

World Summit on the Information Society WSIS-2

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features

- Market prices by SMS
- Email, home for everyone on the web
- Solar-powered community radio stations
- Mapping for sustainable agriculture in Sasatgre, India
- Addressing territorial disputes Somaliland
- Monitoring fish stocks in Lake Victoria
- Satellite surveillance of tuna fishing vessels
- Software for natural products chemistry
- Digital audio technology in Papua New Guinea
- Blogging for networking
- Crop protection: a multimedia tool for pest management

regulars

- Editorial: e-agriculture should go beyond the Internet
- Web resources
- Q&A: FAO, WSIS-2 and e-agriculture

<http://ictupdate.cta.int>

E-agriculture should go beyond the Internet

All world summits help shape international agendas, and the second World Summit on the Information Society (WSIS-2), to be held in Tunis on 16-18 November, will be no exception. WSIS-2 will provide an opportunity to focus the policy debate on the 8th Millennium Development Goal, and the target to '...make available the benefits of new technologies, especially information and communications technologies' to help in the fight against poverty. For African, Caribbean and Pacific (ACP) countries sustainable agricultural and rural development is crucial in the efforts to eradicate poverty. Accordingly, the discussions of WSIS-2 should urgently address the potential for ICTs to transform agriculture, as well as to respond to the challenge of bridging the rural digital divide.

CTA has mainstreamed ICTs in all aspects of its programmes – from capacity building support, development of portals, market information systems, and question and answer services, and in its support to agricultural radio and television. Over the past three years, in *ICT Update*, CTA has monitored innovative applications of ICTs in many agricultural and rural development projects in ACP countries, where they are being used for:

- providing security of land tenure to people in rural areas who do not have formal rights to the land;
- mapping natural resources, using participatory approaches, to empower local communities to manage their own resources;
- creating business opportunities by providing agricultural market information for farmers and traders;
- speeding up application procedures in agricultural credit programmes;
- protecting natural resources, such as fish stocks and forest resources from illegal poachers and loggers;
- forecasting weather conditions and pest outbreaks;
- identifying indigenous plants that could have commercial applications;
- making information more easily available; and
- enabling communication and knowledge exchange in online communities.

The ICTs used include mobile phones, handheld computers or digital personal assistants (PDAs), smart cards, CD-ROM, geographic information systems (GIS), Global Positioning System (GPS), digital TV and radio, radio-frequency identification devices, imaging and acoustic technologies, websites and weblogs, and email-based information services. Often used in combination, these ICT applications can be powerful tools for rural development. Moreover, with user-friendly interfaces these complex technologies can be used at the grassroots level, thus putting the technology in the hands of local communities.

CTA fully supports the inclusion of 'e-agriculture' in the WSIS Plan of Action (C7 – ICT Applications: benefits in all aspects of life). However, the e-agriculture agenda refers to a range of agricultural information services via the Internet. CTA feels that the treatment of ICTs should go beyond the Internet. Indeed, *ICT Update* (see below) has reported on numerous ICT applications that are not Internet-based, but which are being successfully pioneered in ACP countries.



Dr Hansjörg Neun, Director CTA

CTA therefore strongly urges that the support for ICTs in the WSIS process is not restricted to Internet applications alone.

To highlight the range and the scope of ICT applications, we have revisited 11 projects featured in past issues of *ICT Update*. *Daniel Annerose* and *Emile Sène* report on how Manobi, an agricultural market information service, distributes market prices by SMS, and has transformed the lives of

many Senegalese farmers. *Tobias Eigen* describes how Kabissa, an email-based information service in East Africa, has adapted its services to meet the changing needs of its members. *Djilali Benamrane* explains how RURANET's independent solar-powered local radio stations in Niger are becoming rural development and information centres.

Sanat K. Chakraborty recounts how participatory 3D mapping using GIS has helped an isolated hill community in India to optimize the use of their common lands, and asks some pertinent questions of the experts who introduced the technology. *John Drysdale* explains how GIS technology is helping former refugees in Somaliland to gain title to their land, and is helping in fighting poverty. *Oliva Mkumbo* then explains how hydroacoustic surveying is being used to assess fish stocks in Lake Victoria. *Andrew Richards* looks at how the people of Tokelau, three tiny atolls in Pacific, are benefiting from a regional satellite surveillance system to protect their marine resources from illegal poachers.

Robert Lancashire tells the success story of the JCAMP-DX Data Viewer, a computer program developed in Jamaica that is now used in natural products research worldwide. *Micael Olsson* and *Douglas Bell* report on an innovative programme that is using digital audio technology to promote forest resource management in Papua New Guinea. *Luigi Guarino* makes the case for weblogs as a means to disseminate news and information about plant genetic resources in the Pacific, and *Amadou Bocar Bal* and *Lucinda Charles* report on CABI's Crop Protection Compendium, which is increasingly being used to identify and manage crop diseases and pests in Africa.

This issue of *ICT Update* concludes with an interview with FAO's *Anton Mangstl*, in which he explains what organizations such as FAO and CTA can do to ensure that e-agriculture features more prominently on the policy agenda for poverty alleviation, and help bridge the rural digital divide.

I hope that these exciting stories from the field demonstrate the real potential of ICT applications in ACP agriculture and rural development, and underscore the need to conceive ICTs in a broader context than purely Internet applications. ■

Dr Hansjörg Neun, Director CTA

Agricultural information services: market prices by SMS

Daniel Annerose and Emile Sène describe how the life of one Senegalese farmer has been transformed by a mobile phone.

'Xam Marsé', or 'Know your market', is the Wolof name for the agricultural market information system (MIS) developed and operated by Manobi, in conjunction with Sonatel, since 2001. With Xam Marsé, Senegalese farmers, traders, hoteliers or housewives can now receive real-time information via SMS messages on their mobile phone, or the web, on the prices and availability of fruit, vegetables, meat and poultry, on any of Senegal's markets.

Seydou Ndoye, a farmer from Keur Abdou Ndoye, a market town in the Niayes region of western Senegal, was one of the first users of Xam Marsé. After using the system for four years, his experience demonstrates that farmers can make use of innovative ICT solutions to secure their own economic and social development. The market at Keur Abdou Ndoye is a centre for the sale and distribution of fruit and vegetables, and is where local farmers and itinerant traders (*banas-banas*) gather to do their deals. 'Before I started using Xam Marsé, I was forced to accept the prices quoted by the *banas-banas*, because I had no information about the real value of my produce', Mr Ndoye says. 'During the first season I used the system', he explains, 'I quadrupled my net income from about 1.5 million to 6 million CFA francs' (1000 CFA francs = €1.5).

How has he been able to do this? 'I just check the market prices of products on my mobile phone, and I set my prices for the *banas-banas* depending on the actual market value, which I now know better or just as well as the people I deal with', replies Mr Ndoye.

Farmers, even those who are illiterate and have never used a phone, can master the technology within a few days. For a small service fee, subscribers to Xam Marsé are making full use of the accurate price information it provides in their negotiations with the *banas-banas*. Previously, they had little alternative but to accept the word of the traders, who usually offered prices distorted in their favour. As Mr Ndoye recalls, 'The first day I used Xam Marsé, I had 200

40-kilo bags of cabbages to sell. Although the *banas-banas* offered to buy them at just 8500 CFA francs a bag, I was able to bargain and eventually sold them for 11,000 CFA francs a bag. On that day alone I was able to increase my income by no less than 500,000 francs. After that other cabbage producers came to me to ask about the information I was getting from Xam Marsé'.

The accurate information provided by Xam Marsé – a service that is not available elsewhere – is now accepted as a point of reference that all parties can trust. As a result, the relations between producers and the *banas-banas* have improved and their exchanges have become more productive.

Market opportunities

Mr Ndoye has since developed new strategies to improve his business, and so increase his income even further. 'Once I had used the system for a few months, I learned how to gear my production to take advantage of new market opportunities. I decided to diversify my output by going into potatoes, fresh peanuts and green beans. I approached the local farmers' cooperative, and asked for a loan of 3 million CFA francs. I was able to pay off that loan the same year thanks to an excellent crop of 40 tonnes of potatoes, which I sold for 200 CFA francs a kilo. In the second year I increased my income to 17.5 million CFA francs', he says. 'I quickly reinvested some of the profit in a mechanized irrigation system,

and bought five electric pumps costing 700,000 CFA francs each. It also enabled me to farm a new plot of land measuring 6 hectares and to start livestock breeding. I now have 15 head of cattle', he adds proudly.

While Mr Ndoye is very happy about the business success he has achieved through Xam Marsé, he is equally proud of the social benefits it has generated for him and his family. He enjoys receiving visitors and showing them his new farm equipment, as well as the solar-powered refrigerator and the television hooked up to a cable network. Mr Ndoye, who cannot read French, but is good at figures, is especially pleased with the fact that for the last two years he has been able to send all his children to school, and that his eldest son is now a student at Dakar University.

Agricultural market information systems such as Xam Marsé are often discussed from a technical or operational point of view. But success stories such as that of Mr Ndoye provide the most simple and best illustrations of how ICTs can bring many economic and social benefits for farmers, and are now contributing to the development of agriculture in Africa. ■

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Innovative mobile phone applications

Kenya: Agricultural Commodity Exchange (KACE) provides crop growers in Kenya with up-to-date commodity information by mobile phone: www.kacekenya.com/marketinfo/sms.asp

Nigeria: eTranzact, an integrated mobile phone and internet payment system: www.etransact.com/Web/home.jsp

Uganda: Village Phone provides cellular phones via a sustainable financing mechanism: www.tech.gfusa.org/newsroom/news/~story=112

Rural connectivity: email, a home for everyone on the web

Tobias Eigen explains how Kabissa has adapted its email services to meet the changing needs of its members.

It used to be that email was considered simply a tool, like a fax machine. Now, with the proliferation of free email services on the web, each offering its own identity and user-friendly features, email has become much more. It is a safe haven, a home, on the web.

As the nature of email has changed, Kabissa, an organization providing technology assistance to people in areas with poor Internet infrastructure in Africa, has changed its focus as well. Five years ago, email was seen not only as a communications tool, but also as a revolutionary means for accessing essential information on the web. Through services such as Kabissa's www4mail server, users could email requests for web pages and receive them as email attachments they could view offline. They were therefore able to limit their time online, thus reducing their costs, while still accessing critical information.

In recent years, however, all this has changed as people worldwide are spending more time online. Even development professionals and activists in rural areas are increasingly relying on webmail, a web interface that allows users to read and write email using a web browser. This development is indicative of a major shift in the way the Internet is used. Not only are people spending more time online, but when they are online, their focus is increasingly on email itself. The staff of the 900 civil society organizations that are members of Kabissa's network are willing to travel many hours on a regular basis to get to a web connection.

When they finally manage to get online, the first thing they do is go straight to their webmail, to check whether a friend or colleague has sent them a message. Only after they have taken care of the most urgent emails do they venture out to explore what more the Internet has to offer them and their organization.

Adapting to change

In response to these changes in Internet use, in 2004 we shut down the Kabissa www4mail server after four years of operation. Email is no longer a tool



for accessing the web – for many, whether in New York or Lagos, the foothills of Mount Kenya or Soweto, it has become an end in itself. Yet for many, particularly in rural areas, the web remains unknown territory – not everyone knows how to search for the information and opportunities it offers. Although rural professionals have the most to gain, since they have few other reliable channels of information to choose from, it is a challenge for them to learn how to use the web for anything but casual browsing.

Kabissa has therefore developed an approach that capitalizes on the popularity of email, while also seeking to deepen and professionalize our members' use of the Internet. Because our members have become so comfortable with email, we encourage them to join online communities with electronic newsletters to get timely information by email, and we provide personalized technical support via email for our website hosting services.

At the core, however, is our training programme, which combines self-learning materials with hands-on workshops to promote the idea that organizations must gradually build their Internet skills and use those Internet tools most appropriate for their own priorities, communities and environment.

Even in the most remote areas, people are feeling more at home with email. Organizations like Kabissa have

an obligation to respond to this new way of using the Internet. Recognizing the priority our members and others have placed on email, we owe them opportunities to become more efficient in its use, to learn to exploit its full potential, and then to venture outside into the wide world of the web, armed with tools and skills appropriate to their communities and their needs. ■

Tobias Eigen is founder and co-executive director of Kabissa. For more information, visit www.kabissa.org or write to info@kabissa.org. This project first featured in *ICT Update 10*, March 2003.

Email information services

Online communities and e-newsletters

Kabissa: Besides training and website hosting, Kabissa's member organizations can exchange information and learn about ICT news and opportunities around the continent via the monthly *Gong Gong Newsletter* – visit www.kabissa.org/newsletter.

Pambazuka News is a popular e-newsletter that offers a weekly round-up of news on human rights, social justice, conflicts, health, the environment, development, the Internet, literature and the arts in Africa. Sign up at www.pambazuka.org, or send an email to editor@pambazuka.org

Loband offers those who continue to struggle with slow or unreliable Internet connections with an online tool that simplifies web pages for faster downloading. Visit www.loband.org for more information.

Web access via email. www4mail and Getweb allow users with limited Internet access or email-only connections to retrieve specific web pages by email. For more information, send a message to getweb@usa.healthnet.org or www4mail@wm.ictp.trieste.it with the word 'help' in the body of the message.

Javelin™ combines wide-reach wireless narrowband radio technology with software that makes websites and emails available to schools in Ghana through local mirroring/caching: www.arrownetworks.net/javelin.html

Information services: solar-powered community radio stations

Djilali Benamrane looks at how RURANET's independent, locally managed radio stations are becoming rural development and information centres in Niger.

In Niger, a network of solar-powered radio stations is providing farmers in remote, isolated villages with information on weather conditions, farming techniques and market trends in the local languages. The programmes are produced locally and exchanged at the national level by the Rural Radio Network, or RURANET.

The first RURANET locally managed, solar-powered broadcasting station was established in the famine-hit village of Bankilaré in 1999. The audacity of such an initiative at the time of a major food emergency astonished the government, donors and media gurus alike. Coordinated by the Local Radio Steering Committee (CPRP), with core funding from UNDP, more than 80 radio stations are currently operating in exactly the same way in the poorest and most disadvantaged villages of Niger. By 2007, the number of stations is expected to have doubled.

Each radio station is responsible for programme content, the broadcasting schedule and the local languages used, which depend on the preferences of the communities covered by the broadcasts. The range of broadcasts is limited to about 20 km in order to reflect actual local concerns and to help the community retain control over elected broadcasters.

All of the work involved in the construction of a station is done by local people, mostly on a voluntary basis, and as far as possible using locally available materials. The radio equipment consists of a Wantok portable FM broadcast unit, an antenna and a set of solar panels. Other equipment includes a PC and a satellite radio receiver with a modem for downloading multimedia content. Community listening groups within 20 km of each station have been supplied with wind-up or solar-powered FM radio receivers.

More than just radio

The radio stations are also broadening their scope, and are gradually becoming rural development and information centres (DICs). The DICs promote activities that complement the broadcasts and meet the needs

voiced by rural communities, such as for communal showings of television broadcasts and videos, access to documentation and rural telephony, and even solar ovens for drying fruits and vegetables. All RURANET radio stations are equipped with a set of basic meteorological instruments, and thus serve as local weather stations. In the longer term, however, once the DICs have a better understanding of the needs of the communities they serve, they will be able to equip themselves with the appropriate ICTs to respond to them.

The DICs could also become important independent centres for the prevention of humanitarian crises. In the summer of 2005, Niger experienced a severe famine that affected thousands of people in rural areas. However, due to their lack of experience, the DICs did not play a role in raising awareness about the imminence of the famine nationally or internationally.

RURANET could grow to be an indispensable partner both in consumer activities and in providing information and communication services, whether by receiving broadcasts and interpreting or popularizing them in the local languages, or retransmitting information at local, national or global levels. This growth is unlikely to be easy, however, given that the funding agencies involved and national authorities have different views about the future of this initiative.

WSIS: taking stock

RURANET is considered a 'success story' in the world of ICTs for development. Yet the international community and the WSIS process have failed to take into account the concerns and expectations of rural people regarding ICTs. This has been coupled with a tendency to recognize only those initiatives that conform to the trend towards liberalization and privatization. Unlike many projects, RURANET is locally managed and responds to local needs with local content. One of its major achievements is to have secured considerable autonomy from national and local authorities, donors, and those in search of easy profits. Maybe because of this RURANET will probably not be



mentioned at WSIS.

Nevertheless, the work it has already done, and its contribution to rural development – through training and public education campaigns about HIV/AIDS, in strengthening the culture of peace and local democracy, in recovering illicit weapons and managing conflict, in civic education or in promoting the gender dimension in sustainable human development – are successes for which RURANET can take full credit. ■

Djilali Benamrane (dbenamrane@yahoo.com), former chief economist of UNDP in Niger, is now at Public Goods on a Global Scale (BPEM), Paris. For more information, visit <http://membres.lycos.fr/nigeradio>.

This project first featured in *ICT Update* 25, May 2005.

Satellite radio communication

FOCUS Project – Satellite radio project to support basic education in formal and informal schools in the Somali region of Ethiopia: www.firstvoiceint.org/How/FOCUS.htm

Kenya: EduVision E-Learning System (EELS) delivers educational materials to rural schools in Kenya via a satellite radio network: www.eduvision.or.ke/technology/tech1.html

East Africa: Regional Agricultural Trade Intelligence Network (RATIN): www.ratin.net

P3DM: mapping for sustainable agriculture in Sasatgre, India

Sanat K. Chakraborty explains how participatory 3D modelling has helped an isolated hill community to optimize the use of their land.

'You can see our entire village right in front you', the head of the village told the group sitting around the 3D model. 'You can also see where we are going to *jhum* this year. It is very clear', he added proudly.

Participatory 3D modelling (P3DM) was introduced to Sasatgre, a village in the West Garo Hills in North Eastern India, as part of the IFAD-supported North Eastern Region Community Resource Management (NERCRM) project in May 2003. P3DM integrates all aspects of the mapping process – participatory resource mapping, data collection and model building – as well as applications of the model for decision making, and for monitoring and evaluating changes in land use. The changes are recorded (using colour coding) on the 3D model and are digitized to produce a new map, which is then returned to the community for analysis and further decisions.

P3DM is a continuous process that requires gradual the scaling up of activities, follow-up and training. In Sasatgre, it is mostly used for allocating farm plots. The villagers practise *jhum*, the traditional slash-and-burn subsistence farming. Every November, the village head gathers together all 51 families and allocates to each of them a fallow forest plot. They then clear the plot and slash and burn the existing vegetation to provide a bed of nourishing ashes for their crops.

Allocating *jhum* plots

With the 3D model – a simple visual representation of the village and its surroundings – the process of selecting and allocating *jhum* plots for the next season has become much easier and clearer for everyone. At the November 2003 meeting, the community was to allocate plots on an area that had been lying fallow since 1996. First, a plastic sheet was laid on the top of the 3D model, onto which they traced the boundary of the 1996 *jhum* site, which covered an area of about 141 hectares. They realized that for 2004 they would need only 41 ha, so they could leave the remaining 100 ha (almost two-thirds) lying fallow for at least another year.

Rather than allowing families to clear a plot anywhere on the site, as before, the villagers decided to organize the allocation of the 51 *jhum* plots more systematically. By regulating access to the fallow land, they decided, they would be able to protect their water catchment areas, and create a community forest reserve. Sasatgre followed the same process in November 2004.

With the assistance of the NERCRM, villagers have also used the 3D model to monitor government infrastructure building schemes. For example, when the Public Health Engineering Department announced a plan to build a water supply scheme that would run through the village, community leaders asked officials to indicate the route of the pipeline on the model so that they could assess how the project would affect them. The officials visited Sasatgre and used the model to discuss the plan.



Land use in Sasatgre was first digitized in May 2003. Since then, the villagers have recorded changes in land use in the last two cropping seasons by marking them on the model using coloured paints. However, these changes still need to be digitized to produce a map for long-term impact analysis. Digitization is very important for the process, as it helps the community to optimize the use of their *jhum* plots, thus allowing the land to lie fallow for as long as possible. Unfortunately, since the initial NERCRM intervention in May 2003, there has been no proper facilitation or follow-up by either the project sponsors or trainers, presenting a major problem for the community.

Critical issues

The people of Sasatgre are still enthusiastic about the 3D model as a visual tool, and appreciate its benefits. Yet the experience has raised a number of critical issues. In particular, they cannot use P3DM to its full potential unless they have adequate expert support. How should they scale up the process? Who should drive the process, and whose purposes should it serve? Although many villagers are illiterate, they possess a wealth of information about their land and its resources. How can they best use this knowledge, with the aid of technology, for the benefit of the community? All changes in land use have to be digitized and stored for monitoring and impact analysis, but how can the community monitor these changes effectively without the right tools and training?

Under the NERCRM initiative, several 3D models have been constructed in the region, primarily to promote the tool and raise awareness of its potential. With appropriate support, a comprehensive *jhum* site and fallow land management system could be developed for upland areas throughout the region, where the communities themselves will be able to design and direct the process. The people of Sasatgre have learned that introducing technology is not enough. ■

Sanat K. Chakraborty (gosanat@dte.vsnl.net.in) is a journalist. For more information, visit www.necorps.org. See also www.iapad.org/publications/ppgis/grassroots_options.pdf. This project first featured in *ICT Update* 27, September 2005.

Applications of P3DM

IAPAD's website provides an illustrated step-by-step description of a P3DM process as well as a list of resources, links and case studies: www.iapad.org/participatory_p3dm.htm

Manual on Participatory 3-D Modelling for Natural Resource Management is a tool for practitioners who wish to facilitate a community-based 3D modelling process: www.iapad.org/publications/ppgis/p3dm_nipap.pdf

Land tenure: addressing territorial disputes Somaliland

John Drysdale explains how GIS technology is helping former refugees in Somaliland to gain title to their land.

Many farmers in Somaliland are former refugees who abandoned their farms and fled to Ethiopia during the civil wars in Somalia in the late 1980s and early 1990s. On their return, the farmers had no formal proof of ownership, and the unclear boundaries between farms led to fierce and often prolonged conflicts. With no police presence in the rural areas, many farmers defended their territorial rights with AK47s, to the death if necessary.

For the past seven years, the Somaliland Ministry of Agriculture has supervised the demarcation, surveying and mapping of farms and adjudicating farmers' freehold ownership rights. Supported by the UNDP and the UN High Commissioner for Refugees, the programme relies on GIS technology, the Natural Area Coding (NAC) system and teams of young newly trained Somalis.

The programme has helped to resolve many disputes and has contributed to the general development of the areas that have been surveyed. Farmers who have secure title to their land can use it as collateral for loans to invest in production, but such ownership rights can only be granted after the land has been officially surveyed and mapped.

Creative cadastral surveying

The programme is being implemented by Cadastral Surveys, a UK-based NGO, in collaboration with a Canadian company, NAC Geographic Products Inc. (NACGEO). The aim is to demarcate, survey and map farms of about 5 hectares each in the Gabiley and Dilla districts of western Somaliland.

Surveying and mapping the many small farms in these districts may look like a formidable and expensive exercise, but it is not. With the help of the Ministry of Agriculture and the staff of UN agencies, Cadastral Surveys brought together and trained a group of young unemployed Somalis. During a four-month training course, they were taught the basics of surveying and demarcating land and to use surveying equipment to calculate areas and boundaries. They also learned how to create thematic wall maps and compile comprehensive databases, as well as to produce



laminated farm registration certificates to be issued to farmers. To keep overheads to a minimum, a retired surveyor and a computer expert provided training in how to create maps using ArcView, a geographic information system (GIS) software package.

The NAC system

The measurements recorded by three field teams are sent to the Cadastral Surveys head office in Gabiley. There, the raw data are examined to correct any obvious errors and are entered into ArcView to create a preliminary schematic map showing the location and boundaries of each plot. This basic map, or 'ground layer', is emailed to NACGEO, where cartographers superimpose onto it a rectangular grid of NAC coordinates, which are more compact than those used by the GIS. Any point on the map can now be identified with an NAC, giving every farm plot a unique 'address'.

The new two-layer map is returned to Cadastral Surveys, where it is fed into the GIS database. Further layers can be added to indicate other relevant details, such as the location of wells and rain gauges. The finished product is a wall map showing the surveyed property boundaries and their coordinates, which is displayed in all government and UN offices.

The survey teams then return to the field and paint the NACs onto concrete 'boundary blocks' that have been embedded in the ground on each farm. The NACs are stored in a 'master' database maintained by Cadastral Surveys, and at the Ministry of Agriculture. The Ministry is now using the database to issue land registration certificates and freehold title deeds.

A positive impact

So far, Cadastral Surveys has demarcated and mapped more than 6500 farms occupied by 39,000 former refugees in Gabiley and Dilla districts. Currently, the three field survey teams and one in-house team are surveying and mapping nine farms per day. By the end of 2005, Cadastral Surveys expects to double its output. The evident success of the programme has aroused considerable interest. In 2004, for example, Cadastral Surveys was invited to explain the process at a round table organized by the UN Economic and Social Council. Furthermore, a generous donation from a UK company to the University of Hargeisa has been used to purchase equipment for the new Institute of Land, Soil and Water Surveying. In October 2005, 52 students completed the Institute's first 12-month diploma course.

The process of surveying, mapping and adjudicating freehold ownership of farmland has helped to bring to an end the bloody territorial disputes, and to rebuild communities. The farmers now have a valuable legal asset that they can use as collateral for loans and can pass on to their children. ■

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This project first featured in *ICT Update 17*, May 2004.

GIS applications for land tenure

GeoNetwork is an FAO portal to spatial data and information on agriculture, forestry and fisheries: www.fao.org/geonetwork/srv/en/main.search

ESRI is a leading developer of GIS technology and offers a wide variety of resources for practitioners engaged in land-related issues: www.esri.com

Digital Grove is a non-commercial website that offers practical information about digital cartography, GPS and GIS tools and equipment: www.digitalgrove.net

Fisheries: monitoring fish stocks in Lake Victoria

Oliva Mkumbo reports on how hydroacoustic surveying is contributing to the sustainable management of Lake Victoria's fisheries.

The fish of Lake Victoria, East Africa, are a vital resource for local communities and commercial enterprises. The lake's fish stocks have been overexploited for decades, however, and are now declining, with devastating socio-economic as well as environmental implications for the entire region.

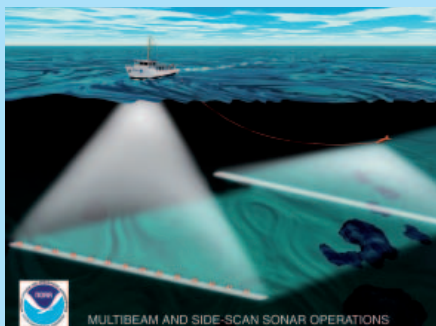
The resources of Lake Victoria, the world's second largest freshwater lake, are shared by three countries – Kenya, Tanzania and Uganda. The commercial fisheries of the lake depend on three species, Nile perch, Nile tilapia and a sardine-like fish locally known as *dagaa*. For all of these species, overfishing has resulted in a significant decline in the number of mature fish, an increase in the number of juvenile fish in catches, and a reduction in the size at first maturity.

In a concerted effort to reverse these trends, and to develop a framework for the management of the lake's fisheries, in 1997 the three partner states requested European Union assistance to implement the Lake Victoria Fisheries Research Project (LVFRP), under the Lake Victoria Fisheries Organization. Between 1999 and 2002, the project conducted a series of six hydroacoustic surveys to assess the lake's fish stocks. Based on the findings it was accepted that the present capture rates were unsustainable, and that a more effective fisheries management plan was essential.

Assessing fish stocks

Hydroacoustic surveys are used to assess fish stocks by generating information about the biomass, composition and distribution of the lake's fish populations. Equipped with a Simrad EY500 echo sounder, a device that uses sound waves to detect objects in a body of water, the research vessel *RV Victoria Explorer* carried out the six surveys at six-month intervals in order to study seasonal differences. At the heart of the echo sounder there is a transducer, an appliance that converts electrical energy from a transmitter into high-frequency sound waves, or sonar signals. These signals travel through the water and form an 'acoustic beam'. When the beam hits a fish, it bounces back an echo, which is captured by the

transducer. The transducer converts the echo back into electrical energy and relays the signal to a laptop computer. Coupled with data from the vessel's global positioning system (GPS) unit, the computer converts the incoming echoes into a high-resolution echogram showing the exact location and number of the targeted fish. What's more, the echo returned by each fish species has a unique amplitude that is identified by the transducer. By separating the echoes, the researchers can then calculate the biomass of each fish species.



During the survey process the project team had to deal with a number of constraints and challenges. These included some imprecision in biomass estimates, and the poor coverage of shallow areas, which resulted in underestimates of the numbers of tilapia, which inhabit shallow inshore waters. Also, the researchers found it difficult to separate the echoes from different species as the transducer was single frequency.

The results obtained over the period 1999 to 2002 indicated a declining biomass index, with the total for all species declining from 2.1 to 1.5 million tonnes. Most of the reduction was due to the decline in Nile perch stocks, which fell from 1.9 (August 1999) to 1.3 (August 2000) and to 0.8 million tonnes in February 2001, but then increased to 1.2 million tonnes in August 2001.

Fisheries management plan

The LVFRP is currently implementing a 5-year Fisheries Management Plan (IFMP) until 2008 with EU assistance. The first hydroacoustic survey under this project was conducted in August/September 2005. In October 2005, the

LVFO hydroacoustic Regional Working Group analyzed the collected data using Echoview, a software package for processing and displaying fisheries acoustics data, and for calculating fish densities according to species.

So far, the survey team has relied on a single-frequency echo sounder, which provides reliable information on the location and size of fish species with very different characteristics. However, when there is a mix of species of about the same size, as in Lake Victoria, it is difficult to separate the target species from the rest. Dual-frequency echosounding equipment is therefore needed to enable the researchers to distinguish between species.

Implementing harmonized management measures by the three States will ensure sustainability of the fisheries. With accurate data on the number of fish in the lake, the authorities can, for example, impose reasonable fishing quotas. For the Lake Victoria Fisheries Organization, however, financial sustainability is a concern, since the hydroacoustic surveys are very costly. At the same time, they continue to be essential for the sustainable management of Lake Victoria and the resources upon which so many communities and commercial enterprises depend. ■

Dr Oliva Mkumbo (ocmukumbo@lvfo.org) is senior scientist at the Lake Victoria Fisheries Organization. For more information, visit www.inweh.unu.edu/lvfo/default.htm. This project first featured in *ICT Update* 16, March 2004.

Sonar technology for sustainable fisheries

Mapping Reef Fish Habitats in Puerto Rico and US Virgin Islands with High Frequency Side Scan Sonar (HFSSS):
<http://biogeo.nos.noaa.gov/products/benthic/htm/overview.htm>

The Oceanic Fisheries and Climate Change Project investigates the potential impact of climate change on fisheries in the Pacific region:
www.spc.int/OceanFish/Html/Globec/Studies.asp

Fisheries: satellite surveillance of tuna fishing vessels

Andrew Richards looks at how the people of Tokelau are benefiting from a wider regional effort to protect their marine resources.



Tokelau, a group of three coral atolls halfway between New Zealand and Hawaii, has a total land area of just 12 km², but its exclusive economic zone (EEZ) extends over 290,000 km² of ocean. Tokelau's population of about 1500 relies heavily on marine resources, particularly its tuna stocks, for food and as well as income from the sale of fishing licences. As the newest member of the Pacific Islands Forum Fisheries Agency (FFA), Tokelau is now able to take advantage of the Agency's vessel monitoring system (FFA VMS), which uses satellite surveillance to prevent illegal harvesting of tuna by foreign poachers.

According to Feleti Tulafono, Tokelau's VMS officer, 'the system is very useful for monitoring the movements of fishing vessels within our EEZ, and is a vital component in ensuring that our waters are free of poachers'.

How the VMS works

The FFA VMS uses satellite technology to pinpoint the position, speed and course of a vessel, and then relays the information to an FFA monitoring station. At the core of the system is an automatic location communicator (ALC), a sophisticated transponder that every vessel with a licence to fish in the EEZ of an FFA member is required to have on board.

The device, about the size of a car radio, consists of an integrated GPS unit and an Inmarsat transceiver. The vessel's position information is beamed up from an inbuilt aerial to an Inmarsat satellite in geostationary orbit above the Pacific. The satellite transmits the data to a Land Earth Station in Australia, from where it is carried by telephone line to the VMS hub computer at the FFA Secretariat in Honiara, Solomon Islands, for further

processing. The computer identifies any vessels violating fishing regulations, and generates alert reports. The reports are sent via an encrypted Internet connection to the FFA member in whose EEZ the vessel is operating. In the 12-month period to 31 August 2005, FFA members were able to use the system to track the activities of 1150 foreign fishing vessels.

Surveillance strategy

Tokelau has based its fisheries surveillance strategy around the FFA VMS. Government authorities regularly receive reports from villagers in outer atolls of lights appearing beyond their reefs at night, indicating the presence of unlicensed foreign fishing vessels. By morning, these vessels have usually disappeared over the horizon, along with their illegal catches of tuna, shark fins and by-catch. Although Tokelau has no wharf facilities to support its own patrol boat, and no airstrip from which to launch surveillance aircraft, it can now call on the other FFA members for assistance in following up on sightings of illegal fishing vessels.

The operating costs of the FFA VMS are fully recovered from the annual fee of USD1236 paid by foreign fishing vessels that operate in the waters of FFA members and are monitored by the system. Thus, the Tokelau government can enjoy the benefits of being part of the system at almost no cost. These benefits include in-country hardware and software, the FFA VMS hub computer overheads, communication costs, and even half of Feleti Tulafono's salary.

Future developments

The remoteness of many FFA members means that communications are a constant challenge, particularly in effectively transmitting vessel position data from the VMS hub to members. The relatively slow penetration of fibre-optic cable and Internet services into the western and central Pacific region remains an obstacle to the enhancement of the system. However, work is underway to improve the VMS, and in 2006 the FFA hopes to take advantage of new technologies that were not available

when it was introduced in the late 1990s. These include wireless technology, which will be used to broaden the user base in FFA member states where the technology is available, and the use of ADSL data transfer could also be investigated.

Using a combination of existing high-speed data services and wireless technology would mean that each member would have relatively easy access to technical support for these services through local telecommunication companies. It would also mean that the FFA VMS equipment would be endorsed by local telecommunication regulatory authorities and not subject to licensing costs associated with satellite-based data communications. The FFA also wishes to improve the quality of VMS training, and intends to develop e-learning resources to be distributed on CD/DVD rather than via the Internet.

The FFA VMS has proven to be a cost-effective means of providing support to the region's compliance and monitoring programme. It has also helped to foster regional solidarity, and has improved both communications and emergency response times in order to protect the marine resources of the western and central Pacific. ■

Andrew Richards (andrew.richards@ffa.int) is FFA's Monitoring, Control & Surveillance manager. For more information, visit www.ffa.int/node/46.

This project first featured in *ICT Update* 16, March 2004.

Other surveillance applications

Monitoring Land Use and Land Cover Changes in the Sahel is a programme developing a framework for monitoring, mapping and quantifying changes in natural resources: <http://edcintl.cr.usgs.gov/sahelinfosheet.html>

Global Monitoring for Food Security (GMFS) is a project of the European Space Agency to provide decision-makers in Africa with accurate and timely information on crop yields, using radar and optical satellite imagery (SPOT-veg): www.esa.int/esaCP/index.html and www.gmfs.info

Traditional plants: software for natural products chemistry

Robert Lancashire tells the success story of the JCAMP-DX Data Viewer, a computer program developed in Jamaica being used by organic chemists worldwide.

Caribbean islands are endowed with a rich diversity of fruits, vegetables, spices and herbs. It is therefore hardly surprising that many of the region's chemists are involved in natural products research to identify compounds in indigenous plants that could have commercial applications.

At the Chemistry Department of the University of the West Indies at Mona (UWI Mona), Jamaica, natural products chemistry has deep roots. The Department's first Chair, Cedric Hassall, devoted much of his career to exploring the chemical composition of Jamaican fruits and vegetables. For example, he traced the cause of a severe vomiting disease to the consumption of a toxin in unripe ackee (*Blighia sapida*), the island's national fruit.

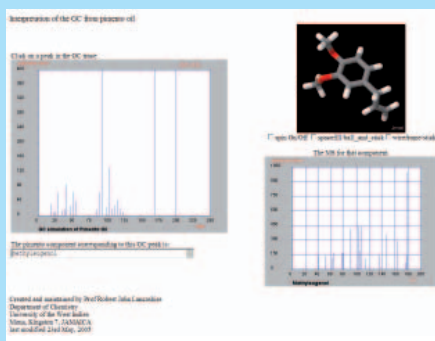
More recently, the Department's chemists isolated the active compound from a plant known locally as spirit weed (*Eryngium foetidum*), which is traditionally used as a remedy against intestinal worms in humans and cattle.

The JCAMP-DX Data Viewer

Arguably a less spectacular but nonetheless important contribution to the advancement of applied organic chemistry at UWI Mona is the JCAMP-DX Data Viewer. With this program chemists can display data generated by spectrometers, instruments that are used to isolate and identify active compounds in a sample.

Natural products chemists engaged in pharmaceutical or agrochemical research employ a variety of spectroscopic techniques to identify organic compounds. These techniques are designed to measure the response of a sample molecule to radiation, whether in the form of a light wave, an electron beam or a radio wave. A spectrometer yields a unique response chart or spectrum of the sample that can be compared to a library of spectra of known materials or analyzed to determine its chemical composition.

Using the JCAMP-DX Data Viewer, chemists can instantly reproduce a spectrum from a dataset stored on a computer. They can also compare and analyze spectra, and use them to illustrate presentations or scientific



publications.

The original Data Viewer was conceived at UWI Mona in 1988, in the aftermath of hurricane Gilbert. The hurricane destroyed the Department's old infrared spectrometer, and the replacement unfortunately did not have any provision for data storage. To address this problem, I wrote two programs: one to capture and transfer data from the spectrometer to an external hard disk, and another to display the data files stored on the disk. I chose to write the Data Viewer for JCAMP-DX files, a non-proprietary format for exchanging spectroscopic data that is widely accepted by all users and instrument manufacturers.

Chime

Some years after the program's first release, Chris Muir, Han Reichgelt and I rewrote the Data Viewer as a 'plug-in' for web browsers, enabling users to display spectra posted on websites. In 1996, we licensed the program's code to MDL Information Systems Inc., a chemistry software developer, which is now a subsidiary of Reed Elsevier, a leading scientific publisher.

The company incorporated the code in MDL Chime, a program designed to display 2D and 3D graphics of molecules directly within a web page. The molecules are 'live', meaning they are not just static pictures, but chemical structures that scientists can rotate, reformat, and save in various file formats for use in modelling or database applications. The merger of the spectroscopic data viewer with the molecular graphics viewer means that chemists can now combine displays and

observe interactions between them.

First released in 1996, Chime has always been free for academic use. This certainly contributed to its appeal: over 2 million copies have been downloaded from the MDL site to date. Another factor contributing to the popularity of Chime is that, for years, it was one of the few viewers that could display JCAMP-DX files.

JSpecView

Our contract with MDL will expire at the end of 2005. A new, Java-based JCAMP-DX viewer called JSpecView is currently being developed and should be released soon. It has additional features not available in MDL Chime, including the ability to display multiple files simultaneously and to overlay spectra.

With JSpecView, I expect that chemical research in general and natural products research in particular can continue to be served and that the characterization of active compounds from plants that can be used as natural remedies for diseases in humans and cattle will be expanded. I hope that the patents on these compounds will generate additional funding for future explorations of the chemical composition of Caribbean fruits and vegetables. ■

Robert Lancashire (robert.lancashire@uwimona.edu.jm) is Professor of Computational Chemistry at the Department of Chemistry of UWI Mona, Jamaica. For more information, visit <http://wwwchem.uwimona.edu.jm/>. This project first featured in *ICT Update* 26, July 2005.

Software development in ACP countries

Ubuntu Linux is a free, open source operating system for PCs developed in South Africa: www.ubuntu.com

Sudan AgroMeteorological Information System (SAMIS) is a computer program designed to produce agro-meteorological information from weather stations and satellite data for the management of agricultural, hydrological and environmental resources: www.mundo.u-net.com/samis

Extension: digital audio technology in Papua New Guinea

Micael Olsson and Douglas Bell describe how digital audio technology is helping to promote traditional culture as the basis for forest resource management.

In the Managalas plateau, in Papua New Guinea, the Rainforest Literacy Project (RLP) is using a combination of broadcast radio and digital audio technology to reach families and village groups using formats that entertain as they inform and educate on forest resource management issues.

Indigenous groups like the Managalas still rely on the forest and its products for food, medicines and building materials. Even though the Managalas own their land, the growing population and expanding cash economy are gradually absorbing land traditionally reserved for forests and their by-products. The RLP seeks to raise awareness about the slow eradication of the resource base upon which the Managalas depend, and to build a consensus on a more balanced approach to address subsistence farming, cash cropping and the need for forest management.

Digital audio technology

In many traditional societies information is brokered by middlemen. In the absence of local media in areas like the Managalas plateau, extension workers and NGOs rely on local counterparts to ensure that information is delivered to households. However, it is often the case that information does not reach all of them.

The project is attempting to overcome this limitation by using digital audio recordings to make information available in the language communities are familiar with. Soap opera dramas,



for example, use colourful characters to represent the conflicting points of view typically found in Managalas villages. Although the dramas are fictional, they are effective in stimulating community-based discussions. Each programme finishes with an open-ended question that triggers debate around a particular land use issue or option.

Villagers also participate in various phases of the design, production, distribution and use of the programmes. For example, following the development of a script, volunteers take a digital recorder to a village where they capture local voices and sound effects. Then, back at the implementing NGO, the various programme segments are recorded, edited and copied onto CD or audio cassettes for distribution to 150 sites across the plateau.

The RLP system of harnessing technology to inform ordinary households, stimulating discussions about issues critical to the survival of the local way of life, and then engaging households and other stakeholders in building consensus around action plans, has proven a powerful tool for mobilizing support for sustainable development. Once people see the connections between current practices and their long-term impacts on the environment, they are keen to take action.

Traditional wisdom

The 2005 programme series brings home the fact that traditional practices associated with kinship obligations and traditional initiation rites include taboos and restrictions that both protect the natural environment and nurture the development of basic life skills. Once

this new series of programmes began to circulate, people immediately associated the growing abuse of the environment and weakening of social skills with the devaluation of traditional practices. This has triggered discussions about what cultural path to take into the future. As a result, the agenda for the upcoming discussions includes items such as using local culture for teaching life skills.

Overcoming challenges

Developing this application has not been without difficulty, however. One problem has been deciding in which languages to record the different segments, since the radio programmes are broadcast locally and nationally. Papua New Guineans are multilingual, and the choice of language carries innuendos about who the message is really for, and the relevance of the content. If the actors in the drama use a local language, local families pay attention. But if a regional or national language is used, they can influence politicians and decision makers. To overcome this obstacle, the programmes have been modified so that different characters use different languages. Lines with critical information are crafted in such a way that one character repeats part of the message in a second language. This works well, but it places additional demands on the scriptwriter.

The RLP approach to community-based learning has proven an effective means of bypassing gatekeepers and reaching individual households directly with new knowledge of sustainable development issues and options. Once people are informed, however, the problem shifts to how to cope with the demands that the new knowledge creates. Once community expectations are raised, people want issues addressed, they expect greater involvement, and they demand more of their leaders. ■

Micael Olsson and **Douglas Bell** are members of the Education Development Centre's Community Learning Systems team. For more information about the RLP, visit <http://ies.edc.org/projects/papua.htm>. This project first featured in *ICT Update* 14, November 2003.

Other digital audio applications

People First Network (PFnet) in Vanuatu and Papua New Guinea uses HF radio technology and solar-powered email stations to provide rural communities access to affordable means of communication: www.undp.org.fj/Strengthening_Community_Access_to_Information.htm

The Farmer Information Support (FIS) system uses radio, mobile phones and Internet to provide distance learning programmes for farmers: www.ginks.org/pages/farmers.htm

Information services: blogging for networking

Luigi Guarino makes the case for weblogs as a means to disseminate news and information about plant genetic resources in the Pacific.

The genetic diversity represented by the myriad local varieties of crops, called plant genetic resources (PGR), is the foundation of sustainable agriculture. It allows farmers to adapt to environmental changes and market demands, and provides the raw materials for scientists to develop improved crop varieties.

In the Pacific, as elsewhere around the world, however, these resources are under threat from factors such as climate change, the spread of modern lifestyles, population growth, the introduction of modern varieties and exotic cash crops, and various pests and diseases. With donor support, the Secretariat of the Pacific Community (SPC) has therefore established the Regional Germplasm Centre (RGC) in Suva, Fiji, where



tissue culture techniques are used for the conservation of regional collections of varieties of crops such as taro, yam, sweet potato and banana. In 2001 the SPC also launched the Pacific Agricultural Plant Genetic Resources Network (PAPGREN), with technical support from the International Plant Genetic Resources Institute (IPGRI) and assistance from New Zealand and Australia.

PAPGREN

The rationale for a PGR network in the Pacific is especially strong because the region is made up of small, isolated countries that need to share their resources – human, financial and genetic – in order to solve common problems.

The exchange of information is crucial to networking. PAPGREN therefore organizes regular meetings, workshops and training courses, and publishes a wide range of printed materials. The

network has also used the Internet, with its own pages on the SPC website (www.spc.int/pgpr), but it was recognized early on that Internet access can be a problem for many network partners due to the high costs and low bandwidth. Other complementary approaches were also needed.

PAPGREN launched an informal, *ad hoc* email service to alert network partners and other stakeholders to relevant news items. However, it was felt that a permanent record of this material was necessary for reference and for later searching, and CTA was approached for advice. The result was a weblog, or blog, entitled *PGR News from the Pacific* (<http://papgren.blogspot.com>).

Blogs

Matisse's Glossary of Internet Terms defines a blog as 'a journal that is available on the web'. Updating a blog is called 'blogging', and someone who keeps a blog is known as a 'blogger'. Postings on a blog are arranged in chronological order, with the most recent additions featured most prominently.

The PAPGREN blog was set up in just a few minutes using Blogger.com, a free service that allows anyone, even with no technical background, to create, update and maintain a blog. Designated individuals are allowed to post items, and anyone can post comments in response. All items are stored in a searchable archive. In the case of the PAPGREN blog, all new postings are also emailed by the blog administrator to a mailing list that now numbers about 500 people around the Pacific. The blog also automatically produces an RSS feed, which is basically an annotated list of the titles of recent postings. This feed can be read in specialized software such as FeedReader, or converted into Javascript using a parser (or translation programme) that can be found on the web, and then pasted into a website.

Simply clicking on the title in either a feed reader or a website carrying the translated RSS feed takes you to the blog web page containing the full text of that particular item. This means that you don't need to visit the *PGR News from the Pacific* website every day to see what's

new. You can just wait for updates to come to you, either by checking in your RSS reader or displaying the blog's RSS feed on a MyYahoo page or your own web page.

The PAPGREN blog

Recent postings have included an announcement of the Pacific Pest List Database and a review of a recent book on sustainable land management with examples from the Pacific. Sources include electronic newsletters, RSS feeds, websites, personalized Google alerts and, of course, individuals.

The responses to *PGR News from the Pacific* have been very positive. In travelling around the Pacific, I often meet people who receive the email alerts or consult the blog, and they invariably say how useful it is in keeping them up to date with what's going on. I have also been receiving comments and feedback on individual items, which have occasionally developed into discussions.

It is true that some people are still reluctant to post comments directly on the blog, and tend to prefer to reply to the email alert. However, this situation will probably change as they become more familiar with blogging and gain confidence in using it. Blogging, and the associated technology of RSS feeds, have enormous potential for improving information exchange in networks. Let's all get blogging! ■

Luigi Guarino (luigig@spc.int) is a plant genetic resources adviser at the Secretariat of the Pacific Community (SPC).

This project first featured in *ICT Update* 25, May 2005.

Other weblogs for rural development

CTA Brussels Weblog on CTA activities and agricultural and rural development in ACP countries: <http://brussels.cta.int/>

International Food Policy Research Institute (IFPRI) Blog on World Hunger: www.ifpri.org/

BlogAfrica, an open listing of Africa-related weblogs: <http://blogafrica.com/>

Crop protection: a multimedia tool for pest management

Amadou Bocar Bal and Lucinda Charles report that the Crop Protection Compendium is increasingly contributing to the identification and management of crop diseases and pests in Africa

Across Africa, a multimedia tool called the Crop Protection Compendium (CPC) is helping farmers to identify and control crop diseases and pests. Available via the Internet and on CD-ROM, the CPC is one of a range multimedia compendia developed by CAB International (CABI) and supported by an international development consortium of 50 public and private sector organizations. The compendium, which is updated annually, is now used worldwide by plant breeders, policy makers, lecturers and students.

The CPC contains the world's most extensive knowledge base that brings together scientific information, images, maps and statistics, related to crop protection. It currently includes details of 200 crop species grown in 150 countries, as well as datasheets on more than 2360 pests, diseases, weeds, invasive species and their natural enemy species. It also offers an archive of background information on an additional 10,000 undesirable species and their natural enemies. The CPC features global and regional distribution maps and diagnostic aids, including electronic 'keys' to insect pests and weeds, as well as a phytosanitary decision support system as an aid to pest risk analysis. The updates in 2004 and 2005 saw the addition of about 500 new data sheets on invasive plants, and additional information on quarantine aspects of forest pests.

The CPC in Africa

The CPC currently contains detailed, referenced datasheets on over 1400 crop pests present in Africa, as well as other pests that have not yet been recorded but may pose a threat if they were to be introduced. Africa has therefore been a major focus for CPC training and dissemination.

CABI's Africa Regional Centre, based in Nairobi, Kenya, offers a wide range of training courses in areas such as integrated pest management. For example, the Centre has organized courses for the members of the Tanzania Plantation and Agricultural Workers' Union (TPAWU), where the participants learned how to search for and retrieve

information using multimedia tools, including the CPC.

In Niger, at the AGRHYMET Regional Centre, the CPC is being used to identify pests and provide information about their ecology and biology, and possible means of control. It has also become an important teaching tool. According to students in the Centre's crop protection programme, the most useful aspects are the keys, with their clear illustrations and detailed descriptions of plant and animal pest species. Following a training course on phytosanitary controls and quarantine procedures, many of the participants were so impressed that they bought their own copies of the CPC. In another initiative funded by CABI, AGRHYMET provided copies of the CPC to all members of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS).

CABI is now exploring the possibility of offering distance training courses by email, coordinated from the headquarters in the UK. The first trial took place in March 2005, and involved participants from seven African countries. Participants were selected from the 200 scientists in 46 institutions who had already received the CPC through a Rockefeller Foundation grant the year before. The results of this trial should provide useful pointers for CABI's future distance training in Africa and elsewhere.

Recently, AGRHYMET and CABI have been discussing ways to improve the contents of the CPC in line with expressed needs of users in the Sahel region. While using the CPC for training and research, it was noticed that some relevant information is missing or incomplete. For instance, some key pests that affect Sahelian countries are not yet adequately covered in the CPC, perhaps because of the lack of published information available in those countries. In future, collaboration with African users in different countries or subregions is therefore needed to collect previously unpublished information for inclusion in the CPC.

Future prospects

Since the CPC was first published on CD-ROM in 1997, and on the Internet



in 2001, hundreds of copies have been distributed throughout Africa, and many African users have participated in CPC training courses. Stories of significant real-world impacts of the CPC are beginning to emerge. One of these concerns farmers in Lugoba, a village in Tanzania, who used the CPC to identify a variety of mealybug that was devastating their cassava fields. They also learned about its natural enemy, a wasp, that could be introduced to control it. The mealybug outbreak is now under control, and cassava growing in the village has been revived.

Success stories such as this provide a solid base upon which CABI and partner organizations in Africa hope to build in the future. However, continuing efforts will be required to improve the content and functionality of the CPC, and promote its use in training, in order to contribute to improved crop protection in Africa. ■

Amadou Bocar Bal (a.bal@agrhyment.ne) is a trainer at the AGRHYMET Regional Centre, Niger.

Lucinda Charles (l.charles@cabi.org) is an editor in the Compendium Programme at CABI, UK. For more information about the CPC, visit www.cabi.org/compendia/cpc/.

This project first featured in *ICT Update* 11, May 2003.

Agricultural resources on CD-ROM

Fact Sheets - Species Profiles for Pacific Island Agroforestry 2003-2005:
<http://agroforestry.net/tti/index.html#Anchor-Preview-49575>

FAO Agro-Maps, a global spatial database of subnational agricultural land-use statistics:
www.fao.org/landandwater/lwdms.stm

Web resources

This section lists key resources and documents regarding WSIS-2. Additional information is available from the web magazine at <http://ictupdate.cta.int>

WSIS stocktaking and the 'golden book'

www.itu.int/wsis/stocktaking

Launched by the WSIS Executive Secretariat in October 2004, WSIS stocktaking is intended to fulfil the dual purpose of providing an inventory of activities undertaken by governments and all stakeholders in implementing the WSIS Declaration of Principles and Plan of Action, as well as to assess the progress made in building the 'Information Society'. A draft report on these activities, based on a questionnaire survey in mid-2005, is available online. The Secretariat is also currently inviting stakeholders to submit new commitments, which will be included in the 'golden book' to be published shortly after the Tunis conference. For more information, visit www.wsis.org/goldenbook

WSIS stocktaking agricultural activities

www.itu.int/wsis/stocktaking/scripts/listing.asp?c_keyword=agriculture&c_keywordin=all

The WSIS Stocktaking Activities Database lists 49 activities in the field of agriculture, 13 of which are government projects and 32 activities of international organizations, mostly FAO. Activities in ACP countries include the project 'Support to the dissemination of knowledge and agricultural technologies for food security and sustainable development', implemented by the Congo Ministry of Agriculture in cooperation with the Central African Economic and Monetary Union (CEMAC); the initiative of Salvage Youth Potential Development, a Kenyan NGO, to establish a community information and ICT services centre in the Makuueni district, Kenya; and the project 'Agricultural information access using ICTs' of the Women of Uganda Network (WOUNET).

INTERNET GOVERNANCE AND FINANCING

Report of the Task Force on Financial Mechanisms (TFFM)

www.itu.int/wsis/tffm/final-report.pdf

After WSIS, the TFFM was set up to address the issue of financing for the information society. Chaired by UNDP Administrator Mark Malloch Brown, and consisting of representatives of 13 governments and 11 multilateral organizations, CSOs and the private sector, the Task Force prepared this report for WSIS 2005.

Working Group on Internet Governance (WGIG) Report

www.wgig.org

On 18 July 2005 the WGIG presented its report to the President of the WSIS Preparatory

Committee, Ambassador Janis Karklins, and the WSIS Secretary-General, Mr Yoshio Utsumi.

REGIONAL WSIS POLICIES AND PLANS

Pacific Islands Participation in the WSIS

www.sopac.org/data/virlib/MR/MR0594.pdf

Prepared by the South Pacific Applied Geoscience Commission (SOPAC), this report is one of the key outcomes of the involvement of Pacific Island Countries and Territories in the WSIS PrepCom-2 held in Geneva, 17-25 February 2005.

Regional Action Plan towards the Information Society in Asia and the Pacific

www.aprcwsis05.ir/Docs/Results/RAP.pdf

The High-Level Asia-Pacific Conference took place in Tehran, Iran, in June 2005. This document outlines a comprehensive plan and strategic framework for collaborative ICT programmes and projects at the regional level for realizing the vision of an inclusive and sustainable information society.

Accra Commitments for Africa

www.uneca.org/aisi/docs/AccracommitmentsEN.pdf

The Declaration of the 2nd Africa Regional Conference, held in Accra in February 2005, recommended that African countries establish national e-strategies based on the overall social economic goals of the countries including their poverty reduction programmes.

African Regional Action Plan on the Knowledge Economy (ARAPKE)

www.uneca.org/aisi/docs/ARAPKE%20version%20of%20September%202005.pdf

The African Information Society Initiative (AISII) is developing ARAPKE at the request of the 2nd African Regional Conference. It is based on the 'Accra commitments for Tunis 2005' and the vision defined by both the AISII and the New Partnership for Africa's Development (NEPAD), under the leadership of the African Union.

The information and knowledge society in Latin America and the Caribbean

http://wsispapers.choike.org/briefings/eng/ana_iks_lac.pdf

This paper explores the possibilities of Latin American countries to become included in the global economic structure by considering alternatives that could be undertaken for the strategic development of the information and knowledge society in the region.

Latin America and Caribbean: Rio de Janeiro Commitment

www.riocmsi.gov.br/english/cmsi/documentation/Rio_de_Janeiro_Commitment.pdf

The Regional Preparatory Ministerial Conference of Latin America and the Caribbean was held in Rio de Janeiro in June 2005. Representatives committed themselves to creating an enabling environment for investment and innovation that fosters regional cooperation and public-private partnerships to improve access to and awareness of the potential of ICTs.



CIVIL SOCIETY STAKEHOLDERS

WSIS Gender Caucus Statement on Internet Governance

www.genderwsis.org/node/48

The statement was submitted by AMARC Africa (World Association of Community Radio Broadcasters), the African Women's Development and Communication Network (FEMNET), and Terre des Femmes on behalf of the WSIS Gender Caucus in September 2005. The caucus stressed that gender equality and women's empowerment are fundamental principles of Internet governance, as are the right to freedom of expression and human rights.

Web resources

Continued from page 14

Pacific Islands Chapter of the Internet Society (PICISOC)

www.picisoc.org/

In preparation for the Tunis summit, PICISOC, a local chapter of the Internet Society (ISOC), set up an online forum and a mailing list to discuss WSIS-related issues, policies and projects in the Pacific Islands. PICISOC has also submitted its views on Internet governance.

Paving the Way to Tunis: Report of the WOUNET WSIS 2005 Online Forum

www.wougnnet.org/WSIS/ug/WSIS2005/docs/WSIS2005OnlineForumReport.doc

In July 2005 the Women of Uganda Network (WOUNET) held an online forum on key issues for WSIS to share views, experiences, knowledge and concerns. The forum focused on ICT policy priorities for Uganda as well as the two outstanding issues for the WSIS – Internet governance and financing mechanisms.

WSIS-RELATED RESOURCES AND POLICY TOOLKITS

ICTs, MDGs and the WSIS

www.itu.int/osg/spu/wsis-themes/UNMDG/index.html

This section of the WSIS website, prepared by the ITU, contains links to resources related to the role that ICTs can play in helping to achieve the Millennium Development Goals (MDGs) in the context of the Tunis phase of the WSIS.

ICTs and the MDGs

<http://topics.developmentgateway.org/ict/sdm/previewDocument.do~activeDocumentId=840982>

A series of essays by John Daly on the role of ICTs in meeting the MDGs. Written as a contribution to the Geneva phase of the WSIS, the papers illustrate the enormous number of ICT innovations taking place around the world, and the complexity of their diffusion.

E-AGRICULTURE

FAO's strategies towards the WSIS 2005

www.infopoverity.net/new/Confs/IWC_05/docs/Mangstl.doc

Message from Anton Mangstl, Director Library and Documentation Systems Division, FAO, presented at the World Infopoverity Conference, 12-13 May 2005.

E-agriculture

www.itu.int/ITU-D/e-strategy/e-applications

Section 21a of the WSIS Plan of Action mentions e-agriculture as one of the 'e-applications' or focus areas for the application of ICTs. As of 27 September 2005, the WSIS Stocktaking Activities Database listed one e-agriculture project of the International Telecommunication Union (ITU) in cooperation with the government of Kyrgyzstan to enable farmers in Madaniyat, a village in the Tokmok-Tchuyski region, to reap the benefits of information technologies.

Q&A: FAO, WSIS-2 and e-agriculture

Dr Anton Mangstl talks about how e-agriculture can contribute to bridging the digital divide

At WSIS-1 in 2003, the FAO launched the 'Bridging the Rural Digital Divide' initiative. In your opinion, what are the biggest challenges in achieving this goal?

First, it is important to define what we mean by the rural digital divide. The term describes the current inequality in access to ICTs between rural and urban areas, which separates rural people from the world's information and knowledge resources. Addressing the rural digital divide involves a complex set of challenges, ranging from improving access to technology and connectivity, to enhancing individual skills and institutional capacity, as well as ensuring the representation and participation of relevant stakeholders in key development processes.

Access to ICTs still features prominently in debates worldwide. But, providing access does not necessarily mean that rural communities will benefit from the use of ICTs. What other issues need to be taken into account to ensure that rural

people can take full advantage of new technologies?

Many technology-oriented approaches to bridging the rural digital divide give insufficient consideration to how and why technologies can improve livelihoods. Often, the weaknesses of these approaches lie not in the infrastructure and tools, but in the process of their adoption and use. Thus, the focus should be on education, information sharing and communication. In addition, solutions that simply connect people to each other cannot solve complex institutional and policy issues. Failure to address who has and who does not have access to technologies can intensify existing inequalities. At the FAO, we are addressing these issues, especially the ways in which rural stakeholders can use ICTs to develop greater influence in their areas.

Within the FAO's Bridging the Rural Digital Divide (BRDD) programme, one of the main activities involves the continuous analysis and reappraisal

of ways to help communities benefit fully from the use of ICTs. These include adapting content to local contexts; building on existing systems and policies; addressing diversity; building capacity; ensuring equitable access; building partnerships and networks; adopting realistic approaches to technology; and analyzing information costs.

What progress has the FAO made towards bridging the rural digital divide?

After WSIS-1, the FAO made the commitment to turn the BRDD initiative into an official programme. The programme is bringing together relevant expertise and resources across the international development community to develop a more coherent, systematic approach, as well as creating synergies between the two distinct disciplines of information management and communication for development.

A major step forward will be the launch of the BRDD programme website at WSIS-2 on 15 November 2005. The website will provide access to a variety of

Q&A: FAO, WSIS-2 and e-agriculture

Continued from page 15

resources, including a policy framework on good practices, case studies of different approaches to information and communication for development, tools for capacity building, as well as links to communities of practice.

Another FAO success has been the Information Management Resource Kit (IMARK), an e-learning tool developed by FAO with partners such as CTA, which provides national and local agricultural agencies and networks with specialized training materials and resources. Another has been the Access to Global Online Research in Agriculture (AGORA) initiative, launched in 2003. AGORA provides free access to articles published in major scientific journals in agriculture and related biological, environmental and social sciences to institutions in developing countries.

Could you explain the term 'e-agriculture', and why is it an important policy priority for the FAO?

E-agriculture is an emerging field within agricultural informatics, agricultural development and business. It refers to agricultural services and information delivered or enhanced through the Internet and related technologies. E-agriculture, therefore, involves the conceptualization, design, development, evaluation and application of innovative ways to utilize existing or emerging ICTs.

E-agriculture is important to the FAO because it goes beyond technology, to promote the integration of technology with knowledge and culture, using a variety of media, with the aim of improving local, regional and global communication and learning processes in agriculture. Key components of e-agriculture that are also part of the BRDD programme include facilitation, support of norms and standards,

technical support, capacity building, education and extension.

The most common approach to e-agriculture seeks to improve information exchange for the benefit of rural communities, households, and providers of agricultural, financial and communication services using the Internet and related technologies. Egypt's Virtual Extension and Research Communication Network (VERCON) is an interesting example that resulted from the FAO's work in this field. In Egypt, government researchers and extension workers in institutes and rural villages are now using the VERCON portal to exchange information with district offices and ministries in Cairo. More advanced applications of e-agriculture in farming include the use of satellite technology, global positioning system (GPS) equipment, advanced computers and electronic monitoring systems to improve the volume and the quality of production in applications such as precision farming.

E-agriculture was one of the policy priorities at WSIS-1. Where does e-agriculture stand at WSIS-2?

E-agriculture is one of the elements of the WSIS Plan of Action, which emerged from the first phase. The Plan of Action is still very much the focus of attention in WSIS-2, even if it is not treated in detail in the main documents. The plenary session of WSIS-2 will be concerned with specific issues that were not covered so well in WSIS-1. E-agriculture was included in the stocktaking exercise undertaken by the WSIS Secretariat in preparation for the second phase, and the FAO has contributed several of its experiences. We are looking forward to continuing discussions with country delegates and

observers on e-agriculture in Tunis.

What can organizations such as FAO and CTA do to ensure that e-agriculture features more prominently in rural development policy?

We feel that e-agriculture has not yet featured on the agenda of rural development policy makers, given that they were noticeably absent from the WSIS process. Indeed, some question whether e-agriculture as a term is useful in influencing policy agendas for rural development. We have to combat the perception that e-agriculture applies only to precision farming in intensive systems in developed countries. Based on this, the FAO is preparing a position paper defining e-agriculture and explaining its potential impact on rural development and food security. We would appreciate inputs from CTA and other organizations in order to improve and broaden ownership of the paper, which could provide a basis for discussion at policy levels. ■

Dr Anton Mangstl (anton.mangstl@fao.org) is director of FAO's Library and Documentation Systems Division.

FAO's digital initiatives

Bridging the Rural Digital Divide Programme:
www.fao.org/rdd/

Access to Global Online Research in Agriculture (AGORA): www.aginternetwork.org/

Information Management Resource Kit (IMARK):
www.fao.org/imark/

Virtual Extension and Research Communication Network (VERCON): www.vercon.sci.eg

ICT Update, issue 29, November 2005. *ICT Update* is a bimonthly printed bulletin, with an accompanying web magazine (<http://ictupdate.cta.int>) and email newsletter. Each issue of *ICT Update* focuses on a specific theme relevant to ICTs for agricultural and rural development in African, Caribbean and Pacific (ACP) countries, and includes feature articles and annotated links to related web resources and projects. The next issue will be available on 1 January 2006.

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