches. Most users, researchers as well as students, tend to stick to one information finding tool that they know, that is easy to use and gives speedy results. Google is the default for many but using the same search strategy with no date limitation possible gives 75 million hits. Using Google for anything other than very specific information searches is hazardous in a research context. Google Scholar allows more search features as well as limiting its coverage to mainly scholarly material.

An efficient way of searching across repositories is via a Harvester. The most relevant for fisheries is **AVANO** (<http://www.ifremer.fr/avano/>), developed by Ifremer. It provides access to almost 300,000 electronic resources about the marine and aquatic sciences from the OAI harvesting of 297 Open Archives and 2 commercial editors. The search results for African fisheries published in 2010 include 38% from DOAJ and 25% from university repositories. See Appendix Table A4.

## Findings and Suggestions

Constraint 1: Lack of awareness of and access to global information resources

More information systems and full-text content have become available to African fisheries scientists in recent years. The collaborative efforts of donor agencies and publishers to provide online access to extensive collections of scholarly journals have achieved what was impossible in the days of print and before the OA movement provided alternative and additional resources. Access to the information needed depends on a knowledge of which of the many systems cover what resources and how well. For example, most participants at the 2011 IAMSLIC Conference were unaware that the two commercial and highest impact African fisheries journals are covered by HINARI but not by AGORA.

Access can be confusing when it is available some of the time to some people for different costs. Journals that are made available as OA for a limited time or for a limited audience are part of this dilemma and may even dissuade use. Another example is when philanthropic efforts to improve access become marketing opportunities and access to a particular journal is inexplicably blocked in a particular country. The systems we searched presented an enormous range of indexing practices and search interfaces, which means that access depends on continuously updating user skills.

Making information resources available does not automatically translate into awareness and ultimately use. Levels of awareness of the vast array of systems varies, even where connectivity is not the major concern. In some cases, too many choices can be daunting and end-users revert to what they know, even if it is a less effective tool. The lack of response from the majority of Afriamslic members to our AGORA survey and low use of the IAMSLIC Distributed Library in Africa are likely indicators of lack of awareness. IAMSLIC's Resources Sharing Committee advertises and provides guidance on the use of the IAMSLIC Distributed Library. The FAO Fisheries Library through its interactions with member libraries promotes the IAMSLIC Distributed Library and AGORA.

A recent training initiative in the health sector involves higher-income institutions working with visiting international students and scholars to introduce them to Research4Life so they are avid users and advocates for the service upon returning to their home institutions (Parker, 2011). This model could be promoted to IAMSLIC members who host students and researchers from African fisheries and aquatic science institutions.

The peer-reviewed journal is important and citing that literature indicates a familiarity with the field and current developments. However, the grey literature remains a rich resource for fisheries scientists and is reflected in their work. Local and regional science is as important and often more relevant in addressing local problems. While access to the peer-reviewed literature has improved, access to the grey literature and regional science remains patchy. Databases such as ASFA play an important role in indexing this information but more needs to be done to improve linking to the full text of grey literature and OA journals. As a library community we have the opportunity to participate in the Aquatic Commons and greater efforts are needed to incorporate African fisheries literature.

Constraint 2: Poor opportunities to publish and disseminate the results of research

African fisheries scientists have more options of where to publish, but also more questions about how to choose. There is perceived prestige in publishing in commercial, global journals. These may not be the best means of disseminating research results. If the primary audience is local and access is limited by cost, poor internet connections or institutional affiliation, readily accessible OA journals, regional publications and institutional reports may prove to be better communication mechanisms.

OA scholarly journals are definitely providing an alternative publishing outlet for African fisheries science. Articles by African affiliated authors were retrieved in over 40 OA journals across a wide range of disciplines. Very few of these were specific to fisheries or aquatic science. One excellent example of an OA fisheries-related journal with international coverage is *Knowledge and Management of Aquatic Ecosystems*. Those published in Africa are few in number and there is often a time lag in publishing, hence excluding them from our search results and possibly from aggregators such as DOAJ.

The dispersal of fisheries articles in other disciplines may indicate the lack of a suitable OA fisheries journal or that authors find the easiest solution for swift publishing. It probably excludes their coverage by subject specific databases and certainly does not make it easier for users to discover them considering that freely available search tools have little to offer in terms of subject searching.

In addition to the many reputable OA publishers, there is also some concern that many new ones are emerging whose ability to promote, preserve and make available scholarship may not be a long-term prospect. This is a serious consequence for authors who may have paid to publish only to find that their article, the journal or even the publisher ceases to exist.

There are opportunities for librarians to assist with the dissemination of research. Besides encouraging deposit in the Aquatic Commons, we should be able to advise our research community on appropriate outlets for publishing including reputable OA publishers and journals. We can nominate journals for coverage in DOAJ and ASFA. Finally, we can engage with researchers and publishers to investigate what is needed for a truly OA, robust high quality African fisheries journal.

### **Measuring The Progress**

These two major information constraints present challenges and opportunities for librarians. While the constraints have existed for decades, the 1995 Code of Conduct for Responsible Fisheries was a catalyst for examining how to improve fisheries management and consequently improve the health and livelihoods of people dependent on fish as food as well as protecting the aquatic environment. We are making progress towards improved access, awareness and use. It is wise to take stock of that progress from time to time. We can inform our funders that their investments are needed by measuring usage of global and local fisheries information, and documenting the access to African fisheries information.

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### **Appendix: Open Access Resources**

Directory of Open Access Journals (DOAJ) ([www.doaj.org](http://www.doaj.org))

DOAJ provides categorized, searchable links to free, full text, quality controlled scientific and scholarly journals. It currently covers 6820 journals, of which 3087 are searchable at article level. DOAJ has become the primary index of OA journals, and also provides long term archiving possibilities via an agreement with the Dutch National Library.

The subject category Aquaculture and Fisheries lists 16 journals, however only one of these is found in the search results, the remaining articles are from 16 different journals in other subject categories.

Search strategy and results:

Found 1088 documents matching the query Title=fish OR Title=fisheries

With PY=2010 (manual) = 196      With Subject: Africa (manual) = Total 33 (4 irrelevant)

Of the 29 relevant articles, 24 have authors with an institutional affiliation in Africa i.e. 83% (excluding the international organizations).

**Table A1. DOAJ search results**

JOURNAL	Number of articles	Author affiliation
Advance Journal of Food Science and Technology	2	Tanzania x 2
American Journal of Applied Sciences	1	Nigeria
Asian Journal of Agricultural Sciences	2	1. Tanzania 2. Nigeria
Biogeosciences	1	Germany, Canada.
Current Research Journal of Economic Theory	2	Nigeria x 2
Current Zoology	1	Netherlands
Frontiers in Zoology	1	Austria
International Journal of Chemistry	1	Ghana
International Journal of Pharmaceutical and Biological Research	2	(Nigeria, Sweden) x 2
International Journal of the Commons	3	1. Norway, Germany 2. Denmark, Philippines, Malawi, Zambia, Mozambique 3. Zimbabwe, South Africa, Denmark
Iranica Journal of Energy and Environment (IJEE)	1	Nigeria
Journal of Agricultural Science	2	(UK, Nigeria) x 2
Journal of Applied Sciences	1	Nigeria
Knowledge and Management of Aquatic Ecosystems	3	1. International Org.: Cameroon, Egypt ; France 2. Burundi, Benin 3. Burundi, Benin, France
Onderstepoort Journal of Veterinary Research	2	South Africa x 2
Pakistan Journal of Nutrition	3	Nigeria x 3
Research Journal of Environmental and Earth Sciences	1	Ghana

**African Journals OnLine (AJOL) ([www.ajol.info](http://www.ajol.info))**

AJOL is the world's largest and pre-eminent collection of peer-reviewed, African-published scholarly journals, currently covering 411 titles. Historically, it has been difficult for African researchers to access the work of other African academics. In partnership with hundreds of journals from all over the continent, AJOL works to change this, so that African-origin research output is available to Africans and to the rest of the world.

Search strategy and results:

TI = fish or fisheries      Input Years = 2010 & 2011      PY (manual) = 2010      Total = 48 (1 irrelevant)

Of the 25 journal titles with relevant articles, 9 of them are available free to all users i.e. 36%. Libraries in low income countries have a quota of 12 free articles per month from journals that are not OA. Of the 16 relevant articles in the OA journals, 15 of them have authors with an institutional affiliation in Africa i.e. 94%

The majority of journals categorized as fish and fisheries in AJOL do not appear in the results.

Three important journals have no issues later than 2008/9 in AJOL:

African Journal of Tropical Hydrobiology and Fisheries; Nigerian Journal of Fisheries; Western Indian Ocean Journal of Marine Science. Similarly from the category of Aquatic Sciences, two additional journals are missing for the same reason: Journal of Aquatic Sciences; Tropical Freshwater Biology.

Of the 9 OA journal titles from the AJOL search results, 3 of them are not covered by DOAJ: African Journal of Environmental Science and Technology; Ethiopian Journal of Environmental Studies and Management; Journal of Agriculture and Social Research

**Table A2. AJOL search results**

Journal	Articles	Author Affiliation	OA
African Journal of Aquatic Science (South Africa)	7		No
African Journal of Environmental Science and Technology	1	Uganda, Austria	Yes
African Journal of Food, Agriculture, Nutrition and Development	5	1. Norway, Tanzania 2. Malawi, Botswana 3. Tanzania 4. Kenya 5. Côte d'Ivoire	Yes
African Journal of Marine Science (South Africa)	7		No
Agro-Science	1		No
Bayero Journal of Pure and Applied Sciences	2	Nigeria x 2	Yes
Bio-Research	1		No
Bulletin of the Chemical Society of Ethiopia	1	Saudi Arabia	Yes
Ethiopian Journal of Environmental Studies and Management	2	Nigeria x 2	Yes
Ghana Journal of Development Studies	1		No
Global Approaches to Extension Practice: A Journal of Agricultural Extension	1		No
Global Journal of Pure and Applied Sciences	1		No
International Journal of Biological and Chemical Sciences	1		No
Journal of Agricultural Extension	1	Nigeria	Yes
Journal of Agricultural Research and Development	1		No
Journal of Agriculture and Food Sciences	1		No

Journal	Articles	Author Affiliation	OA
Journal of Agriculture and Social Research (JASR)	1	Nigeria	Yes
Journal of Agriculture, Forestry and the Social Sciences	2		No
Journal of Applied Science and Technology	2		No
Journal of Applied Sciences and Environmental Management	1	Nigeria	Yes
Journal of Science and Technology (Ghana)	1		No
Nigerian Journal of Basic and Applied Sciences	2		No
Rwanda Journal	1		No
Water SA	2	South Africa x 2	Yes
Zoologist (The)	1		No
Total	48	Total OA articles	16

### Google Scholar (<http://scholar.google.com>)

Google Scholar provides a search of scholarly literature across many disciplines and sources, including theses, books, abstracts and articles. The search and small sample give an indication of the spread of publishing sources and the proportion of articles available as OA.

Search strategy and results:

(fish OR fisheries) AND (uganda OR tanzania OR kenya OR nigeria OR botswana OR senegal) Any field  
 PY=2010 Results= 13,000 Analyzing 10 in every 100 Total in sample = 100 (Not relevant = 10)  
 [A Google search of the above with no PY limit gives 75 million hits, restricting to PDF reduces it to 2 million]

Categorizing the provider of an OA article is not so straight forward as the definition of what is a publisher becomes more fuzzy.

Table A3: GoogleScholar search results

	Articles	OA	Type	Author Affiliation
Publishers and journal aggregators				
Commercial publishers	21	0	Journals	
AJOL	20		Journals	See AJOL search. No PY search
BioLine Int.	1	1	Journals	Uganda
BioOne	2	0	Journals	
Proquest	3	0	?	
National and International Organization websites	7	6	Journals and Grey	Tanzania, Nigeria, Rest

Author posted on websites	7	5	Journals and Grey	Problems with broken links, Authentication, Copyright
Repositories - University or Research Institute				
Africa	2	2	Journals and Grey	Botswana, Nigeria
Rest of world	7	7	Journals and Grey	43% African institutional affiliation
Repositories - Subject				
Aquatic Commons	1	1	Grey	Tanzania
Repec	1	1	Grey	Senegal
PubMedCentral	1	1	Journal	Europe
Professional Societies	1	1	Int. J. Commons	Zimbabwe, Malawi, Mozambique
OA Publishers				
jeb.co.in	1	1	Journal of Environ. Biol.	Nigeria, India
Maxwell Scientific Org.	1	1	Journals	Tanzania
Academicjournals.org	6	6	Journals	Nigeria
Medwell journals	1	1	Journals	Nigeria
Agrosciencejournal.com	1	1	Journals	Nigeria
Docsdrive.com	2	2	Journals	Nigeria
Wojast.com	1	1	Journals	Nigeria
Globaljournalseries.com	1	1	Journals	Nigeria
Friends Science Publishers	1	1	Journals	Nigeria
Science hub Scihub.org	1	1	Journals	Nigeria
TOTAL	90			

**AVANO ([www.ifremer.fr/avano/](http://www.ifremer.fr/avano/))**

Provides access to 289,930 electronic resources about the marine and aquatic sciences from the OAI harvesting of 297 Open Archives and 2 commercial editors.

Search August 2011

ALL FIELDS (fish or fisheries) and (uganda or kenya or nigeria or botswana or senegal)

AND PY=2010

Gives 47 records



**Table A4**

DOAJ	18	University repositories	
PubMed Central	1	(Europe)	8
Bioline	3	(N.America)	4
WorldFish	1	Journals	6
OAI record only	6		

Articles from the journal Aquatic Living Resources were 19% of the results; Ifremer holds the copyright to this journal and hence can make it openly available even though it is technically not OA. However, looking at the full text showed that only one article was published in 2010.

**REPEC**

Search EconPapers <http://econpapers.repec.org/> Sept.2011

(fish or fisheries) AND (2010) AND (uganda OR tanzania OR kenya OR nigeria OR botswana OR senegal)  
33 documents matching - of which 13 are available full text

**PubMed Central** <http://www.ncbi.nlm.nih.gov/pmc/>

Search Sept. 2011

((fish OR fisheries) AND (uganda OR tanzania OR kenya OR nigeria OR botswana OR senegal)) AND  
2010[Publication Date]

Results: 177 of which ALL are available full text

**IAMSLIC Union List of Serials** (<http://library.csumb.edu/iamslic/unionlist/index.php>)

Afriamslic African Union List of Marine and Aquatic Serials

(<http://library.csumb.edu/iamslic/africa/unionlist/index.php>)

In addition to providing access to large collections of library journals, the IAMSLIC Union List of Serials also includes 148 OA Serial titles in the marine and aquatic sciences, many of which would be categorized as grey literature