Session 3: New Initiatives & New Technologies
Moderator: Hannah Russell

**THINKING OUTSIDE THE BOX:
MAKING DIGITAL CONTENT AVAILABLE WHERE THE INTERNET IS NOT**

Steven G. Watkins
California State University, Monterey Bay, Library
100 Campus Center
Seaside, CA 93955 USA
swatkins@csumb.edu

Joan M. Parker
Moss Landing Marine Laboratories/Monterey Bay Aquarium Research Institute Library
8272 Moss Landing Rd.
Moss Landing, CA 95039

Abstract
Despite continuing progress, robust and reliable Internet access is still not available at an affordable cost to many research centers served by IAMSLIC libraries. In contrast, there is increasing availability of mobile devices with wireless capabilities among the researchers and students at many of those locations. IAMSLIC and its partners have made a growing body of full-text content available for open access through the Aquatic Commons and OceanDocs projects. In addition, the Secretariat of the Pacific Community has created its own open access repository, the FAME Digital Library. One approach to making this content more readily available to IAMSLIC institutions whose Internet access is problematic is to download copies of such digital publications onto inexpensive LibraryBox devices, which can make them available any time to anyone nearby who has a wireless device.

Keywords: LibraryBox, wireless access points, institutional repositories, open access, libraries.

Internet Access versus Mobile Cellular Subscriptions in the Pacific Islands Region
As shown in Table 1 below, the percentage of the population with wired broadband connections to the Internet is extremely low in most Pacific Island nations, even in some of the most economically developed countries. However, in many of the same countries the percentage which report using the Internet is substantially higher, likely due to the much higher saturation of mobile cellular subscriptions across most of the region. The International Telecommunication Union (2013) reports similar patterns in other areas of the developing world, particularly across much of the African continent.

Country	Percent using Internet	Mobile cell subscriptions per 100	Fixed (wired) broadband per 100
Nauru	n/a	68.0	0.0
Niue	86.9%	n/a	0.0
Papua New Guinea	6.5%	41.0	0.2
Solomon Islands	8.0%	57.6	0.3
Kirabati	11.5%	16.6	1.1
Fiji	37.1%	101.3	1.2
Indonesia	15.8%	121.5	1.3
Tonga	35.0%	54.6	1.6
Guam	65.4%	n/a	1.8
Micronesia	27.8%	30.3	2.0
Philippines	37.0%	104.5	2.6
Viet Nam	43.9%	130.9	5.6
Tuvalu	37.0%	34.4	7.1
Malaysia	67.0%	144.7	8.2
French Polynesia	56.8%	85.6	16.2
New Caledonia	66.0%	93.8	20.9
Australia	83.0%	106.8	25.0
New Zealand	82.8%	105.8	29.2

Table 1. Internet and cellular access for selected Pacific Island nations in 2013.

Also according to the International Telecommunication Union (2013), "Mobile broadband is much more expensive in developing countries. However, in developing countries, mobile broadband services cost considerably less than fixed-broadband services: 18.8% of monthly GNI p.c. for a 1 GB postpaid computer-based mobile-broadband plan compared to 30.1% of monthly GNI p.c. for a postpaid fixed-broadband plan with 1 GB of data volume."

At the 2014 IAMSLIC Conference in New Caledonia, feedback was solicited from members of the Pacific Islands Regional Group (PIRG) to confirm whether the national data on Internet and cellular access match their experience. The discussion also helped to assess the potential need for standalone wireless devices as a means of access to full-text content in areas with poor Internet access. Attendees at the conference were asked to share their observations and responses to the following questions:

- How reliable and robust is Internet access at your institution?
- How expensive is it?
- What percentage of your library users have mobile devices with Wi-Fi connectivity?
- Do you have remote research facilities with limited or no Internet access?
- Does your institution operate research vessels?

Attendees affirmed that while many central facilities in the island nations have reasonably good Internet connectivity, most other facilities do not, particularly those in more remote locations. Many or most of their researchers and library users do have access to personal wireless devices that would be able to connect to standalone wireless routers. They additionally noted that reliable electrical power is often not available in some of those remote facilities, therefore a preference was expressed for devices that incorporate a rechargeable battery.

Scope of Digital Collections

IAMSLIC undertook the development of a shared institutional repository called Aquatic Commons in 2007 as a means to collect and preserve digital versions of publications from member institutions. The statement of scope for Aquatic Commons is as follows:

> The Aquatic Commons is a thematic digital repository covering the natural marine, estuarine /brackish and fresh water environments. It includes all aspects of the science, technology, management and conservation of these environments, their organisms and resources, and the economic, sociological and legal aspects. It is complementary to OceanDocs, which is supported by the Intergovernmental Oceanographic Commission (IOC)/ International Oceanographic Data and Information Exchange (IODE) specifically to collect, preserve and facilitate access to all research output from members of their Ocean Data and Information Networks (ODINS). It is directed by the International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC) to provide visibility, usage and impact through global access to digital publication from worldwide marine and freshwater organizations that do not have access to an institutional repository of their own.

The Aquatic Commons contained over 12,500 total documents as of July 2014, including:
- 8700 related to fisheries.
- 1000 related to aquaculture.
- 3100 on biology.
- 2300 on ecology.
- 2100 on management.
- 1500 on limnology.

There was discussion at the conference about the Aquatic Commons content and whether it includes the documents that would be most directly useful to those in the region. Comments were generally positive; however, it was clear from two other conference presentations that the FAME Digital Library collection from the Secretariat of the Pacific Community (SPC) contains a much larger number of documents of immediate regional relevance. A request was made to consider the possibility of adding the 9,700 FAME documents to the full-text collection for use in Pacific Island Regional Group (PIRG) libraries and their associated fisheries facilities. A preliminary investigation showed that it would be possible to harvest all of the FAME metadata from their OAI-PMH compatible repository and that it could be merged with the Aquatic Commons metadata fairly easily.

Creating a User Interface

OAI-PMH Validator is a simple, but powerful web-based tool that was used to harvest metadata records from both of the repositories. It enabled the download of metadata from repository "sets" that correspond to broad subject areas or publication series, greatly simplifying the task of creating subject

listings as part of the user interface. It was also possible to harvest a complete set of records from each repository to generate the author indexes and a large, single text file on which search capabilities could be built. The metadata was harvested in Dublin Core format and delivered in XML, which was then parsed through a set of PHP scripts to extract the desired fields to form readable citations and to create links to the accompanying full-text documents. In creating the author indexes, individual author names were extracted and listed as entries, even from documents with multiple authors, to maximize retrieval of documents by a known person.

Metadata records were harvested from the two repositories and merged to create user interface options that replicated the primary options on the Aquatic Commons website:
- Basic search on keywords within citations, including simple Boolean.
- Browse by Author, Subject, or Issuing Agency.

In the project's user interface, one can use the web browser's "search in page" option to locate relevant items in lengthy subject pages such as Fisheries, which includes about 17,000 citations

LibraryBox as the Distribution Platform

The LibraryBox Project was initiated in 2012 and created a distribution platform that inspired the possibility of using it to extend access to the Aquatic Commons content. The lead developer, Jason Griffey (2014), describes the LibraryBox Project as "… an open source, portable digital file distribution tool based on inexpensive hardware. LibraryBox is a digital distribution tool for education, libraries, healthcare, and emergency response. Anywhere there is a lack of open Internet access, LibraryBox can bridge the gap of information delivery."

A LibraryBox consists of:
- A portable wireless router (a battery-powered model is also available).
- A USB flash drive for storage.
- Web server software that delivers files stored on the USB drive.

While pre-configured LibraryBoxes are available for purchase, the platform is open source and a device can be built from scratch with minimal effort and expense. The total cost for a supported Wi-Fi router and 64GB flash drive is approximately $70 USD. The 64GB flash drive is required for this project because the Aquatic Commons document files total 31GB and the FAME Digital Library documents add another 10GB.

Using the digital collections on a LibraryBox is quite simple:
1. Connect to the "*IAMSLIC Aquatic Commons*" wireless network with your mobile device.
2. Open a web browser.
3. If not redirected automatically, refresh the browser or type *librarybox.lan* into the address box.
4. Browse or search for documents and download those of interest.

Users of any LibraryBox remain completely anonymous, but document-level usage statistics are generated and will provide useful feedback regarding the topics and types of publications that receive the most use. The web server software incorporates a responsive design that displays well on laptops, tablets and smartphones. To test the ability of each LibraryBox device to support multiple, simultaneous users, at least 10 people in the room at the conference connected to each device and were able to successfully locate and download documents without any significant reduction of response time.

Project Evaluation

IAMSLIC purchased the hardware for the two LibraryBoxes that were taken to the conference with the agreement that they should be left with the institutions in the region that could best benefit from standalone wireless access in lieu of Internet access to the online repositories. The consensus was that the best way to make them available in the region would be through the network of contacts that the Pacific Islands Marine Resources Information System (PIMRIS) has already established. Therefore, both devices were left with the current PIMRIS coordinator based in Fiji, with the proviso that they be placed in locations that would test their feasibility to replace poor Internet access and that they would report back on their experience after using the devices for some months. USB drives with updated content that includes the FAME Digital Library were shipped to Fiji in order to have a more complete and relevant collection of documents for the pilot implementation phase.

If the pilot proves successful, plans will be made to place LibraryBox devices and the full-text content in additional locations within the Pacific Island region and possibly in IAMSLIC member libraries in Africa. It is anticipated that content from the digital repositories of PIMRIS would also be incorporated onto the LibraryBox devices within the region during this second phase of the project.

References

International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC). *Aquatic Commons*. http://aquaticcommons.org.

International Telecommunication Union. (2013). *Time Series by Country*. http://www.itu.int/en/ITU-D/Statistics.

Griffey, Jason. (2014). *About the LibraryBox Project*. http://librarybox.us/about.php.

file://localhost/OAI-PMH Validator. http/::validator.oaipmh.com.

Secretariat of the Pacific Community. *FAME Digital Library*. http://www.spc.int/DigitalLibrary/FAME.