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ICT Update

a current awareness bulletin for ACP agriculture

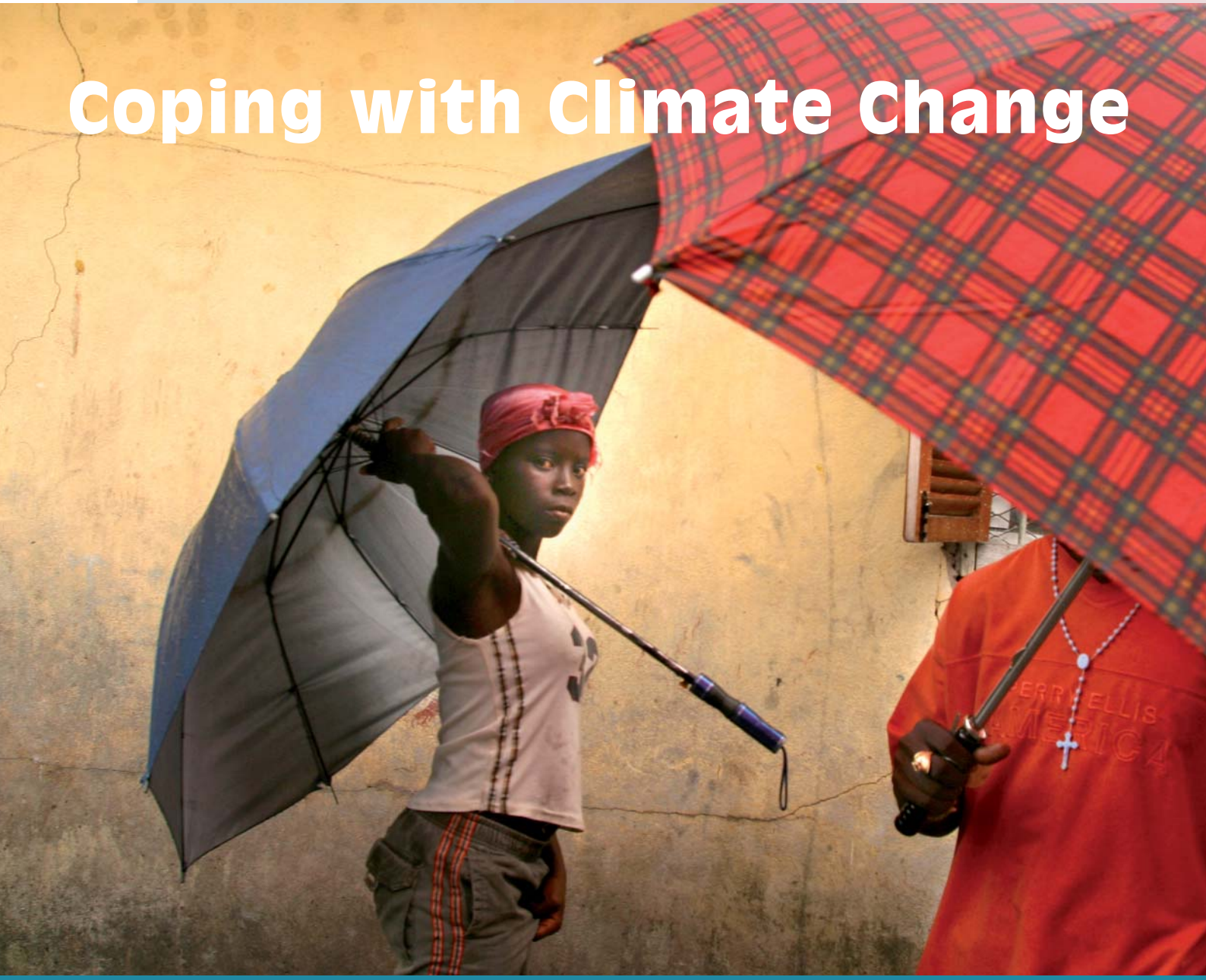
CTA
http://ictupdate.cta.int

Sea-level rises, retreating mangroves and GIS in **American Samoa**

Amateur radio operators battle hurricanes across **Jamaica**

Drought, food insecurity and satellite early warning systems in **Niger**

Coping with Climate Change



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ICT Update

ICT Update issue 35, February 2007. *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 in April.

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Editorial

Communication - the key to coping with climate change

Today, we are bombarded by alarming scenarios of the severe effects of climate change. Already, some 150,000 people die every year as a direct result of global warming. Developing countries suffer far more from the impacts of global warming than the big polluters in Europe and North America. Soil erosion and desertification will affect ACP countries far more than Europe and North America. Some small island states in the South Pacific and the Indian Ocean could be entirely engulfed by the seas. This month, the Intergovernmental Panel on Climate Change – the scientific authority for the UN Framework Convention on Climate Change – issued its Fourth Assessment Report. The report is the IPCC's most critical yet, saying that the reality of global warming is 'unequivocal' and its effects will continue to haunt us for over 1,000 years. Such dire threats seem overwhelming and tackling them impossible. The scale of the big-picture hazards can sometimes obscure practical strategies of mitigating and adapting that local communities, NGOs and research projects in the South are developing. In this issue of ICT Update, we look at a few of such pioneering activities in ACP countries. The common thread that runs through these projects is the need for the circulation of information about both global warming and methods of adaptation. A report from the International Research Institute for Climate and Society (IRI) published in January of this year suggests that it is not all 'doom and gloom', highlighting the use of climate information in practical settings in Africa. Further, the report argues that up-to-date meteorological information needs to be needs to be communicated in a timely fashion and farmers must be informed of strategies that can help them adapt to climate change, such as choosing different crops or changing planting dates according to rainfall predictions.

However, to provide such advice, the gathering of weather information from the grassroots needs to be improved. In the Q&A of this issue , Dr Mannava Suvakumar, the head of agricultural meteorology at the World Meteorological Organisation, argues for increasing the number of automatic weather units in Africa's most vulnerable regions. It is not therefore merely a matter of the 'centre' delivering information to the grassroots or 'periphery' but of the periphery delivering information back to the centre.

In our own lead story on the use of GIS to monitor rising sea-levels and the resultant retreat of mangrove swamps inland, we learn how island nations are particularly endangered by rising tides. The information gathered here on retreating or deteriorating mangroves allows local planners to make decisions that will minimise the damage of this phenomenon to their communities. In Niger, Telecoms Sans Frontières has introduced a satellite communications network that enables agricultural information to be delivered from isolated areas to decision makers instantly, in time to prevent the food security crises that are the product of decreased rainfall, soil erosion and degradation, and desertification. Previously this information took weeks to arrive, often far too late. In the Caribbean, with its growing number of hurricanes, ham radio operators help to mitigate their damage, again, primarily by passing on information from weather stations to local communities and emergency services and back again.

The IRI report also points to the importance of the role that the media - radio, television, the internet and print - play in delivering crucial information on climate change to the communities that need it. Thus in this issue, Ochieng' Ogoodo, a Nairobi-based science journalist, shows us how the lack of coverage of climate change in the media of the developing world limits its ability to adapt to the problem.

The examples in this issue are a few of the many grassroots activities of those who are dealing with the effects of climate change. Perhaps these initiatives can inspire us all to make the difficult, structural changes that we have to make to cope with climate change. ■

For the IRI report, visit: http://iri.columbia.edu

IISD

Dr. Wulf Killmann
(Wulf.Killmann@fao.org) is chair of the UN Food and Agricultural Organization's (FAO) Interdepartmental Working Group on Climate Change.

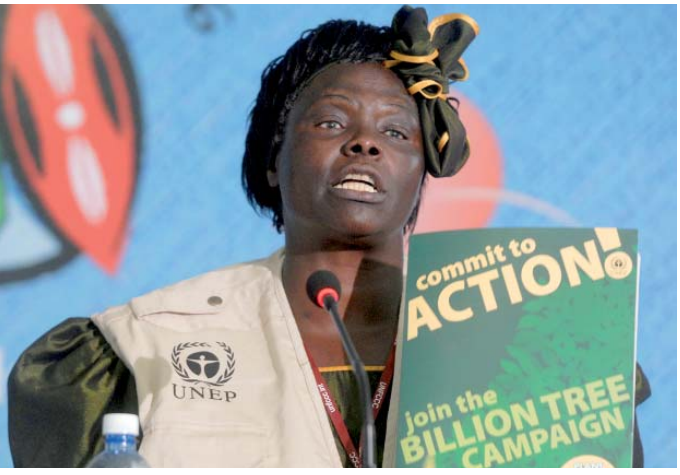
Climate, ICTs, the FAO...
and the Fall of Rome

History provides us with excellent examples of how climate change dramatically affects agriculture and how this in turn affects the stability of society, even civilization itself. For my work with the FAO, I sit in an office in Rome. The sacking of Rome by our ancestors in the fifth century was actually a result of climate change: the weather in northern and central Europe during this period had become so inhospitable that the reduced crop yields forced the inhabitants to move southward, increasing pressures on the Roman Empire. The rest, as they say, is history. Society, agriculture and the climate are intricately interlinked.

Holistic approaches

No less interlinked are the various aspects of the ways in which climate change affects agriculture. This, naturally, necessitates an integrated approach to the problem. There are a number of issues, such as biodiversity, desertification and climate change that we at the FAO have to address individually, but also in an holistic way as they cut across our various departments, requiring us to make the best use of the resulting synergies to cope with these cross-sectoral challenges.

Beyond the internal dynamics of the FAO, the Interdepartmental Working Group on Climate Change collaborates with a number of multilateral organizations, including the climate change secretariat at the UN Framework Convention on Climate Change (UNFCC), the Intergovernmental Panel on Climate Change (IPCC) and individual member countries. The aim is to ensure that climate change issues are mainstreamed in all our daily work



Professor Wangari Maathai and UNEP launch the Plant for the Planet: Billion Tree Campaign at the UNFCCC COP 12 conference in Nairobi last November

Climate change scenarios and the South

Several scenarios have been advanced of how climate change is likely to play out, according to what we know now. They diverge slightly in the magnitude of climate change that is anticipated and the dimensions of the temperature increase, but they all agree on one thing: the higher latitudes will be less affected. North America, northern Europe, northern Asia, but also Chile, Argentina, and Australia and New Zealand will have hardships, certainly, but the most severe problems will occur in the equatorial zone and sub-tropics.

Most developing countries, sadly, fall in this very zone. South Asia and sub-Saharan Africa will suffer considerably under climate change. For many other reasons beyond global warming, food security in these countries is already precarious enough. Today, 800m people around the world go hungry everyday. Most of them live in this central geographical belt and these numbers will only increase with the pressures from future climate changes.

Last November in Nairobi, the twelfth Conference of the Parties to the Climate Change Convention (COP 12) of the UNFCCC produced a five-year work plan - the Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change. Until this point, we had focused on mitigating the effects of climate change. However, we must realize that climate change is already here: We can try to reduce its effects, but, frankly, we have no other choice but to help particularly vulnerable countries to adapt to this new situation - through different cropping patterns, crop varieties and so on.

Information gaps and digital divides

For this to occur, a number of things need to be done. While action is needed at the political level, capacity building and the dissemination of information are also vitally important. Farmers, fishing and rural communities, have to be kept informed and supported in identifying methods of adaptation. The current information gap is perhaps our biggest problem. We can plan all kinds of things, but if these concepts, methods and examples are not formulated with the people most affected by climate change, then all our efforts are in vain.

To move forward, we naturally need expanded investment in information and communication technologies, otherwise, how else will such ideas be communicated?

The digital divide is unfortunately very acute in developing countries. Individuals and organizations with knowledge and experience with ICTs need to become more inventive and creative in applying their know-how to deal with this formidable threat, and to share their ICT awareness with others.

This, needless to say, is an enormous task. ■

What is the UNFCCC?

The United Nations Framework Convention on Climate Change (UNFCCC) is the first binding legal treaty on climate change. The Convention's objective is "to achieve stabilization of greenhouse gas concentrations in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with the climate system." In other words, to reduce greenhouse gas emissions so as to prevent global warming. Updates to the treaty, known as 'protocols', set mandatory emissions limits. The most important of these is the much-publicized Kyoto Protocol.

More information: http://unfccc.int

Feature

Escaping the rising sea

Researchers in American Samoa are employing GIS, satellite imagery and tide gauges to track the landward retreat of mangrove forests in response to rising sea levels.

The mangrove forests that fringe the coastlines of many tropical and subtropical islands harbour exceedingly rich ecosystems, and protect the coastlines from erosion and damage due to storms. Their stilt-like rooting systems filter sediment and nutrients from fresh water rivers and streams before they flow into the sea, and in the process protect the nurseries of valuable fish and crustaceans in offshore sea-grass beds and coral reefs. Mangrove forests also represent a valuable resource for many local communities, who use mangrove wood for building materials and in the manufacture of a wide variety of products. In total, the economic value of mangroves ranges from €150,000–700,000 per hectare on an annual basis.

Over the last few decades, the average sea level in the Pacific has risen by about 2 mm per year. Models used to calculate the effects of global warming forecast that this rate will accelerate in the coming decades. In 2001, the UN's Intergovernmental Panel on Climate Change (IPCC) predicted sea level rise of between 9 and 88 cm over the course of this century [The IPCC's Fourth Assessment Report, published this month, has since issued a more precise range - of between 28 and 58 cm].

A rise in sea level of this magnitude will seriously affect mangrove forests. A 12 per cent reduction in the extent of mangrove forests is possible in the Pacific as a whole by the year 2100. Some islands, such as American Samoa, could experience up to a 50 per cent loss.

This predicted decline of mangrove forests in the Pacific would both reduce their economic value and increase the threats to human safety and shoreline developments due to the other expected effects of global warming, such as more frequent and more intense storms, higher average wave levels and changes in tidal regimes.

Predicting shoreline responses to sea level rise

When sea levels rise, mangrove forests naturally tend to move landwards. However, this 'migration' of the forests is often prevented by man-made obstructions such as sea walls, roads and residential and industrial areas. As a result, the mangrove forests can not 'escape' the rising seas. They degenerate to narrow strips along shorelines, or are lost altogether.

On most Pacific islands, communities cannot remove these structures or relocate residential or industrial areas in order to allow the mangrove forests to take their natural landward course. The economic and social costs involved in such restructuring of coastal areas would simply be too high. Nevertheless, island communities must develop strategies to adapt their current uses of coastal areas, and to prevent the expected loss of coastal habitats due to sea level rise. Possible strategies include restricting future coastal developments by introducing zoning regulations, fortifying the shorelines of economically developed coastal areas, retreating to higher ground, or, as a last resort, departing from the islands altogether.

Therefore, it is important that land-use planners on Pacific islands have access to reliable information about how coastal habitats, in particular mangrove forests, will respond to sea-level rise and other effects of global warming over the coming decades. In many cases, their capacity to use this information for land-use planning will need to be enhanced.

In recent years, several national and territorial vulnerability studies in the Pacific have been carried out to provide qualitative assessments of how coastal ecosystems are likely to respond to the projected rise in sea level and other climate change effects. However, there is a distinct lack of site-specific information on how mangrove forests are likely to respond, and of the capacities that will be required to use this information in the development of plans and strategies for coping with rising sea levels.

Generating site-specific information

For some areas of the Pacific satellite imagery dating back several decades is available. For these areas, it is possible to predict the changes in the position of the seaward borders of mangrove forests by reconstructing their historical positions over time and extrapolating their movements into the future. This method demonstrates the net result of all forces that affect the position of the seaward borders, including the rising sea level, and provides a realistic way of predicting future changes. Unfortunately, it is usually impossible to predict the landward borders of mangrove forests with any confidence from interpretations of aerial photos and satellite imagery. This can only be done on the basis of detailed information such as the current demarcations of the forests, their physiographic setting – including the slopes of adjacent areas and the presence of roads, sea walls and other man-made structures that obstruct their natural landward migration – and projections of future sea-level rise.

My team, supported by the UNEP Regional Seas Programme, have developed a methodology to predict the movement of mangrove forests brought about by rising sea levels. We have applied this methodology to determine the future position of American Samoa's three largest mangrove forests – Masefau, Nu'uuli and Leone – and their movements over a ten-year period. For this, we analyzed tide gauge records, projections of rising sea levels, time series aerial photos and satellite imagery, and a geographical information system (GIS).[1]

First, we calculated the rate of sea-level rise across American Samoa over

W. DOLDER /LINEAIR

Red mangrove aerial roots at low tide

the period 1948 to 2004, using mean monthly sea level data gathered by the tide gauge at Pago Pago, the island's capital city. We then compared this rate of sea level rise for American Samoa with the global rates over the same period calculated by the IPCC. On the basis of this comparison, we extrapolated our historical data and projected a range of possible increases in sea level to the year 2100.

Second, we identified the borders of the mangrove forests and the edges of major tidal creeks in the three study areas, using aerial photos and satellite images. We used aerial photos from six dates between 1961 and 1994, and Ikonos and QuickBird satellite images from 2001 and 2004, respectively. With ERDAS Imagine 8.7 software, we co-registered the aerial photos to the georeferenced 2001 Ikonos satellite pictures. For this co-registration we used a minimum of 20 ground control points per photo and a third-order polynomial model. The third and last step in our analysis was a linear regression analysis to determine whether there was any significant correlation between the change in the area of mangrove forests due to movements in the seaward margin, and changes in sea level at the three study sites.

A sea-level rise of this magnitude will seriously affect the mangrove forests that fringe Pacific islands

We found a strong correlation between the rise in sea level and the inland movement of the seaward borders of the mangrove forests. The areas of two forests had clearly declined. We also noticed that the seaward borders of the mangrove forests had moved inwards by 25–72 mm per year over the ten year period, i.e., 12–37 times the rate of sea level rise. In two of the study areas, we concluded that rising sea level had caused the landward migration of the forests. In the third area, the shoreline movement was variable, and we found no significant correlation with the changing sea level. In conclusion, we detected that between 16 and 68 per cent of the forest areas bordered coastal developments that had obstructed the natural landward migration of the forests.

Extrapolating the results of our study in American Samoa to the rest of the Pacific, we have found that sea level rise could lead to a 12 per cent reduction in mangrove forest areas on many other islands. This must be considered to be a conservative estimate. Our observations in American Samoa suggest that various underground processes, such as the compaction of offshore sediments and fluctuations in water tables, may cause the 'forest floors' to sink, thus

Related resources

Fourth Assessment of the IPCC: Climate Change 2007 – Physical Science Basis
➜ First major global assessment of climate change science in six years from the UN's climate body, the IPCC. Released February, 2007. 21-page summary for policy-makers based on thorough review of the most up-to-date, peer-reviewed scientific literature available worldwide.
www.ipcc.ch/SPM2feb07.pdf

PDF: UNFCCC Nairobi work programme on impacts, vulnerability and adaptation to climate change
➜ Document outlining work to be undertaken on impacts, vulnerability and adaptation to climate change by parties to the UNFCCC's Kyoto Protocol.
http://unfccc.int/files/meetings/cop_12/application/pdf/sbsta_26.pdf

South Pacific Sea Level and Climate Monitoring Project
➜ The 14-year-old South Pacific Sea Level and Climate Monitoring Project (SPSLCMP) aims to generate an accurate record of variance in long-term sea level for the South Pacific and make these data available to Pacific Island countries.
www.bom.gov.au/pacificsealevel

Small Island Developing States Network climate change and sea-level rise dossier
➜ SIDSnet connects 43 Small Island Developing States (SIDS) in the Caribbean, the Mediterranean, the Pacific, Atlantic, and Indian Oceans, and African island nations. Its main goal is to use ICTs to support sustainable development.
www.sidsnet.org/1f.html

Clean Development Mechanism
➜ The Clean Development Mechanism (CDM) is an arrangement under the Kyoto Protocol allowing industrialised countries to invest in emission reducing projects in developing countries as an alternative to emission reductions in their own countries.
http://cdm.unfccc.int/index.html

Clean Development Mechanism Watch
➜ Indonesia-based CDM Watch monitors the Clean Development Mechanism (CDM), analyses CDM projects and provides a clearinghouse for information on CDM projects and CDM related issues and developments.
www.cdmwatch.org

World Climate Research Programme
➜ This WMO programme aims to determine the predictability of climate; and to determine the effect of human activities on climate.
http://wcrp.wmo.int/index.html

BILDERBERG/HOLLANDSE HOOGTE

Aerial view of mangrove forest

compounding the rise in sea levels.

Technical and institutional capacity to cope with rising sea levels

As part of the programme, we also investigated the technical and institutional capacity of Pacific island communities to assess the vulnerability of their mangrove forests to the effects of climate change, as well as to plan and develop strategies to cope with and adapt to climate change. We identified a number of priority areas in which local capacities need to be enhanced:

- establishing benchmarks for assessing the coverage of existing mangrove forests, and for measuring gradual changes using standardized techniques;
- strengthening management frameworks for conducting site-specific assessments of the vulnerability of mangrove forests, and for incorporating the resulting information into land-use plans that will allow their landward migration, and measures to offset expected losses; and
- reducing and eliminating stresses on and rehabilitating mangrove forests, in part to increase their resilience to the impacts of climate change.

Given the many uncertainties about climate change, and the responses of mangrove forests to it, we need to manage adaptively and proactively. So far, there is no mangrove monitoring programme in place in the Pacific region. National mangrove monitoring efforts need to be linked through a regional network in order to come to a better understanding of how mangrove forests respond to sea-level rise, and to develop strategies for mitigating any adverse effects.

Such a system, while designed to record the effects of climate change on mangrove forests throughout the region, would therefore also demonstrate local impacts, providing coastal managers and planners with valuable information on which they can base decisions on ways to prevent their continued degradation.

Coping with climate change in the Pacific will require establishing management frameworks for minimizing the adverse effects of rising sea levels on mangrove forests, and land-use planning systems to allow for their natural landward migration. Developing these management frameworks will require increased institutional capacity to plan for site-specific strategies designed to deal with and prepare for the impacts of change climate in the areas for which they are responsible.

Such strategies will only be effective, however, if island communities recognize the economic benefits of conserving their mangrove forests. Investments in education programmes and outreach campaigns via various media are therefore essential. These should aim to increase local communities' awareness of the importance of mangrove forests as unique coastal ecosystems, and what they can do to conserve them for their own protection against the impacts of climate change. ■

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[1] For references to detailed descriptions and discussion of the methodology, see http://ictupdate.cta.int

Hurricanes and Hams

Jamaican amateur radio operators serve their communities as extreme weather events increase in frequency across the Caribbean.

Although no one can say that any individual hurricane is the direct result of climate change, there is general consensus amongst scientists that global warming has exacerbated the intensity and frequency of hurricanes, and has led to an increased incidence of so-called super-hurricanes.

The Caribbean is particularly susceptible to hurricanes and storms. On a small island, a single bad one can undo years of development work in the space of a few hours. The agricultural, forestry, and fisheries sectors are particularly vulnerable.

Effective communication both in the lead-up to and aftermath of a storm is vital to minimizing the damage to the livelihoods of affected communities.

Every Caribbean country has its own national coordinating agency for disaster preparedness, and beyond the services one expects - police, fire, the Red Cross - amateur (ham) radio and citizens' band (CB) radio operators are also often part of these emergency networks. In Jamaica, amateur radio operators have a history of aiding hurricane preparedness and emergency communications dating back to the fifties, but with the increase in extreme weather events in the region caused by climate change, it is likely that hams will be called on to provide services ever more frequently.

In 1981, we at the Jamaican Amateur Radio Association formed the Jamaica Amateur Radio Emergency Corps (JAREC), following an extensive upgrading of our high frequency (HF) equipment. This established Jamaica's first island-wide very high frequency (VHF) repeater system. We are a specialized team that offers hurricane monitoring and emergency communications services to the Red Cross, the Office of Disaster Preparedness and Emergency Management (ODPEM), and the Salvation Army.

Our portable stations consist of an HF and VHF transceiver and a battery that operates the equipment, as well as two operators who can relieve each other. The HF radio links us internationally to the US National Hurricane Centre (NHC) in Miami. We assist the emergency services by passing messages between them and the NHC. While hurricanes often cause disruptions to the electricity and telephone systems, deep cycle and auto batteries ensure that our repeater system can continue to operate. This is complemented by our HF radio network through which we can relay messages. Often, the NHC in Miami is bombarded with messages from the islands, causing the phone system to become quickly overwhelmed. Ham radio thus offers an alternative channel for getting information through.

We have come a long way in the last two decades. Today, we are able to place a portable two-man station in any community on the island. Thus we can also pass on messages relating to health and welfare and routine messages between communities and the various agencies.

Over the past few years, we have augmented our service with the internet, using it to link distant radio sites via voice over internet protocol (VOIP), as part of the Internet Relay Linking Project (IRLP). We connect the VHF radio to a computer and the radio then links into a repeater system. Any local person with a VHF radio can talk across the miles by accessing the repeater system. The repeater then connects to the computer allowing communications via VOIP to a distant repeater. This gives global coverage to frequencies that are normally only locally accessible.

Regional coordination of these activities has been enhanced through the Caribbean Amateur Radio Meteorological Emergency Network (Carmen). This is a joint project between Caribbean amateur radio operators, the NHC, and the National Oceanic Atmospheric Association. We ham operators provide supplemental surface weather data to forecasters at the NHC whenever a hurricane approaches land in order for them to refine the forecasts they produce.

Carmen runs five weather stations, which gather data on wind speed, rainfall and atmospheric pressure. They are posted at ham radio operators' homes on different parts of the island. The operators pass on the data via IRLP or HF radio. Set up to run manually - the Carmen radio operator takes a reading and sends it to the NHC – efforts are underway to establish automatic reporting using solar-powered Automated Position Reporting System (APRS) units. These would allow operators more time to secure their homes and family, as the units could be placed in critical locations that are usually evacuated when a storm is approaching. The ultimate goal is to install a large number of weather stations across the region, all connected via APRS and automatically sending weather data to the NHC.

In this era of the internet and mobile phones, we hams are often asked why we are still around. Yet, in times of crisis, our communities and even state-of-the-art facilities such as the Hurricane Centre come to depend on us. It may seem like 'just' a hobby, but we are proud to serve our nation. ■

Gerald Burton
(6y5ag@cwjamaica.com) is the president of JARA. His call sign is 6Y5AG

Related resources

Caribbean Community Climate Change Centre
➜ The Caribbean Community Climate Change Centre coordinates the Caribbean region's response to climate change. The Centre is the key node for information on climate change issues and for the region's adaptive to climate change.
http://caribbeanclimate.bz

PDF: International Collective in Support of Fishworkers (ICSF) report: Hurricane warning. *By Bisessar Chakalall.*
➜ Report argues that hurricane preparedness for the fisheries sector in the Caribbean is not uniformly strong.
www.icsf.net/jsp/publication/dossiers/Art5.pdf

Desert garden, Zoo Baba, Niger

Dakoro calling

As global warming exacerbates food insecurity in Africa, satellites are bridging the communications gap in early warning systems that alert central authorities of looming food crises.

Climate change affects us all, but Africa is literally in the hot-seat. The continent warmed up by 0.7 degrees over the course of the 20th century, according to a report issued at last November's UN Climate Change Conference in Nairobi. Without immediate and drastic action worldwide, says the same report, some 40 per cent of the continent's wildlife habitat will be lost over the next 25 years, while crop yields will fall by five per cent.

For many Africans, however, such reports only confirm what they already know. For them, climate chaos is not some future nightmare that can yet be averted. This is their waking reality. In many areas, as rains diminish and the rainy seasons become fewer and more unpredictable, the types of crops that can be grown become ever more restricted. Water scarcity forces cattle and sheep farmers to move to more fertile regions, leading to conflicts over grazing land and water.

However, with enough advance notice of weather conditions, governments can make decisions that enable them to avert or minimize the food security crises that these circumstances can produce. Sadly, traditional systems of passing on such information to central authorities – especially from very isolated areas - often deliver news of worsening conditions far too late.

In response to this, we at Telecoms Sans Frontières, a France-based NGO that provides emergency telecommunications services around the world, have begun to implement satellite communications systems in parts of Africa, radically reducing the time it takes to pass on such vital, life-saving information. In the summer of 2005, Niger was particularly badly hit by a food crisis, which followed an unusually dry season and a locust invasion. We were deployed in July of the same year to support the relief agencies and local authorities in the most affected region - Dakoro in eastern Niger. We soon discovered that while it was in place, the government's food crisis prevention system had not been working fast enough to cope with the effects of the crisis. Information on livestock and on agricultural revenues from remote areas was not arriving at the capital, Niamey, in time since it was collected manually in each village, and a messenger was then sent by road to bring it to the capital. It would take weeks or even months for all the information to be compiled.

We talked to the government, the European Commission and one of our commercial partners, Inmarsat, to see if they would be prepared to fund a project to connect the most vulnerable areas of Niger to the capital. Once

PASCAL MAITRE/ COSMOS/ HOLLANDSE HOOGTE

approved, the project connected 12 of the most remote areas to the capital between June and July 2006. Instead of the laborious process used before, the form is now sent digitally, instantly delivering detailed information on livestock and agricultural markets.

All the sites where we deployed the network are in what we call 'uncommunicative areas' - with no GSM network, landline, or internet connections - and hardly any radio communications. The only way of connecting these areas is through satellite. For this, we used RBGan terminals, which were donated by Inmarsat. Another partner, France Télécom, is supporting the project by paying the RBGan terminal subscription costs (€19/month). Local government staff gather information in local markets around the country through the SIMA (Système d'Information des Marchés Agricoles - information system on agricultural markets) and the SIMB (Système d'Information des Marchés du Bétail - information system on livestock markets). Each telecom centre covers a certain number of villages, and therefore markets as well. At each satellite terminal, we have a computer connected to a small data transmitter that sends the agricultural information gathered to the capital.

The system is currently up and running and the amount of information gathered exceeds the level of detail that was passed on before. Decision makers in the capital can now obtain, in real-time, data on the situation in the cereal and livestock markets, variations in stock of subsistence crops, modifications in the population's diet, the development of sanitary and nutritional situations, variations in natural resources, and the dynamics of commercial trade. The forms sent to decision makers in Niamey also include information on the local health situation, based on information collected by government workers from every health centre.

Since information delivered through satellite communications, and particularly mobile satellite solutions, is paid for by volume, the information packets need to be as 'light' as possible in order to make the system sustainable, and ensure that information is sent on a regular basis. Therefore, with support from the Université de Pau et des Pays de l'Adour, France, we developed software that compressed the data sent in each form from around 300kb to 3kb. Similarly, communication costs at each terminal need to be kept to a minimum. While the European Commission paid for the equipment, the training and the initial communications costs, the Niger government will eventually have to bear the communications costs of the 12 terminals (approximately €75 a month). The stations themselves are manned by local staff, trained by TSF. Apart from the communications and remuneration for data collection staff at the stations, there are no other costs involved. The simplicity of the system allows it to be replicated relatively easily in other parts of Africa. In collaboration with the European Commission, TSF is currently exploring how the model can be expanded to cover neighbouring countries. With slight modifications, the system could be adapted to collate information relating to avian flu, AIDS, malaria and many other early warning or prevention system needs.

As the weather situation has been stable since the setting up of the network, the system has yet to be truly tested. This is likely to happen during the next dry season, particularly in the months of May, June and July.

In the coming months we will begin to see the real impact of our work. ■

Oisin Walton
(communication@tsfi.org) is the communications director of TSF.

Oisin Walton/TSF

Related resources

Global Change System for Analysis, Research and Training (Start)
➜ Start, the global change SysTem for Analysis, Research and Training, provides an international framework for capacity building in developing countries in the area of climate-related scientific knowledge and technology.
www.start.org

AGRHYMET Regional Centre (ARC)
➜ The Centre Regional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationne Institute of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) analyses satellite imagery from its nine member states to contribute to achieving food security and increased agricultural production.
www.agrhymet.ne/eng/index.html

African Association of Remote Sensing of the Environment (AARSE)
➜ Professional association of African organisations aimed at improving local capacity in the field of remote sensing and GIS for resources management, environmental assessment and global changes studies.
www.itc.nl/aarse

Southern Africa Development Community Drought Monitoring Centre
➜ The Zimbabwe-based SADC DMC carries out climate monitoring and prediction for early warning and mitigation of adverse impacts of extreme climatic events on agricultural production, food security, water resources, energy, and health among other socio-economic sectors.
www.dmc.co.zw/index.htm

PDF: Trouble in the Air – Global Warming and the Privatised Atmosphere
By Patrick Bond and Rehana Dada.
➜ 242-page PDF book from University of KwaZulu Natal's Centre for Civil Society covering the threats from and resistance to South Africa's new carbon market.
www.nu.ac.za/ccs/files/ccs_energyseries_1005_complete.pdf

PDF: The Effects of Climate change on World Aquaculture: A global perspective
➜ Report from Geographical Information Systems and Applied Physiology (GISAP) and DFID in which GIS are exploited to develop models which indicate vulnerabilities around the world.
www.aquaculture.stir.ac.uk/GISAP/Pdfs/Climate_full.pdf

Anders Gunnartz/Lineair

Bush Radio recording studio, Capetown

Need to know

Communities need information on climate change, yet the subject is hardly covered by media in the South, according to one Kenyan journalist.

Throughout the 1990s, the media in the developing world was at the forefront of reporting on the devastation brought by the 'El Niño' rains, and bringing the issue of global climate change - and its impact on the local economy - into sharp focus. The extensive coverage provided farmers and rural communities with a scientific explanation for the dramatic weather changes that they had been witnessing in recent years.

But while such high-profile occurrences captured the public imagination and generated intense debates on the impacts of environmental degradation on people's day-to-day lives, the momentum generated was not sustained. The media has continued to focus on the 'big' stories such as deaths from drought, or the destruction caused by floods, with little information being provided on how to cope with the effects of climate-related changes.

Climate change is a relatively new concept within African media. Few journalists - or even editors, who are the gatekeepers of stories that go on air or into print - have a clear grasp of the science behind this phenomenon. On many occasions, science-oriented stories, as well as those covering forestry, agriculture, and climate change, get 'spiked'. Publishers prefer stories about crime, violence and political scandal because this is what sells.

Yet above all, what farmers and rural communities require for mitigating and adapting to the effects of climate change, is access to information.

Farmers need to know whether the changing circumstances in which they grow their plants or raise their animals is merely a question of variability or a permanent change to weather patterns. Communities across the ACP also need channels through which they can share information on strategies that have worked well for them, and to adapt such techniques to their own circumstances, whenever possible.

Beyond sharing practical experiences, civil society organizations in the South need to discuss how best to exploit international support available through such instruments as the Kyoto Protocol's Clean Development Mechanism, while continuing to debate amongst ourselves whether these approaches to emissions reductions are in their best interest.

NGOs in the South are becoming increasingly critical of how the CDM allows Northern countries to fund carbon sequestration projects in the developing world, giving rich countries a licence to continue to pollute. CDMwatch and South Africa's Centre for Civil Society, among others, argue that CDM projects often fail to take into account domestic needs, lock up the land used as carbon sinks indefinitely, and deliver financial rewards to Northern investment groups rather than local communities. We need to debate our responses to such North-developed solutions, while exploring ways in which we can reduce our own emissions.

The media – television, radio, print and online – naturally have a vital role to play in such debates, and yet there is a dearth of coverage of this issue in the developing world. A recent survey by the London-based NGO, Panos, of 47 journalists and from Jamaica, Zambia, Honduras and Sri Lanka found considerable frustration amongst media professionals, with what they felt was a severe lack of interest by editors.

Media owners are often concerned about short-term profits and may be unwilling to criticize industry, or offend advertisers. As many of the media houses operate on shoestring budgets, they often do not have adequate resources to undertake thorough investigation of climate-related stories.

Literacy too can be an obstacle to awareness, although the creation of online image banks of photographs and diagrams could help to convey the impacts of climate change.

There is also a need to build bridges between scientists and journalists. Scientists are often unwilling to simplify their research findings for a lay audience, so journalists have to sharpen their skills to simplify jargon-heavy scientific content and make the subject more relevant and easier to understand.

We journalists too can do much to help ourselves. We can set up networks in order to share information. The Caribbean Environmental Reporters Network (CERN), the Sri Lanka Environmental Journalists' Forum, and the Southern African Development Community Network of Climate Journalists are good examples.

We also need to build bridges between Southern and Northern environmental and science journalists so that we can exchange ideas and information.

Ultimately, everyone with a stake in this problem - journalists, editors and publishers, NGOs, policy makers and funders, and of course the people of the developing world – must pull together to fill this grievous information gap. ■

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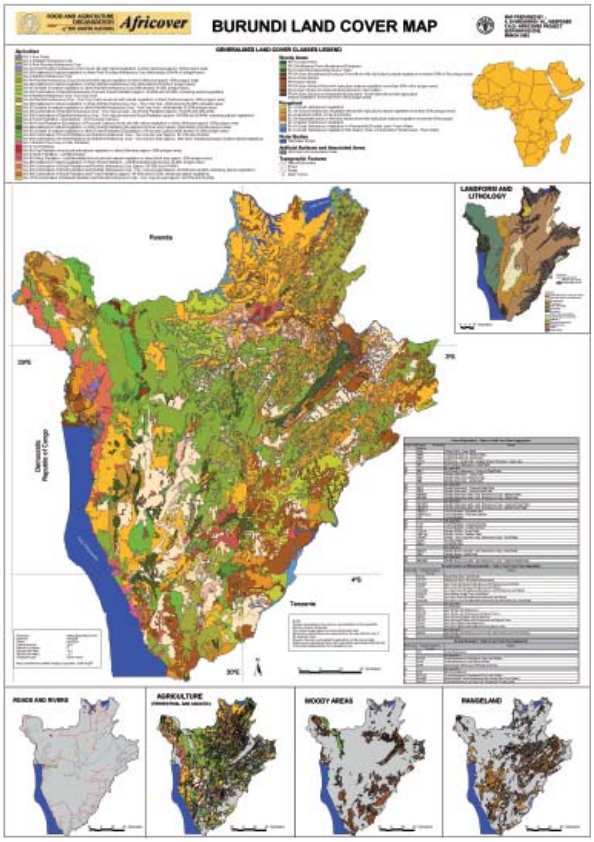
Africover Software Family



Example of Africover land cover map

The Africover Software Family is a powerful suite of tools for land cover mapping that is free and easy to use.

The natural resources of many African countries have come under severe strain in recent decades from both human and climatic pressures. In order to develop strategies to deal with climate change, develop environmental planning systems and construct effective early warning and disaster prevention and management networks, it is vital to have acesss to land cover maps (maps of the physical 'stuff' found at the surface of the earth – plants, trees, bare land, water, human constructions, etc.) and spatial databases.

The Africover project was established by FAO's Environment and Natural Resources Service (SDRN) in response to a number of national requests for the development of reliable geo-referenced information on natural resources. While a great deal of remotely sensed data is available, there remains a shortage of country-wide, regional and sub-regional quantitative and qualitative information on vegetation cover and current land use.

The Africover project fills this gap by developing such digital geo-referenced databases on land cover for the whole of Africa and making it available at no cost to the user.

MADE

So far, the project has produced Multi-purpose Africover Databases on Environmental Resources (MADE) for ten countries - Burundi, DR Congo, Egypt, Eritrea, Kenya, Rwanda, Somalia, the Sudan, Tanzania and Uganda.

MADE is produced at a 1:200,000 scale (1:100,000 for small countries and specific areas).

With MADE, users can:

- visualize and browse public domain data through the Africover interactive web maps;
- download public-domain geographic layers (requires free registration);
- download the data warehouses for free, interactive desktop GIS use; and
- consult the metadata on the content and characteristics of the data sets.

Beyond this, the project has developed a suite of mapping tools that are appropriate for the continent, enabling the structuring, developing, and querying of the spatial environmental databases.

Africover Mapping Tools

This software suite is divided into a pair of tools for land-cover database development: - LCCS and GeoVIS.

LCCS (Land Cover Classification System)

LCCS is free, user-friendly software that allows users to create their own land-cover legends compliant with the FAO - UNEP international standard, use them for land-cover mapping directly in GeoVIS, or export them to common file formats such as Excel, HTML, and Access.

GeoVis (Geographical Vector Interpretation System)

GeoVis is a vector-based editing system designed for thematic interpretation. It speeds up mapping activities based on remotely sensed data. It is also a user-friendly vector drawing and editing system, offering topological functions and advanced capabilities of raster management and a direct link with LCCS. It produces classified vector maps that can be exported to ArcView (a popular GIS programme) for further GIS-based manipulation or modelling. The GeoVis software is free for UN Agencies and organizations and national institutions dealing with the FAO.

The Africover software suite and databases, along with manuals, interactive web maps and public domain geographic layers are available for free download from the Africover website: www.africover.org ■

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Related resources

PDF: Whatever the Weather – Media attitudes to reporting climate change
➜ Survey of attitudes to climate change from radio, TV, print and online media professionals in the developing world.
www.panos.org.uk/resources/reportdownloadasp?type=report&id=1078

Climate Research journal Issue 16
➜ Special edition of Climate Research journal on advances in applying climate prediction science and technology to agriculture
www.int-res.com/abstracts/cr/v33/n1/

Tiempo
➜ Bi-monthly PDF bulletin on climate change and sustainable development
www.tiempocyberclimate.org/portal/bulletin.htm

Q&A

Dr. Mannava V. K. Sivakumar (MSivakumar@wmo.int) is chief of the agricultural meteorology division at the World Meteorological Organization (WMO).

Africa's monitoring stations feeling a little 'under the weather'

Is there a problem with Africa's weather monitoring system?
➜ The current networks of weather stations in Africa - and their spatial coverage - are insufficient for monitoring structural changes in rainfall patterns and therefore inadequate for dealing with climate change. In addition, most of these stations are located near airports, because historically aviation was the first sector that gathered weather data. However, meteorological information from airports cannot be applied to distant locations due to the high variability of rainfall.

In terms of climate change, this a particular problem for Africa, isn't it?
➜ To make informed predictions of climate changes in future, and their impact on rural communities, we need weather records that span at least 30 years. Such a historical database is indispensable for determining whether what is being observed is actual climate change or just climate variability. Variability refers to the normal changes in climate patterns in a region, while climate change implies a distinct difference either in temperature or rainfall from one period to another.

This is a particular problem for Africa, in terms of climate change, isn't it?
➜ Of course. The greatest impacts of climate change, according to the Intergovernmental Panel on Climate Change (IPCC), will be felt in the semi-arid regions of Africa. Here, rain is concentrated in three to four month seasons each year and is barely sufficient to grow rain-fed crops. The anticipated climate changes in these regions will result in a greater frequency of droughts, but also of heavy storms that cause erosion, flooding, soil loss, and land degradation.

A key problem facing rural communities is the lack of information. Communities can deal with the impacts of climate change, but only if they have information that will enable them to take appropriate action, and in a timely manner. If I know with certainty that there is going to be a drought this rainy season, I can plan for it: I can change my crop; I may decide not to sow as much seed as I would normally do; I might even try to find a supplemental water supply for my crops or to leave parts of my land fallow. So farmers can apply various strategies - but only as long as they have access to quality information!

What needs to be done to fix the problem of Africa's deteriorating weather stations?
➜ At the WMO, we advocate that the meteorological networks in Africa should be improved. First, there should be more stations in areas that are critical for a country's food security. Using GIS technology, we can quickly analyse many layers of information on crops, soils, physical infrastructure and so on, and identify communities that are most at risk. Then we need expand the number of stations to provide sufficient spatial coverage more generally. Next, we need to put in place a system that ensures that collected data are analyzed and disseminated to farming communities without delay.

Last November, just ahead of the UN Climate Change Conference in Nairobi, the WMO's Secretary-General, Michel Jarraud said that 200 automatic weather monitoring units were needed across Africa. How much would this cost?
➜ Automatic weather monitoring units are equipped with small data loggers that can record information in units of one minute, 15 minutes or every hour– whatever is needed. Typically, an automatic weather unit with just the basic sensors for temperature, rainfall, humidity and radiation would cost €3000. A network of 30 units would translate into a base cost of around €90-100,000. However we cannot just put up these units and then forget about them. Each unit needs to be physically inspected about once every three months to make sure that the sensors are functioning properly. A further ten to 15 per cent of the set up costs should be allocated for maintenance on an annual basis.

I admit that this is not loose change for a developing country. However, these units speed up the process of providing reliable weather forecasts to rural communities. We can receive the data from the monitoring units via satellite or telephone, analyze them and pass this information on to radio or TV stations, who can then pass them on to farmers in the form of bulletins. Moreover, as the data are collected in digital format, they can be fed into computer models to generate climate change scenarios.

Meteorological networks should be treated in the same way as a country's health system, with its network of hospitals. Dealing with climate change is no different and just as important for our survival, if not more so. We need to invest in networks that collect the weather data and provide the information when we need it. ■

More information: www.wmo.ch

Automatic weather monitoring station