

Date : 29/06/2007



**Access to African published research:
the complementary approaches of NISC
SA and African Journals OnLine**

(www.nisc.co.za and www.ajol.info)

Susan Murray

PO Box 377, 19 Worcester St., Grahamstown, 6140,
South Africa.
susan@aol.info

And

Margaret Crampton

PO Box 377, 19 Worcester St., Grahamstown, 6140,
South Africa.
Margaret@nisc.co.za

Meeting:

137 Serials and Other Continuing Resources

Simultaneous Interpretation:

No

WORLD LIBRARY AND INFORMATION CONGRESS: 73RD IFLA GENERAL CONFERENCE AND COUNCIL

19-23 August 2007, Durban, South Africa

<http://www.ifla.org/iv/ifla73/index.htm>

Abstract

Researchers on African topics need access not only to European and American sources, but to the publication output from Africa. Traditionally, African research relies heavily on such information derived from Europe and America, which, although important, is not always relevant or appropriate.

*NISC in South Africa is a bibliographic database publishing company whose mission is to promote the publications and research output of Africa and an information flow from South to North. NISC compiles licenses and aggregates bibliographic databases. Information sources are scattered and there is no single comprehensive information resource for Africa. **Africa-Wide NiPAD** (NISC information Publications and African Databases) is a collection of 40 bibliographic databases derived from three continents, comprising over 2 million records. Integrated together for the first time, this collection offers unprecedented access to multi-disciplinary information on African topics and countries. **Africa-Wide** will be used to demonstrate the aggregation techniques used by NISC to serve information retrieval and dissemination. Constituent databases are each unique and special, but it is only by combining a multitude of sources that we can attempt comprehensive coverage of African output.*

AJOL is a non-profit organization whose mandate is to promote access to African research output and support African scholarly publishing. This is done primarily via the provision of a central and globally available online platform, using open source software, through which African journals can be accessed and from which full text articles can be downloaded.

NISC and AJOL collaborate to apply different but complementary models to provide integrated and practicable solutions to the challenges of global and sustainable access to African Research output. This paper details the current models, challenges and additional potential of these services to the African research, library and publishing communities.

1. Introduction

Africa is often seen as a single entity. However, it is comprised of 54 countries and hundreds of language and cultural groups. It is far larger and more diverse than Europe. While acknowledging the substantial diversity within Africa, it is still possible and useful to make some generalizations about the continent. One such legitimate generalization is that strengthening research and research-publishing are crucial priorities for improving higher education in Africa¹ and link (via research-based innovation) to Africa's much-needed economic development.

Traditionally, the main information resources, published journals, journal articles and bibliographic databases available to and used by researchers, librarians and students in Africa are the same as those used in Europe and America. This information, although usually more readily available than that of developing countries, does not adequately reflect the research output of Africa and is not always relevant or appropriate. Although access to global information resources is essential; equally important and essential is access to the local research output from the continent. African work also needs to be better represented in subject specific databases and the need for bibliographic databases which reflect the region as a whole, along with an online digital repository of African-published journals, was identified. Africa needs access to its own research publications and likewise there needs to be an improvement in worldwide access to African research.

The combined mission of NISC² and African Journals OnLine (AJOL)³ is to support African research and counter the "North-South" inequality of information flow by facilitating awareness of and access to Africa's research. NISC documents the research in bibliographic databases and AJOL provides an online platform for the aggregation of African-published scholarly journals. Together, NISC and AJOL are both valuable tools for and a showcase of African research and both are available on the internet – increasing the visibility and accessibility of African research outputs globally as well as on the African continent. This paper explains a selection of the challenges relating to dissemination of African research outputs and NISC and AJOL's approaches in meeting some of these.

2. Challenges for African scholarly publishing and dissemination

2.1 Skills

Beyond the gamut of AJOL and NISC's work are the developing country challenges of *en masse* provision of quality basic, secondary and tertiary education that allow skills necessary to access, interpret, understand and utilize bibliographic information and the research findings published in scholarly serial publications.

2.2 Language

Although the prevailing language of publication in Africa may be English, a high proportion of journal authors in African journals have English as a second or third language of choice. African publishers have to address this problem by including a language editor in the publication process (which adds to the quality and international accessibility of the publications, but also to the expense for the publisher).

¹ Teferera, D. and Altbach, C. "African Higher Education: Challenges for the 21st Century" Higher Education 47 (January, 2004), pp.21-50

² www.nisc.co.za - a company based in Grahamstown, South Africa

³ www.ajol.info - a non-profit organisation based in Grahamstown, South Africa

2.3 ICT Infrastructure

Also beyond what AJOL and NISC can address (and a major constraint of their use within Africa) is the extent of Information and Communication Technology (ICT) infrastructure within the continent. Africa's population is 14.2% of the world total but African internet users account for only 3% of global internet users as of March 2007⁴. Despite this, nearly a quarter of the researchers using AJOL are from Africa (24%) and 44% of NISC subscribers are African (40% of which are from South Africa) – a strong indication of the need within the continent for the services the two organizations provide. While Africa is starting from a technological disadvantage, the expansion of digital technologies does offer the possibility for African policy-makers and planners to increase infrastructure on a regional level and positively affect Africa's opportunities⁵, and the number of internet users in Africa is growing rapidly.

Downloading full text from an African host is slow and becomes a deterrent to the developed country researcher accustomed to rapid internet speed. As regards the stability of the service provided, both AJOL and NISC maintain "mirror sites" and data is also hosted outside Africa to avoid Africa's bandwidth problems, and to facilitate international access speed.

2.4 Economic constraints

Most of Africa faces enormous economic challenges. 35 African countries are classified by the World Bank as Low Income Countries, 19 are Middle Income, and there are no High Income Countries on the continent. Of the 50 countries throughout the world classified as Least Developed Countries (LDCs) by the UN after the 2006 triennial review, 33 are in Africa.

Funds for sound research are an enormous challenge for the continent's academic community, as are funds for the dissemination of African research. Making African-published research accessible and more visible is impeded by a lack of resources on the part of many developing country journal publishers; which is an area of challenge AJOL works to address.

AJOL attempts to bridge the gap between the enormous higher education (and development) potential inherent in digital online technology, and the economic limitations that constrain African journals from using it. AJOL's various free services to journal publishers and researchers help to decrease their costs in a way that has a net reduction in the cost of online journal hosting and access. The sum of the costs of each African journal outsourcing the online hosting of their content in isolation would far outweigh the cost of AJOL doing so for multiple journals. The cost to libraries and researchers of accessing African-published research, particularly those from Low Income Countries, is also partially addressed by AJOL.

2.5 Online publication and maintenance costs in the face of technology changes

There is a perception that publishing journals online is a cost effective or even free alternative to the printing and dissemination of hard copy. There ARE cost savings relating to printing and dissemination costs; however online publication does come with its own running costs as well as long-term costs relating to maintenance and sustainability of the information/data over unpredictable technological changes going forward. Although it is expected that the technical barriers and difficulties faced by pioneers in electronic publishing will decrease as the field matures⁶, electronic database and journal publishing are likely to remain a fairly specialised business that requires ongoing software development to continuously retain functionality while also maintaining compatibility with users' expectations and the users' changing hardware and software needs. Although Africa offers an enormous and largely untapped resource of knowledge, the gap of recognition continually increases as a result of the inability to share in the global connectivity and remain up to date with international online publishing standards and developments. NISC and AJOL counter this, having built expertise in this area, and maintain a team of software developers to continuously maintain and update their online services.

2.6 Open Access

With the advent of widespread internet use, the Open Access (OA) movement to make scholarly research articles freely available to all via the web is increasingly supported and OA to scholarly research offers real benefits to society, particularly in Least Developed Countries (LDC's), where paid access to research output charged in US Dollars, Euro or Pounds is constrained by lack of funds.

⁴ <http://www.internetworldstats.com/stats1.htm> - viewed 28 April 2007

⁵ Murphy, P. et al "Enhancing Learning Opportunities in Africa: Distance Education and Information and Communication Technologies for Learning" Africa Region Human Development Working Paper Series, the World Bank, 2002

⁶ Willis, J. "Bridging the Gap Between Traditional and Electronic Scholarly Publishing" Center for Information Technology in Education, College of Education, University of Houston, Houston, Texas. Paper presented at the 1995 EDUCOM Conference in Portland, Oregon. <http://www.coe.uh.edu/> site visited 10 May 2007

While free access to research outputs from the developed world can boost the knowledge base in LDC's, it is original indigenous research, innovation and the access to and use of this research output that holds the key to economic development in LDC's. There is no doubt that Open Access to African-published research has the potential to increase its local and international use and citations, and while publishing in journals may fall away in the very long term, this means of scholarly communication is deeply and systemically entrenched and will continue for many years to come. While keeping commercial journals in business is not necessarily a goal of the scholarly information community as part of the provision of access to information (notwithstanding that publishers add value to the information chain and are part of the scholarly information community⁷), keeping small or medium institutional or society publishers (that communicate local research) in LDC's in operation, at least online, should be.

The current free access for LDC's to high quality foreign research may have the effect of reducing the subscriptions that most African LDC journals rely on primarily to cover their costs (in the face of severely limited funds, why would a library pay for a local journal when one from elsewhere in the same discipline is available for free?). If free access to overseas research continues and Open Access becomes mainstream in scholarly research publication globally, the journals in LDC's will struggle or even cease to publish local research and may need to find some alternate way for their research publication costs to be covered.

However, the same economic realities that make free access to developed country research output so useful for LDC's, act as a constraint to the publication of local research. The institutional and commercial publishers who have managed, to date, to transfer to an Open Access publishing model are largely based in Middle or High Income Countries and most commonly entail shifting publication costs from subscriber contributions to authors' (or authors' institutions') research funds. Most journals publishing from poorly-resourced institutions in Africa manage to do so through a combination of a small (often local) subscription base and volunteerism along with, in some cases, institutional support and donor funding. The challenge here is to devise and test appropriate models for the sustainable Open Access publishing in Least Developed Countries. In the interim, non-profit organisations, like AJOL, can assist greatly with aggregated online accessibility to developing countries research output, although programmes like this are still subject to the vicissitudes of the donor environment.

2.7 Quality and perception

The quality of research and research publications in Africa varies enormously, but overall there is a great need to improve the quality of research, the quality of management of many African journals, as well as shifting perceptions on quality where these are incorrect.

The prevailing systems of rating journals do not always sufficiently correlate with the quality of the publication and the research therein. For example, journals that have been historically inaccessible and have lacked adequate marketing and awareness-raising will not be frequently cited and therefore not be perceived as quality journals, irrespective of the quality of the research published in them.

African university academic staff are often highly critical of African-published journals⁸, which can have the effect of quality African research being published in overseas journals instead of locally and of African-originated journals moving to developed country publishers in order to be perceived as quality titles in another form of "brain drain". This perception can further result in an adverse effect on the acknowledgement and utilization of valuable and quality locally conducted and published research.

It is important to note that there is a reciprocal relationship between the publication and distribution of African research and the quality of African research. "Research (in Africa) is suffering, because the means to publish research results are lacking and the results on which to develop further research are not disseminated"⁹. In the face of the agglomerating publishing giants based in developed countries, it is critical that African systems of scholarly publishing, dissemination and intellectual property rights be supported and improved (most particularly in the 33 LDC's in Africa) in order for African research to be strengthened and for the realization of the potential economic benefits from research to accrue locally.

While recognizing the overall need to strive for internationally acceptable quality on the part of African scholarly journals, it is also useful to acknowledge that there is a role in developing countries for the publication of local research that may not be up to the highest standards but may nonetheless be of great

⁷ Anderson, R. "Open access – clear benefits, hidden costs" *Learned Publishing*, Vol 20 No 2 April 2007

⁸ Alemna, A.A., Chifwepa, V. and Rosenberg, D. "African Journals: An Evaluation of the Use Made of African-published Journals in African Universities": London: Department for International Development, 1999 (Education research; serial no. 36)

⁹ Rosenberg, D. "African Journals Online: improving awareness and access" *Learned Publishing* (2002) 15, 51-57

local relevance and value. Additionally, through disseminating this research internationally, feedback to the originating institutions and authors is made possible, which can be of immense benefit in increasing local research capacity and skills.

2.8 Practicable digital accessibility of African scholarly publications

Scholarly journals remain an important means of distributing knowledge. Relating to the publication of African research, many hundreds of journals throughout the continent succeed in publishing African research, despite a plethora of challenges, but they do not always succeed in disseminating this research widely. In the past, the international research community has had difficulty locating and even subscribing to many African scholarly serial publications. Consequently, African journals have been under-represented in the world's academic libraries¹⁰. The extent of the accessibility problem has been such that many African countries have struggled to obtain the outputs of research done in neighbouring countries. African research papers have been under-utilised, under-valued and under-cited in the international and African research arenas.

Accessibility of information is sometimes confused with mere existence and availability of documented information. However, in the information age, making African scholarly meta-data and full text comprehensively digitally accessible requires:

- 1) **availability** on the internet (through online hosting) AND
- 2) **visibility** on the internet (through aggregation and awareness raising) AND
- 3) **usability** on the internet (through sensible and pragmatic software design and organising of information).

Over and above the other significant challenges for African scholarly publication and dissemination detailed above, the accessibility of African information remains a major challenge. This is the area that both NISC and AJOL work to improve.

3 NISC & AJOL's approaches to making African research accessible

In addressing the challenge of digital accessibility to African research output, NISC and AJOL have developed different but complimentary approaches.

NISC	AJOL
Compiles, aggregates, organises, promotes and sells digital bibliographic information from a vast amount of African-originated research and international research done on or in Africa	Aggregates, digitally archives and hosts African-published, peer-reviewed scholarly journals for free, with open access to titles and abstracts and progressively subsidized access to full text

Both approaches are explained in more detail below.

3.1 The NISC model – bibliographic databases

Realising a need in Africa for indigenous information and a local service, National Inquiry Services Centre Pty Ltd (NISC SA) opened in Grahamstown, South Africa in May 1995. NISC SA is an independent African company affiliated to NISC International, Inc. in Baltimore, USA and to NISC Export Services Pvt. Ltd in Hyderabad India (NES).

NISC in South Africa is an academic journal and bibliographic database publishing company whose mission is to promote the publications and research output of Africa, within Africa and to the wider world and to integrate these African resources with similar publications relating to Africa which are published elsewhere¹¹. By aggregating research outputs relating to Africa it is the intention to develop an increasingly comprehensive information resource covering African research and issues. NISC has worked to achieve this aim by building bibliographic databases, sourcing and licensing databases relevant to Africa worldwide, and compiling and making these resources widely available by publishing database aggregations on the Internet, CD-ROM and DVD.

¹⁰ Levey, L.A. "Slipping through the cracks no more: better dissemination of African research information". In Access to information: Indaba97. Harare: Zimbabwe International Book Fair Trust, 1997, pp.98-105.

¹¹ Libmann, F. "NISC: des ressources sur l'Afrique, l'eau et la faune marine". Paris. Bases No 234 – Jan 2007

NISC also publishes nine academic journals, which are available in print and online on Ingenta <http://www.ingentaselect.com> and full text journal articles are available through African Journals Online at <http://www.ajol.info>.

Each NISC has a software development team. Today the largest of these is that of NES in India. They maintain and develop such things as the search engine software and developments to promote full text linking from databases to online publications, and ensure that NISC stays abreast of new innovations in electronic publishing and is able to maintain the access no matter how the technology changes. NISC SA has invested in the development of data capture software with built in intelligence and data validation to ensure quality database compilation. NISC SA has also been able to benefit from the software development of their publishing partners.

3.1.1 Database Aggregation

In many subject fields there is no single database source for information and this applies particularly in Africa and particularly in specialist subject fields where there is a need to ensure African coverage. In NISC's experience, no database can in honesty claim to be comprehensive in coverage. To address this problem NISC compiles database aggregations and has developed software to integrate large and small databases to a single information resource. Related databases are combined and the combinations may span geography and time. Related databases with different aims and varying sizes can also be combined. The combinations enrich the information resource often offering different facets to the information and even differing points of view on the same article. Users of one database will benefit from exposure to all the databases. Each database has the opportunity to update their information quarterly and new databases can be added as they become available at the time of update.

When combining different databases there is inevitably overlap in the records and references which they contain. To prevent tedious repetitions, NISC has developed composite record building technology to limit duplication. Using fuzzy logic and custom-developed duplicate detection software, duplicates are identified. Composite records are then compiled by combining the duplicates into a single record which retains all unique contributions from each database. Nothing is lost and the resulting records can be seen as value-added references retaining all unique keywords and all original abstracts. Users of each database benefit from the different context in which the other database compilers work and the composite records are enriched by the variant choices of keywords allocated to the same article by the different database producers. Not only do the added keywords enhance the information value of the composite record, but each keyword added provides potential for richer retrieval.

It is always surprising how unique each database proves to be and how little overlap there is between the databases and how composite records are often fewer than expected. For example in African Studies out of a total of 756 500 records and 19 databases there are only 42 842 composite records made up of duplicates.

3.1.2 Database Aggregations with African Content

NISC bibliographic database aggregations with African content are of two types: They are either subject specific databases where African information is incorporated with major European and/or American international databases (Table 1) or they consist of multi-topic databases all of whose references are African, or of particular African relevance (Table 2).

Table 1: NISC Specialist Subject Titles: Aggregation of African, European and American bibliographic databases

Title	African database	Number of records	Number of databases
Aquatic Biology, Aquaculture & Fisheries Resources	FISHLIT	1 267 327	14
Fish & Fisheries Worldwide	FISHLIT	572 548	12
Water Resources Worldwide	WATERLIT	774 265	6
WildLife & Ecology Studies Worldwide	BIRD and NATCHA	688 546	9

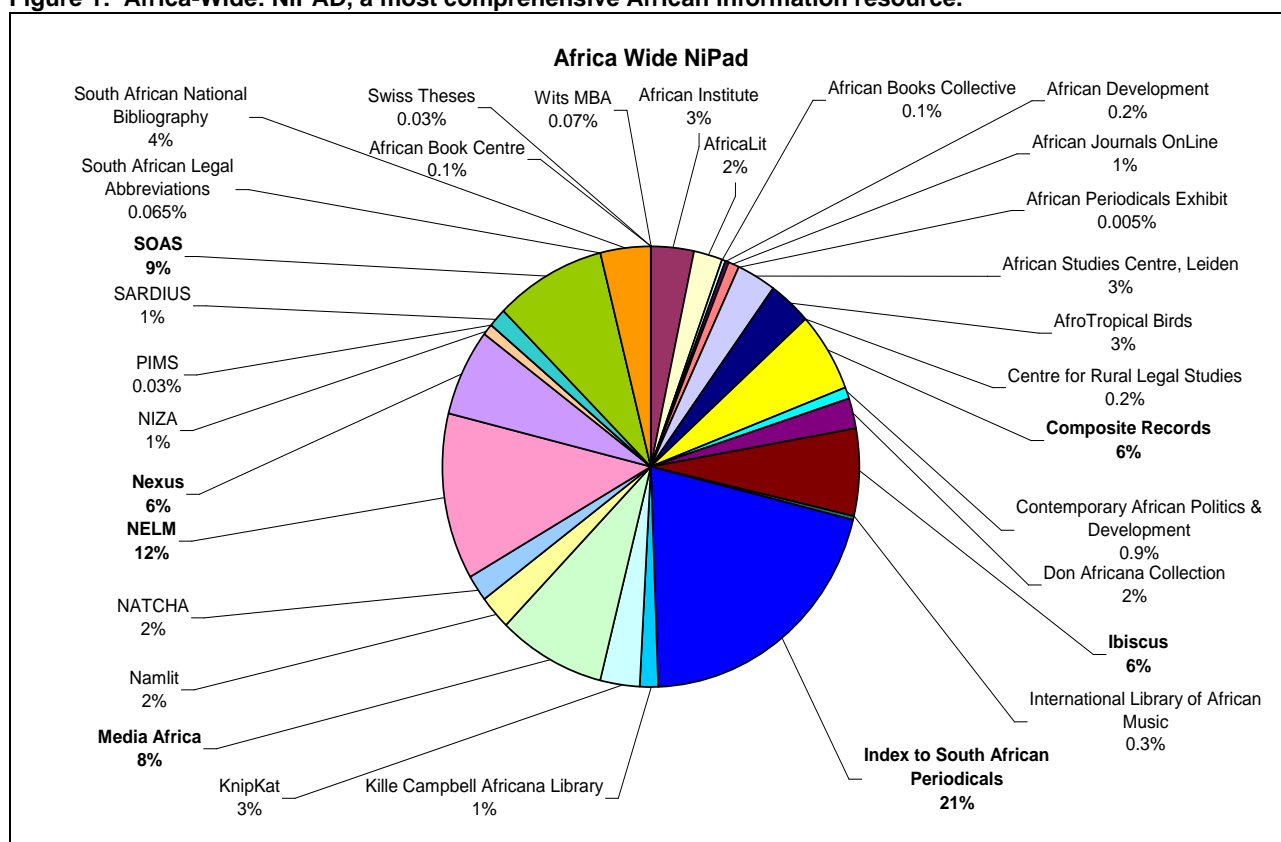
NISC's 'all African' databases collections are *South African Studies (SAS)*, *Africa-Wide NiPAD* (NISC information, Publications & African Databases) (Figure 1) and *African HealthLine (AHL)*, (Figure 2).

Table 2: NISC African Titles: Aggregations of African and Africa-relevant bibliographic databases

Title	Number of records	Number of databases
African HealthLine	876 732	13
South African Studies	1 163 942	17
Africa-Wide: NiPAD	2 138 284	38

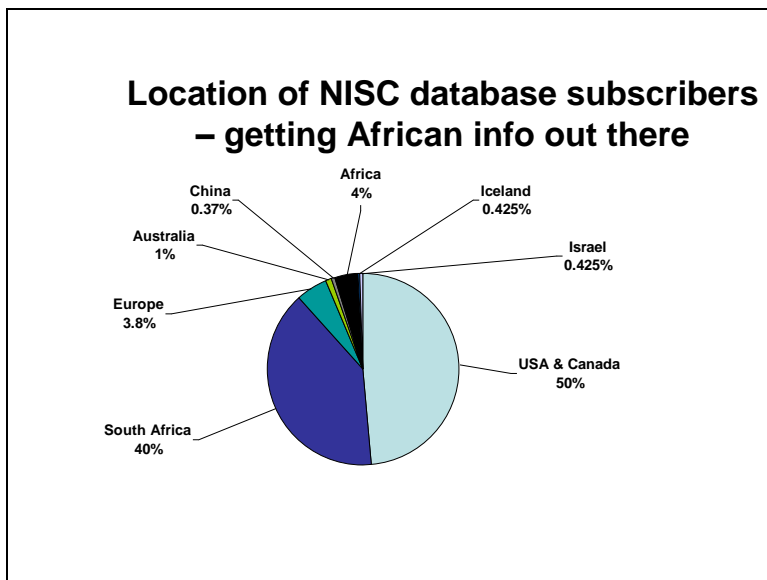
In 2004, NISC released a new and important database aggregation: *Africa-Wide: NiPAD* (Fig 1). *Africa-Wide* was compiled by combining the databases of two existing products *African Studies* with *South African Studies*. New databases were added, and duplicates converted to composite records. The result is a comprehensive African information resource. Details of the databases included in this collection are listed on NISC’s website and the relative proportions of the major databases are shown graphically in Figure 1.

Figure 1: Africa-Wide: NiPAD, a most comprehensive African information resource.



Africa-Wide is a collection of 38 databases and over 2 million records and offers unprecedented access to information on all aspects of African research. Databases include information from books, journal articles, theses, reports, grey literature, pamphlets, conference proceedings and more. Databases are sourced from Africa, Europe and the USA. In this paper, this database collection on Africa-Wide will be used to demonstrate the techniques used by NISC to serve information retrieval and dissemination.

Figure 2: NISC subscriptions: showing subscriptions per geographical area



3.1.3 Search and retrieval software and features

NISC has developed an intelligent, powerful, user friendly search interface and, by using the power of the internet, NISC offers links from citations and abstracts to the full text, at the click of a button. Online searches are made on the NISC BiblioLine service. On BiblioLine, a user can search all databases simultaneously, or choose one, or a selection of databases. This is another example of the power, functionality and flexibility of database aggregation.

With database aggregation, comes variation between databases in spelling conventions and keyword choices. NISC has developed PIC Variant Searching to address this. When doing a search, variants of words are automatically searched including Plurals, International Spelling Variants and the variations in Compound words. Type one and all will be retrieved. This is a valuable feature when, for example, Americans are using databases with English spelling and vice versa. It is also helpful for second language English speakers and novice searchers. As an example; type fibre glass and retrieve glassfiber, fiber-glass, fibre glasses, glass-fibers etc. To help with difficulties experienced with Author names NISC has introduced a 'sounds like' option. This feature can be switched off if not required.

3.1.4 Retrieved Records

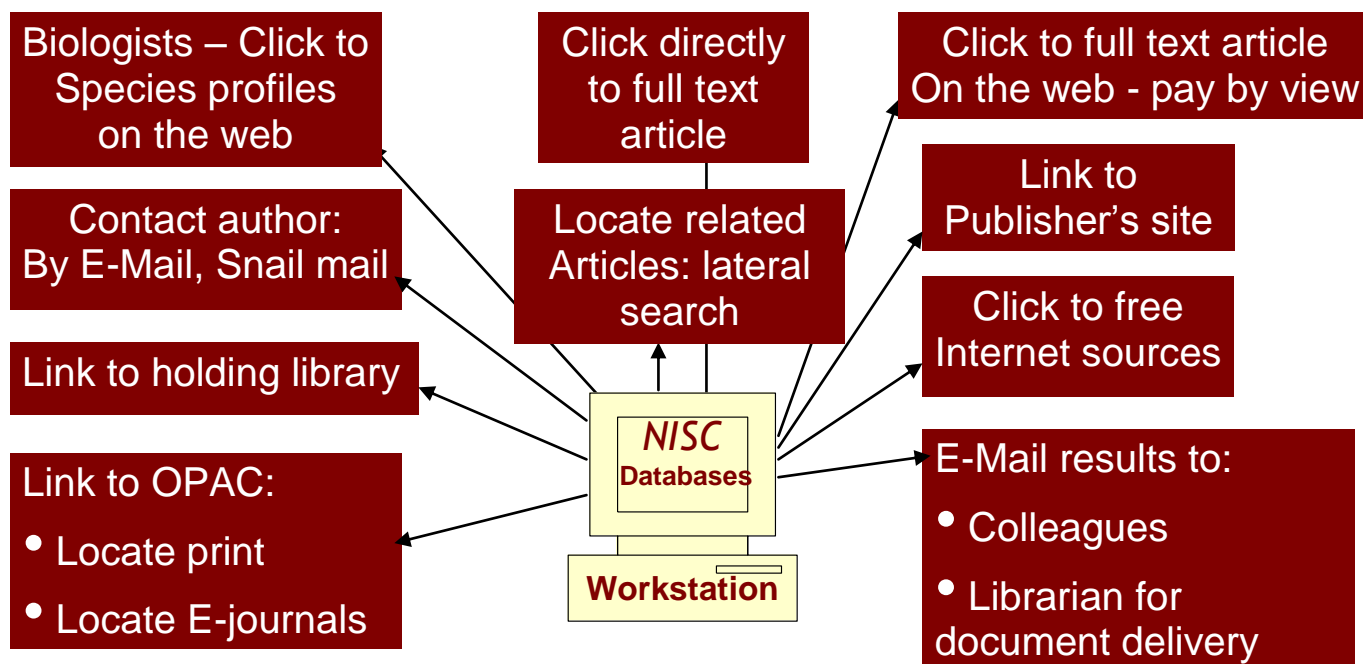
The retrieved records: references or 'hits' are listed in publication date order, but can be sorted almost instantly by such things as author, journal, and language. If related words appear in the references these can be clicked on and the new word can be added to the search strategy and new references can be located by doing a lateral search and new records added to those already retrieved. Reference lists can be produced so easily using marked records from the list. Records can also be ranked by relevance as an option. There is often a feature to view new records since the last update using a saved search strategy. The records can be viewed, displayed, printed or downloaded as a short reference to indicate retrieval success, a basic bibliographic reference or with all keywords and with or without abstracts.

3.1.5 Full text location and Full text linking

Bibliographic databases are a powerful tool for the location of relevant full text articles pertaining to a particular information need. The combination of well indexed databases and a well crafted search strategy will retrieve simply and efficiently the exact references required. The relevant selection is made at the time of the search from what can often be a massive collection of records.

With the proliferation of online publications the value of bibliographic databases remains as a way of locating and accessing exactly the publications required, from whichever online site they are located. There is now the extra functionality of direct linking to the online article from a selection box which gives a choice of options from online vendors or publisher's web sites or freely available publications (See Fig 3). The database record will indicate as far as possible whether articles are only available in print, and locality, or whether they are to be found freely on the internet or in a journal aggregation where subscription payment is required.

Fig 3: Bibliographic Databases embed the links; full text is a click away



3.1.6 Database linking functionality is the key: Locate relevant documents for sound research

There is a tendency to believe that online information is comprehensive and all embracing. Powerful as online information is, it as yet offers part of what is available, and much of the publication record is still only available in print. This is particularly true in Africa and very important for the serious researcher. NISC databases offer many routes to the published record in full text and uniquely combine access to both print and online, wherever it is. Researchers and librarians use a variety of different routes to the ultimate full text, and NISC endeavours to offer access through a variety of access points. NISC is actively promoting ways to retrieve the full-text from the database collections through sophisticated, fast and efficient full-text linking, inclusion of authors' addresses and e-mails, holding libraries and purchase options.

Full-text linking from NISC records on BiblioLine to the full-text article directly can be far more efficient than searching the Internet to find the information online. No journal aggregator has comprehensive journal coverage and there is a need to index the aggregators. Importantly there are links to free full-text and related web pages. Nevertheless much access to the peer reviewed literature, so essential for researchers, depends on journal subscriptions and a journal aggregator and vendor. NISC has linking agreements with commercial vendors such as BioOne, Blackwell Synergy, EBSCOhost Electronic Journals Service, HighWire, IDEAL, Ingenta, JSTOR, Project MUSE, PscARTICLES, Springer-Verlag, SwetsWise and more. These journal aggregators offer fee-based full-text services. NISC also works with Open URL services such as LinkFinder Plus from Endeavor, SFX from ExLibris and 1-CATE of Openly Informatics which access the full-text vendor, library catalogues, OPACs or other interlibrary loan services.

3.2 The AJOL approach – free online hosting of African, peer-reviewed journals

African Journals OnLine (AJOL) is a non-profit organization based in Grahamstown, South Africa. By using the internet as a gateway, AJOL aims to enhance conditions for African learning to be translated into African development. The AJOL Project was initiated in 1998 by the International Network for the Availability of Scientific Publications (INASP) (www.inasp.info), Oxford, UK. In 2004, after a rigorous tender process, NISC SA was selected to assist the further development of AJOL in Africa. In September 2005, AJOL was registered as an independent South African Section 21 company and handed over to African management by INASP.

Individually, African academic journals suffer from a lack of resources, funding and bandwidth, to publish, publicise and distribute online as effectively as their Western counterparts. African Journal publishers and editors can combine together, through participation in the AJOL website, to achieve collectively the online availability, visibility and usability that is unattainable by each individual journal. It is hoped that, indirectly, this service will assist in creating conditions needed for sound research in Africa and strong utilization of it.

AJOL includes only African-published, peer-reviewed scholarly research. It has a regional focus on the African continent and covers the full range of academic disciplines, and as far as AJOL knows, it is the only online journal aggregator of its kind. Others are country-specific, global, or specific to subject themes within Africa and usually charge for hosting.

AJOL is a cost-saving resource for African journals to disseminate online the research output they publish and a user-friendly tool for international researchers to access it. Since its inception, AJOL has grown from 10 science and 4 medical titles to hosting 271 journals from 22 African countries at the time of writing. The website is used each month by an average of 50 000 researchers from all over the world. The subject coverage is multidisciplinary, including agriculture, health and medicine, mathematics, natural sciences, social sciences, psychology and earth sciences; with new titles added monthly. The aim is to eventually include most quality, peer-reviewed scholarly journals published on the African continent, with an emphasis, going forward, on those that publish Open Access.

AJOL provides free hosting (and promotion) of the meta-data and full text (from the second half of 2007) of African-published journals on the internet in order to:

- Increase exposure of African journals and African research – aggregation of journals in one location on the internet increases visibility of all (AJOL is fully “Googleable”)
- Help users access African information for educational, research and cultural purposes – a single online resource with online access to hundreds of African journals
- Promote, establish, protect, preserve and maintain an online digital archive of academic journals published throughout the continent of Africa.

AJOL benefits to Journals:	AJOL benefits to Users:
<ul style="list-style-type: none"> • Consistent exposure leading to greater visibility and awareness of participating journals by continent-wide and global audiences • Quick and easy online location of journals by researchers through internet searches (fully “google-able” meta-data) • Free online hosting of the tables of contents and article abstracts of all issues sent to AJOL – soon to include free full text hosting also • Free generation of a homepage on AJOL for the journal – homepage includes: <ul style="list-style-type: none"> - Summary of the journal’s subject focus and scope - An image of the journal’s cover page - Editorial Team - Journal contact details - Subscription details - Submissions process and Author Guidelines - Publication Frequency - Copyright Notice • Journals may choose to load and manage their own homepage and online content • Potential for increased number of article submissions from authors due to greater visibility of journal through the AJOL website • Potential for increased income for journals via the individual article delivery service AJOL provides to researchers • Potential for increased numbers of subscriptions due to wider visibility • Resources to support Editors or publishers 	<ul style="list-style-type: none"> ▪ A single site to search for African research output. ▪ Free registration as an AJOL user ▪ Free internet access to participating peer-reviewed African journal homepages ▪ Free internet access to participating journals’ tables of contents of each issue ▪ Free internet access to article abstracts from each issue. ▪ On the AJOL website, journals can be listed by subject area, country, or alphabetically, to help researchers find journals of relevance, and allow browsing of the journals. ▪ The website has a sophisticated searching tool, to help users locate articles of interest and relevance to their area of study. ▪ Free e-mail alerts sign-up – to be notified each time an additional issue from a given journal is uploaded on AJOL. ▪ Full text article access (by pdf download or via email) ▪ Quota of free articles available through libraries or research institutions in Less Developed Countries. ▪ Pre-paid document delivery bundles for high volume users from Middle or High Income Countries. ▪ Bilingual web pages (English and French) ▪ Links to online full text where hosted elsewhere

3.2.1 The Components of AJOL

African Journals OnLine (AJOL) is hosted at www.ajol.info. A user can search by journal title, subject or country of origin, and then enter a particular journal's AJOL homepage. There, information is provided about the journal and, in the case of subscription model journals, details of how to subscribe are provided. That journal's issues available online are immediately visible and the user can view the table of contents of each issue and the abstract of each article. Full text is available by download (free in the case of open access journals, and subsidized to Low and Middle Income Countries for subscription-based journals). Users can also enter specific search strings from the AJOL homepage.

AJOL allows for both Open Access and subscription-model journals to be hosted for free on the internet, with varying degrees of free accessibility and the possibility for an additional small income stream for journals lacking institutional or grant funding. Access to abstracts is free on the website and AJOL provides a full text electronic article download service, which is progressively charged on the basis of World Bank country income classification, and the income from which (less AJOL costs) is annually repatriated to the originating journals.

Open Access Journals	Subscription Journals
Full text free by link or PDF download from AJOL	<p>Access to Individual article full text is by paid PDF download from AJOL (pay-per-view or by purchase of a pre-paid bundle)</p> <p>For whole issues or a subscription to a journal, users are encouraged to contact subscription journals directly</p>

3.2.2 The AJOL Platform

AJOL (www.ajol.info) is a web platform that provides international access to African peer-reviewed journals, and it allows both AJOL-loading of new issues as well as the option for African publishers and editors to centrally manage the online publication of their own journals by loading and maintaining their own content on AJOL.

The existing AJOL system is based on quite heavily amended open source software – Open Journal System (OJS) – as developed by Public Knowledge Project. The system consists of a bibliographic database as well as digitized full text, with a user front-end (where users can browse and search the contents of the database online) and an administration front-end (where publishers can log in and manage their journals on the database by performing tasks such as adding new abstracts). It is currently developed using the open source scripting language PHP with the database constructed using MySQL.

Although brilliant in its design, a number of limitations in the initial AJOL version of OJS were identified through participatory evaluations and are being amended through OJS2 and through substantial additional “front end” software development:

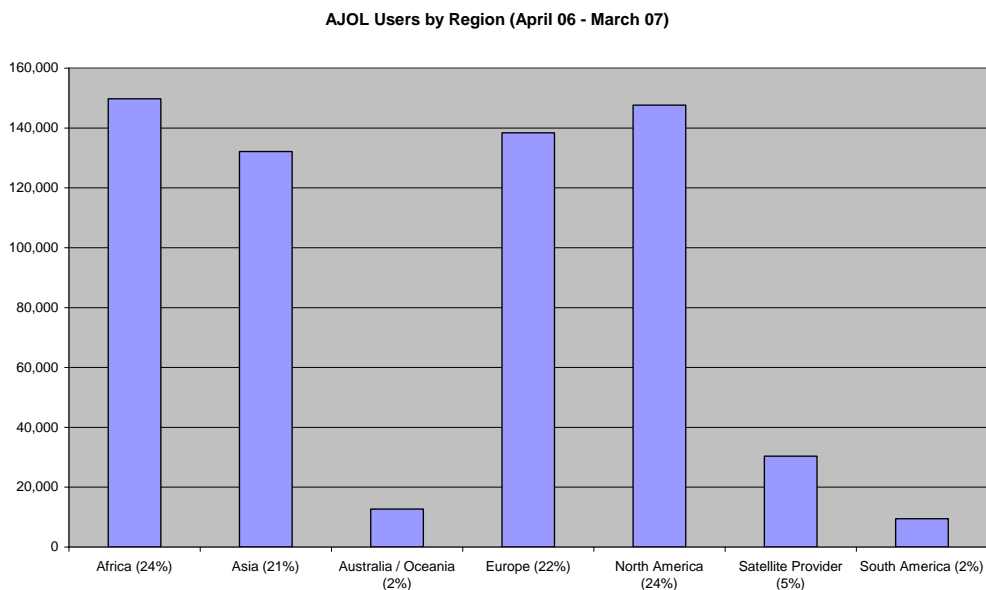
- **Full text loading:** Lack of resources (financial, infrastructure and or bandwidth) limits access to AJOL for many in the African publishing community. They could not previously reliably access the current AJOL online system to manage or load their own journal content effectively. An alternative offline content loading system is being developed to allow the entire African scholarly publishing community to participate in AJOL.
- **Full text download:** Full text download functionality has been developed for AJOL to allow flexible user driven download options and will be live on the AJOL site during 2007.
- **Full text access management:** The tables of content and abstracts of participating journals are wholly open access. This is ideal for the citations and abstracts of the database. However many participants do not have the financial backing to support complete open access to their journals and need the income of subscribed access to remain viable. The AJOL website has been further developed to enable publisher / editor driven journal access management. The system now allows variable degrees of free or subscribed full text access to be assigned on a journal by journal basis by the publisher / editor. In parallel to this, a user registration and recognition system has been developed to manage the varied access levels to journals that different AJOL users may have.
- **General website development needs:** In addition to the specific developments above the whole AJOL system required overall upgrading; to better meet the expectations of its users. In particular it must match the speed, usability and standards of Western full text platforms. The following has been addressed by overseas hosting, mirror sites and software advances:

1. Connectivity
 - a. Operating speed optimisation
 - b. Error and timeout and disrupted connection handling
2. Data integrity and site security

Figure 4: AJOL participant journals are published from the following countries



Figure 5: AJOL Users by region (totalling over 620 000 in a one year period)



3.2.3 Sustainability of the AJOL service for as long as the need for it continues

Recent evaluations of the AJOL service have strongly indicated that the need for it continues. However, to continue providing its services in the current model, AJOL is almost completely reliant on donor partnerships.

AJOL certainly increases the visibility and awareness of African-published journals and is a leading and cost-effective source of African scholarly information. Although making the journals accessible is essential, it is only one aspect of increasing their use. Improving the quality of African journal content and management is critical. Going forward, AJOL intends to focus increasingly on providing tools and resources to journal editors/publishers that can assist in understanding appropriate Open Access publication models, improving the management of their journals' publication process and attainment of internationally acceptable best practice.

4 Conclusion

The publication record for this continent is a precious resource documenting as it does, our cultures, history, and natural and economic resources and we need to conserve this and maintain access to the valuable published record for current development and future generations. Each database, journal or article is unique and valuable in its own way, but it is only by combining a multitude of sources that we can begin to attempt comprehensive coverage of African output. Digital accessibility to African information is attained by available, visible, aggregated and usefully organised information online. Using the different but complimentary approaches outlined above, NISC and AJOL contribute to solving the challenge of making African scholarly research output more accessible.