Tiempo

#54

A bulletin on climate and development Issue 54 January 2005

Vulnerability in Samoa

Page 11

Tiempo

Issue 54 January 2005
www.tiempocyberclimate.org

Cover photo: The aftermath of a tropical cyclone in Moataa, Samoa. CBDAMPIC Project.

Solar power in South Africa Photo: Anders Arvidson, SEI

Gerald Leach
January 4 1933 – December 10 2004
It is with a great sense of loss that we report the death of Gerald Leach. Gerry died on Friday December 10th 2004 after a long illness. He was a towering man, with an intellect to match, fully committed to his decades of work as an energy and development analyst. Gerry was a much-valued contributor to Tiempo, appreciated for his perceptive comments as our "bemused observer", and he recently became co-editor of the quarterly bulletin. We will sorely miss his insight, knowledge and wisdom. Our thoughts are with his dearly loved family at this time.

Indigenous dialogue

Bill Lopik discusses a recent conference that considered sustainable development models and the practices of indigenous peoples

An opportunity to give voice to realities and studies of sustainability practices and concepts within indigenous communities was realized in June 2004 with the conference, "Sharing Indigenous Wisdom: An International Dialogue On Sustainable Development."

The conference was hosted by the College of Menominee Nation's Sustainable Development Institute. The College is a tribally controlled community college located in Wisconsin in the United States. The college and institute were organized in 1993 by Menominee community leaders representing a broad spectrum of institutional interests including governance, commerce, education and natural resource management.

The mission of the Sustainable Development Institute is two-fold: to reflect upon and disseminate the expertise of the Menominee people in sustainable development, and to advance the tenets of sustainability to other economic and social sectors.

Menominee expertise in forest management has gained widespread attention, receiving commendation by the United Nations in 1995, and designation as the first recipient of the United States Presidential Award for Sustainable Development in 1996. The conference was the fulfilment of a long-time dream of the Institute staff of hosting an international conference with a focus on the foundational elements of the Menominee model of sustainable development.

MAIN POINTS

- **Bill Lopik** discusses the outcome of a conference on the sustainable practices of indigenous peoples.
- **He describes** examples of sustainability from various parts of the world.
- **The conference** was a learning experience and a celebration of cultural diversity and indigenous unity.

The Menominee model of sustainable development is a theoretical model that conceptualizes sustainable development as the process of maintaining the balance and reconciling the inherent tensions between the various dimensions of sustainability.

The six dimensions are:

- land and sovereignty;
- natural environment;
- institutions;
- technology;
- economics; and,
- human perception, activity and behaviour.

Each dimension is understood to be dynamic, both in respect to its internal organization, and in relationship to each of the other five dimensions of the sustainable development process.

The model takes as its point of departure that change within one dimension will impact other dimensions in an ever-unfolding

diffusion of responses to change, whether externally driven or inherent to the dynamism of a specific dimension. Topics which reflect the interface of any two or more dimensions of sustainability are central to the Institute's interests, and are engaged through independent, collaborative and sponsored research and dissemination of information.

The Sharing Indigenous Wisdom conference brought representatives across political, social, economic, institutional and cultural boundaries from around the globe to Green Bay, Wisconsin. The ideals, values, customs and traditions of diverse indigenous cultures focused upon developing sustainable models of technology, economics, land and sovereignty, natural environment, institutions and human perception and behaviours in contemporary societies.

Twenty three practitioners and scholars delivered papers and made presentations outlining sustainable practices and models. These presentations were grouped into four topical areas at the conference. They included: Sustaining the Wisdom, Sustaining the Nation, Sustaining the Spirit and Sustaining the Earth.

Seventy registered participants participated in a salon discussion model following each of the four topical sessions. The salon model facilitated dialogue among participants allowing conference attendees the opportunity to discuss areas of interest and concern derived from the information presented in the sessions.

The context of the conference was framed by Verna Fowler, President and Founder of the College of Menominee Nation. She opened the conference by recognizing that the Menominee Nation has been internationally acknowledged for its leadership in sustainable development and takes pride in its legacy of stewardship of its forested ancestral lands, and honours those similar efforts of other indigenous communities globally.

She clearly framed the goal of the conference by saying that "collectively those efforts will not only assure a high quality of life for the future generations of our communities, but also make a positive contribution to the global body of knowledge on how best to achieve sustainable development among the community of nations."

The first theme centred upon "Sustaining the Wisdom". Papers were presented on how indigenous knowledge and philosophy is embraced in a variety of ways. For example, Ojibwa philosophy has been instrumental in the planning of the academic and building facilities at the Turtle Mountain Community College located in the northernmost section of the state of North Dakota in the United States. All academic and facilities growth of this college is designed in recognition that we are stewards of Mother Earth.

An example from Africa gave evidence of how indigenous tenure and knowledge systems offer hope for gender equity and best ecosystem management in sub-Saharan Africa.

Tribal representatives from the Pikangikum First Nation in Ontario, Canada, spoke of how a tribal enterprise approach to forestry can effectively contribute to best ecological practices and aboriginal economic self-sufficiency. They expressed their desire to learn from the same sustainable forestry practices that the Menominees have historically followed.

Indigenous Maori people from New Zealand shared a unique learning journey called "The Tipu Ake Lifecycle – A Leadership Model for Innovative Organizations". It is a cyclic behavioural model that is used to create effective community sustainability programmes. It is a model of organizational development that is based on the Maori's deep understanding of nature with all its complexity and interconnectedness.

The second theme covered at the conference dealt with how indigenous cultures contribute to "Sustaining the Earth". This theme focused primarily on environmental issues. The first presentation focused on the climatic similarities between South Tunisia and South Texas and the options for developing alternative resources of water and energy in remote hot zones.

Another paper examined efforts in Kenya to inventory and conserve the mpingo tree located throughout East Africa. It is a tree that contains a myriad of uses and functions for the Wamwera people of Kenya.

The Menominee model of sustainable forestry was also addressed during this ses-

THE CLIMATE NEGOTIATIONS

Joke Waller-Hunter, Executive Secretary of the United Nations Framework Convention on Climate Change, has congratulated the world's indigenous peoples on the substantial progress they have made in "creating a policy space" in the environmental treaty processes. Parties to the Climate Convention have "acknowledged the importance of the on-going participation by indigenous peoples' organizations ..., especially though discussions on relevant agenda items, participation in workshops and informal contacts," she said in a statement to mark the International Day of the World's Indigenous Peoples on August 9th 2004.

sion by the head forester for Menominee Tribal Enterprises. The 140 year history of the resource use and management of the Menominee forest stands as a practical example of sustainable forestry – forestry that is ecologically viable, economically feasible and socially desirable.

The session on "Sustaining the Nation" offered examples of how geospatial technologies can be utilized as an extension to ancestral philosophies of land stewardship and cultural preservation on the Rosebud Lakota reservation in South Dakota of the United States.

Also highlighted was work in the Kakamega Forest of Kenya. Here local development organizations have linked with the Kakamega community to implement a number of integrated rural development strategies that are effectively addressing problems of human poverty and environmental degradation.

Evidence was also presented on how the Permaculture Institute of El Salvador is working with small farmers to halt the destruction of their environment and way of life. The Institute builds upon the pre-Colombian practices of natural agriculture that the indigenous Mayan and Pipil practised. The strategy is to build leadership within poor rural communities, introducing subsistence farmers to permaculture as a tool for sustainable development.

Another presentation highlighted how potato farmers in the Venezuelan Andes have drawn upon long-standing social and cultural resources to reduce the risk of farming due to market liberalization policies and the wide dispersion of their field plots.

The presentations within the "Sustaining the Spirit" theme offered examples of how indigenous cultures are being preserved and restored. The need for preservation of cultural heritage in Palestine was one of the important topics of discussion raised in this session. Palestine crucially needs public policies that promote the sustainability of the cultural heritage of Palestinians amidst the unsettled economic and political situation. Efforts at designing community development projects in Palestine that are based on principles of sustainable development where effectiveness depends, in part, on solutions that resonate with the associated community were addressed.

The Woodlands Wisdom Nutrition Project was cited as community-based action research designed to benefit the nutritional needs of native people. It is a programme initiated by the Native American Tribal Colleges

College of the Menominee Nation

in the upper midwest of the United States to address chronic health issues in Native American communities through culturally-based food and nutrition programmes of teaching, research and community connections.

Continuing within the "Sustaining the Spirit" theme, another presentation highlighted development fieldwork from Cambodia and the Philippines. The work showed how development practitioners are working subversively to convert development to a tool of rejuvenation of indigenous cultures for a sustainable future rather than one of global homogenization.

The fourth presentation focused on how the Canadian government has effectively negotiated legal agreements between aboriginal communities and mining companies through the principle of impact benefit agreements.

A highlight of the week for many participants was the all day tour of the Menominee forest. They had the opportunity to see close-up the ecological health of the forest and receive an explanation of sustainable forestry practices. They could physically sense the micro-climatic change between driving through miles of open field crops and then entering the 236,000 acre forest. The air turned noticeably cooler and more humid.

It is a forest that is continuously harvested for its high quality saw-timber, but remains a healthy ecosystem in terms of increased flora and fauna. One would never surmise that the forest has been cut over two times in the last 140 years, yet currently has more board feet of timber standing now than ever before. It is a testament to how economic development, cultural preservation and environmental sustainability can not only co-exist, but actually complement each other.

The field trip into the forest and the culminating feast comprising of traditional Menominee food sources from the forest was indeed memorable for all participants. It placed the entire conference into its appropriate context.

The conference was not only a learning experience for those who attended, but also a celebration of cultural diversity and indigenous unity.

One evening was completely devoted to a grand pow-wow celebration. Drum groups and dancers from five Wisconsin Native American tribes were invited to take part in the conference festivities. Conference participants all had a chance to dance, share gifts and share stories about their respective cultures.

The week-long event fostered a sense of unity and cohesion that many expressed as being unique from other conferences they have attended. There was a strong sense that this initiative must continue on in subsequent years and that the indigenous perspective towards sustainable development must be disseminated to a larger audience. ■

ABOUT THE AUTHOR

● **William Van Lopik** is Academic Program Director for the Sustainable Development Institute at the College of Menominee Nation in Keshena, Wisconsin, in the United States.

CONTACT

● **William Van Lopik,** Sustainable Development Institute, College of the Menominee Nation, PO Box 1179, Keshena, WI 54135, USA.
Fax: +1-715-7995951
Web: www.sustainabledevelopmentinstitute.org
E-mail: wvanlopik@menominee.edu

FURTHER INFORMATION

● **On the Web:** The Sustainable Development Institute is currently in the process of publishing the proceedings of the conference, the keynote addresses offered by David Korten, Ricardo Navarro and Daniel Durett, as well as making available compact discs of the pow-wow celebration. Visit the conference site at www.sharingindigenouswisdom.org for details.

South Africa climate strategy

Mick Kelly reports on the new National Climate Change Response Strategy

The Deputy Minister of Environmental Affairs and Tourism, Rejoice Mabudafhasi, launched South Africa's new National Climate Change Response Strategy on 7 October 2004 in Johannesburg. She said that the strategy would address the government's priorities of poverty eradication, job creation and sustainable economic, social and environmental development.

"It is quite clear that our struggle to fight against poverty and our mandate to manage the natural resources will be undermined unless climate change response strategies are developed and implemented at local, regional and continental levels to ensure that problems associated with climate change are dealt with in a proactive manner," she said.

The plan is aimed primarily at government departments who will use it as a basis for developing their own plans for integrating climate issues into their policies and practices. Director-General of the Department of Environmental Affairs and Tourism, Chippy Olver, reported that "we are adopting an integrated climate change response strategy which maps out a detailed set of responsibilities for each department."

The national strategy is based on the following principles:

- growing the economy and competitiveness within the globally-negotiated response to climate change;
- focusing on areas that promote sustainable development;
- the need to consistently use locally-available resources (coal);
- recognizing that South Africa's emissions will continue to increase as development is realized; and,
- recognizing that adaptation to the adverse impacts of climate change will be necessary.

Listing threats to South Africa posed by climate change, Olver concluded that "it's a grim picture". The country is getting hotter, drier in some places and wetter in others. Crop production will be affected. He warned that "within two generations, what we know as the maize triangle may no longer exist." Malaria could spread into previously malaria-free areas. The economy will suffer as climate alters.

South Africa's vulnerability is exacerbated by the fact that the nation has a fossil fuel-

MAIN POINTS

- **Mick Kelly describes** the South Africa National Climate Change Response Strategy.
- **The Strategy** maps out responsibilities for government departments.
- **The main elements** concern renewable energy and energy efficiency, transport, coal-mining, sustainable industrial development, agriculture, forestry, waste management. Education is also a priority.

based economy, is a coal exporter and has insufficient appropriate technology.

The South African economy is vulnerable to the possible response measures implemented by Annex 1 countries. The economy is highly dependent on income generated from the production, processing, export and consumption of coal.

As regards mitigation, the strategy prioritizes the development of renewable energy. South Africa should obtain 10,000 gigawatt hours of energy from renewable sources by 2012. The strategy also calls for a national authority, under the Department of Minerals and Energy, to facilitate Clean Development Mechanism projects. South Africa needed to take advantage of new opportunities for funding and investment, Olver pointed out.

The main elements of the mitigation strategy are:

- implementing the Government's White Paper on Renewable Energy and the Energy Efficiency Strategy;
- developing a transport sector mitigation programme;
- developing a coal-mining sector mitigation programme;
- implementing sustainable industrial development;
- interventions to reduce greenhouse gas emissions in the agricultural sector;
- the establishment and extension of forest schemes; and,
- the optimization of waste management practices.

At the launch, Chippy Olver noted that, although progress was being made in reducing greenhouse gas emissions, there was less clarity with regard to dealing with the impacts of climate change and adaptive responses. The Department of Agriculture would develop "advisory packages" so that farmers would be aware of their options as climate alters.

The national strategy calls on the Department of Education to speed up education, training and awareness to facilitate the implementation of response actions. Relevant ministries would need to develop water resource management, adapt agricultural, rangeland and forestry practices appropriately and extend health protection and promotion measures to counter climate change-related health impacts.

The national strategy has been welcomed by most commentators, though there has been some criticism from non-governmental organizations on the grounds that the document does not go far enough. Bruce Hewitson of the University of Cape Town considers the strategy positive in principle, but he too has reservations. He argues that the plan "does not address the priorities or critical issues" and should be seen as a first step rather than a definitive solution.

"This strategy is not the end of the story," responded Joanne Wawitch, Deputy Director-General of the Department of Environmental Affairs and Tourism. The government is starting work on a second document that will provide a concrete action plan. ■

ABOUT THE AUTHOR

● **Mick Kelly** is an atmospheric scientist with the Climatic Research Unit, University of East Anglia, Norwich, UK, and an editor of *Tiempo*.

CONTACT

● **Mick Kelly,** Climatic Research Unit, School of Environmental Sciences, UEA, Norwich, NR4 7TJ, UK.
Fax: +44 1603 507784
Web: www.tiempocyberclimate.org
E-mail: m.kelly@uea.ac.uk

FURTHER INFORMATION

● **On the web:** South Africa's first National Communication under the United Nations Framework Convention on Climate Change is available online at: http://unfccc.int./resource/natcom/nctable.html (1 Mb download).

ACKNOWLEDGEMENTS

● We thank Trodger Thebe of the South African Department of Environmental Affairs and Tourism for providing material for this report.

Community level adaptation

WORKSHOP REPORT

Conclusions from a three-day International Workshop on Community Level Adaptation to Climate Change, held in Dhaka, Bangladesh from 16 to 18 January 2005.

The workshop was the first of its kind. About 80 people from Asia, the Pacific, Africa, Latin America, North America and Europe attended. It was jointly organized by the Bangladesh Centre for Advanced Studies (BCAS), the International Institute for Environment and Development (IIED), the Regional and International Networking Group and the World Conservation Union (IUCN) with support from Canadian and UK development agencies.

"Although the recent Tsunami in the Indian Ocean was not linked to climate change, its impacts on some of the poorest and most vulnerable communities along the coasts have highlighted the vulnerability of these communities to the potential adverse impacts of future climate change" said Saleemul Huq from IIED, UK. Richard Klein from the Potsdam Institute for Climate Impact Research, Germany, highlighted the need to enhance adaptation knowledge by learning from practice. Barry Smit from the University of Guelph, Canada, stated that climate change impacts will affect not only vulnerable communities in poor countries, but also those in wealthy countries, such as the Inuit in Canada. Farhana Yamin from the Institute for Development Studies, UK, stressed the need for international negotiations to focus more on adaptation and the need to link climate change with development. She described a new network – Linking Climate Adaptation – to keep researchers, policymakers and practitioners in touch. Murari Lal from the University of South Pacific highlighted the need to ensure messages to communities are based on solid science. Atiq Rahman from BCAS said that communities often have long-established coping strategies for climate variability, "the challenge is for researchers to learn from local knowledge and provide further advice based on established practices."

Community-based adaptation activities from Bangladesh, Vietnam, Sri Lanka, Nepal, Samoa, Argentina, Mozambique, South Africa, Canada and India were presented. Participants concluded with some shared lessons including the need to: identify communities most at risk; find ways to reach and interact with them (using local languages and non-written means of communication such as songs); simplify messages but ensure they are based on reliable science; ensure researchers and practitioners at the local level learn from each other.

Several national level policymakers from Bangladesh also participated. The Minister for Justice and Parliamentary Affairs, Barrister Moudud Ahmad, said that while the poor countries (and poor communities in all countries) suffer the adverse impacts of climate change, rich countries and rich people around the world are responsible for creating the problem. Speaking to them he said, "you burn while our people die!" He stressed the need for greater reductions in greenhouse gas emissions, as adaptation can only be a partial solution to the problem.

● **Further information:** Please contact ccadaptation.workshop@bcas.net

NEWS

TSUNAMI

Commenting on the Indian Ocean tsunami tragedy, Klaus Toepfer, director of the United Nations Environment Programme, insists that the world must guard against both natural catastrophes and long-term climate change.

"We have not and will not play one threat against another," he said, arguing that it would be a huge mistake to focus attention on the threat of tsunamis whilst neglecting the long-term problem of climate change.

Toepfer noted that poor people were suffering twice-over as a result of the tsunami as many were not insured.

Read more:
news.bbc.co.uk/1/hi/sci/tech/4152331.stm

BRAZIL

The Brazilian government has released its inventory of greenhouse gas emissions, required under the United Nations Framework Convention on Climate Change.

A matter of some controversy in Brazil, the report shows that the nation generated 1.03 billion tons of carbon dioxide-equivalent in 1994, about three per cent of global emissions. This makes Brazil one the world's largest polluters.
Burning of the Amazon and other forests accounts for three-quarters of the total.

Read more:
news.bbc.co.uk/1/hi/sci/tech/4087493.stm

CHINA

China has released its first official estimates of national greenhouse gas emissions.

With total national emissions of 2.6 billion tons of carbon dioxide in the early 1990s, and despite reported efficiency gains later in the decade, China is the second biggest greenhouse polluter behind the United States.
Taking emissions per head of population, though, China ranks much lower. "It's still relatively low per capita, but the volume is increasing rapidly," said Khalid Malik, United Nations resident coordinator in Beijing. China intends to quadruple its economic output by 2020.

Read more:
www.terradaily.com/2004/041109074517.kn4zftrm.html

CDM

The first Clean Development Mechanism project has been formally registered, marking the latest phase in the implementation of this market mechanism aimed at reducing greenhouse gas emissions.

The project will cut landfill emissions of methane in the State of Rio de Janeiro, Brazil. Methane from rotting rubbish will be burned to generate electricity, rather than escaping to the atmosphere.
Project partners are S A Paulista, EcoSecurities and the World Bank Netherlands Clean Development Facility.

Read more:
www.terradaily.com/2004/041118174321.zbbji9na.html

CLIMATE REPORT

"There is a sense that climate is only marginally entering into development planning, and that societal resilience is not improving," concludes a report on climate science in Africa.

The Africa Climate Report suggests strengthening research capacity and the creation of a regional climate centre.
Declan Conway of the University of East Anglia, one of the report's authors, believes that solutions to the climate threat cannot be imposed by the international community. "The answers will come from Africa," he says.

Read more:
www.scidev.net/News/index.cfm?fuseaction=readNews&itemid=1808&language=1

Vulnerability in Samoa

Karen Sutherland, Barry Smit, Violet Wulf and Taito Nakalevu assess vulnerability to climate change and adaptive capacity in Samoa: the case of Saoluafata Village

As a small island developing state, Samoa is expected to be particularly vulnerable to climate change. Projected sea level rise could increase coastal erosion, cause loss of land and property, and dislocate island inhabitants. Changes in tropical cyclone systems may alter risks to life, property and ecosystems. Water supplies and food security could be threatened by changes in climate. As a Least Developed Country, Samoa is considered to have limited ability to cope with the risks associated with changes in climate. This has been recognized by the international community, and in Article 4.4 of the United Nations Framework Convention on Climate Change (UNFCCC), which makes explicit commitments to the most vulnerable developing countries:

"The developed country Parties shall assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects." This international commitment was reaffirmed at the Eighth Conference of the Parties (COP) to the UNFCCC with particular attention paid to small island developing states: "Adaptation to the adverse effects of climate change is of high priority for all countries. Developing countries are particularly vulnerable, especially the Least Developed Countries and Small Island Developing States. Adaptation requires urgent attention and action on the part of all countries." In Samoa, there is a need to assess vulnerabilities to climate-related risks in order to identify measures to enhance Samoa's adaptive capacity to better cope with a changing climate.

This paper summarizes the Samoan component of the Capacity Building for the Development of Adaptation Measures in Pacific Island Countries (CBDAMPIC) project sponsored by the Canada Climate Change Development Fund and co-ordinated by the Pacific Regional Environment Programme (PREP). The project was undertaken in Samoa by the Ministry of Natural Resources and Environment and it focussed on two communities, one of which, Saoluafata Village, is described here. The project was designed to

MAIN POINTS

- **The authors describe** the particular vulnerabilities to climate-related risks in Samoa.
- **They summarize** research designed to assess the vulnerability of Saoluafata Village as a basis for identifying measures to improve local adaptive capacity and mainstream adaptation into the national policy framework.
- **They conclude** that Saoluafata's adaptive capacity is probably insufficient to accommodate future changes in exposure to climate-related risks, and suggest several possible adaptive measures.

assess the vulnerability of Saoluafata Village as a basis for identifying measures to improve the community's adaptive capacity and for mainstreaming adaptation into the national policy framework.

The concept of vulnerability

Scholarship from a wide range of disciplines, including natural hazards, political economy, risk management and climate change, helps conceptualize 'vulnerability'. Most researchers now recognize that the vulnerability of a community is a function of its exposure to climatic conditions and its adaptive capacity to deal with those exposures. Exposure depends on the frequency, magnitude and extent of climate-related risks, and whether the community lives in a hazardous environment. A community's exposure to tropical cyclones, for example, reflects both the occurrence of cyclones and the location and structure of the community.

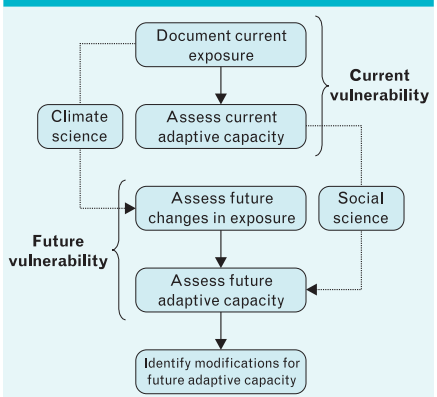
Adaptive capacity refers to the ability of a community to prepare for, and cope with or recover from, exposure to climate-related risks. Adaptive capacity is determined by community characteristics such as wealth, equality, political and social stability, access to infrastructure, institutional support and 'social capital', all of which can facilitate or constrain the ability of the community to deal with climate-related risks. This conceptualisation of vulnerability provides the basis for this analysis of community vulnerability in Samoa.

The vulnerability approach

The analysis of vulnerability was done using principles from the vulnerability, or 'bottom-up' approach increasingly used in the climate change adaptation field. The assessment begins at the community-level and examines the conditions that give rise to vulnerability based on the personal experiences and insights of local people. The approach requires intensive participation of community members to identify climatic conditions relevant to the community and to assess the effectiveness of adaptive strategies. The ultimate objective is to identify opportunities to strengthen the adaptive capacity of the community to climate change.

As summarized in the figure below, the assessment of vulnerability begins with documenting the community's current exposure to climate-related risks, reflecting both the climatic conditions and location of human settlement, assets and infrastructure which place the community at risk. The current capacity of the community to cope with climatic conditions is assessed by consulting local residents on what they do to prepare for, cope with or respond to climate-related risks. Together, the exposure to climate-related risks and the adaptive capacity characterize the vulnerability of the community.

ASSESSING VULNERABILITY



Future changes in the attributes of climate to which the community is particularly sensitive are estimated using climate science. For example, regional climate change models provide indications as to how particular climatic conditions are expected to change in the future. This provides an estimate of future community exposure to climate-related risks.

An assessment of the community's adaptive capacity to accommodate these future climatic conditions is made by evaluating the scope and limitations of existing strategies. In other words, would the community's current efforts or methods to deal with climate-related risks be sufficient if these risks increased in frequency and/or severity? Limitations or constraints placed on the community's adaptive capacity are considered here, as well as the sustainability of current coping mechanisms. The possibility of increased exposure limiting or compounding the community's ability to deal with climate-related risks is also exam-

ined. The interaction of future exposure and adaptive capacity represents the future state of community vulnerability.

Finally, modifications to strengthen or improve the community's adaptive capacity are identified. This involves targeting ways of overcoming limitations or constraints on the community's adaptive capacity, such as limited economic resources, institutional support or 'social capital'. It also involves implementing particular adaptive strategies to reduce vulnerability, such as measures to address coastal erosion, flood damage or threats to water security.

Community-level vulnerability assessment

The main source of data was from 'focus group discussions' (see photo). Five focus group discussion sessions were held, one each with the village chiefs, the chiefs' wives and women elders, unmarried women, untitled men, and the youth group and Sunday school. The focus groups reflected the social structure of the village and provided a setting in which participants felt comfortable expressing their ideas and describing personal experiences.

Research questions were posed in a semi-structured and open-ended manner, broadly reflecting the steps in the figure on page 12. The questions were structured to generate information on how climate affects the livelihoods and well-being of the groups in the village. Each focus group session began with a very general and open discussion about problems faced by the group or village, climate-related or otherwise. This led into questions about the attributes of climate which the group or village had particularly sensitivities to. Participants were asked to identify climatic events from the past that were especially problematic for the village. This resulted in climate-related risks characterized by their severity, frequency and extent. The implications and effects that these climate-related risks had on livelihoods and well-being were discussed. The coping mechanisms or response measures taken to deal with climate-related risks were described by the participants. Participants provided information on the effectiveness or success of such coping mechanisms. The future success of these coping mechanisms in the face of increases in frequency and/or intensity of identified climatic events or conditions was considered. Focus group sessions ended with a discussion of possible adaptive strategies for the village in order to help people cope better with climate risks.

Vulnerability to climate-related risks in Saoluafata village

Current vulnerability to climate-related risks

Saoluafata is exposed to climate-related risks including tropical cyclones, coastal erosion and heavy rain. The narrow coastal plain bordered by steep headlands and the concentration of settlements along the coast contribute to Saoluafata's exposure. The strategies employed to cope with these risks range from self-constructed drainage ways and seawalls to financial remittances, and institutional support provided by the Village Council, the Church and development agencies.

Focus group discussion in Saoluafata

Photo: CBDAMPIC Project

Residents said tropical cyclones were particularly problematic. Samoa is located in the tropical cyclone belt of the South Pacific and Saoluafata is in a hazardous coastal area, thus predisposing it to exposure to tropical cyclones. The back-to-back cyclones in 1990 and 1991 caused extensive damage to housing, plantations, buildings and roads in Saoluafata and many other villages across Samoa (see cover photo). Most households suffered from a shortage of food, and those that sold their produce at the market suffered huge reductions in income.

Financial remittances sent from relatives working overseas made an important contribution to the adaptive capacity of Saoluafata when recovering from the cyclones. This money was used to purchase food, rebuild houses, replant plantations and supplement lost income. Institutional support was provided by the Church in the form of shelter and food supplies, and by development aid in the form of seeds and materials for rebuilding. The Village Council coordinated the clean-up of debris and the repair of roads and buildings. Those households along the coast which could afford to do so, reclaimed the land lost or constructed a partial seawall in the hope of protecting their properties from future cyclones. Some chose to retreat from the coast and resettle further inland, while others resorted to tying their rooftops down with rope in attempts to withstand high winds.

Future exposure to climate-related risks

In addition to tropical cyclones, the residents of Saoluafata identified intense rainfall, sea level rise and prolonged periods of drought to be particularly problematic. Numerous regional climate change models for the Pacific Islands region were reviewed to identify how these attributes of climate are expected to change in the future. An increase in the daily intensity of precipitation is projected, suggesting an increase in the probability of more frequent floods. This could be intensified by future El Niño events. It is expected that the intensity and frequency of tropical cyclones in the Pacific Islands region will increase in the future. This would cause increases in wind speed, peak precipitation levels and destructive potential. An increase in the frequency of extreme high temperatures is also projected, thereby increasing the probability of heat stress conditions and droughts.

Sea level is projected to rise steadily for the Pacific Islands region. This increases the risk of inundation and coastal flooding, erosion, and saltwater intrusion into surface water and ground water supplies. Coupled with storm surges associated with tropical cyclones, sea level rise increases the risks of loss of land and displacement of communities. While the islands of Samoa can be as high as 2,000 metres, most settlements and economic activity is located near the coast, and is thus susceptible to damage and destruction from coastal erosion and flooding.

“Sea level is projected to rise steadily for the Pacific Islands region. This increases the risk of inundation and coastal flooding, erosion, and saltwater intrusion into surface water and ground water supplies”

Future adaptive capacity to deal with climate-related risks

Saoluafata’s adaptive capacity is probably insufficient to accommodate future changes in exposure to climate-related risks. For example, the ‘social capital’ of Saoluafata is a key component of its adaptive capacity. This social network is both within Saoluafata, in terms of family and neighbours offering shelter, food and labour to those in need, and outside Saoluafata, in terms of financial remittances sent from relatives working overseas. With more extreme events, the social network of Saoluafata may be needed to respond to crisis situations more often. However, Samoa is experiencing a transition from traditional systems to a more Western-style society, and it is unclear whether the existing tight social networks and the sense of service to one’s community will remain. Social instability would hinder Saoluafata’s capacity to deal with climate risks. Furthermore, as climate-induced losses increase, dependency on the flow of remittances will rise and there is no guarantee that losses will continue to be offset by remittances in the future.

Adaptive measures to reduce vulnerability to climate-related risks

In view of the projected changes in climatic conditions affecting Saoluafata, and the assessment of the community’s adaptive capacity to deal with future changes in exposure, local residents identified several adaptive measures. These included a seawall, a water

drainage system, water tanks, a ban on tree clearing, some relocation, a place to store food supplies and renovations to existing infrastructure.

Residents favoured the construction of a seawall to protect coastal settlements and properties from coastal erosion, storm surges and resulting loss of land. The safety and security of those living along the coast is the primary concern of the village. People feel very strongly about protecting the sacred grounds and burial plots of their ancestors, both of which are located near the coast and are susceptible to loss through coastal erosion. The people of Saoluafata see the land as a part of their heritage and preventing further land loss is therefore very important to them.

Seawalls have long been the traditional response to coastal erosion and flooding in many small island states. The construction of a seawall would require significant financial investment, labour, materials and equipment. The majority of the required funds would need to come from development agencies or banks. For Saoluafata, a seawall may be the only practical option along the coast, where vital infrastructure, assets and settlements are at immediate risk.

The adaptive measures proposed above help to focus attention at the local scale. However, enhancing adaptive capacity involves more than just technical options; it must consider larger social, political and economic processes. Broader measures could be examined. These might include strengthening the institutional support provided by the Samoan government, promoting economic development through trade, or implementing poverty alleviation measures which target subsistence households not receiving external assistance. An adaptation strategy will be successful when it is integrated with other policies, such as disaster preparedness, land use planning, environmental conservation, coastal management and national plans for sustainable development. This is likely to be the case for Samoa. National policies and programmes are currently being evaluated as to their effectiveness in capturing vulnerability to climate change. Possibilities for 'mainstreaming', or incorporating climate change adaptation strategies into national policy and programme frameworks, are being assessed. ■

ABOUT THE AUTHORS

● **Karen Sutherland** recently completed her graduate studies in the Department of Geography at the University of Guelph.

● **Dr Barry Smit** is a Professor in the Department of Geography at the University of Guelph.

● **Violet Wulf** is the Principal Climate Change Officer at the Ministry of Natural Resources and Environment in Samoa.

● **Taito Nakalevu** manages the CB-DAMPIC Project and is Climate Change Adaptation Officer of the Pacific Regional Environment Programme.

CONTACT

● **Karen Sutherland**, Department of Geography, University of Guelph, Guelph, Ontario N1G 2W1 Canada
Email: ksutherl@uoguelph.ca

● **Dr Barry Smit**, Department of Geography, University of Guelph, Guelph, Ontario N1G 2W1 Canada
Email: bsmit@uoguelph.ca

● **Violet Wulf**, Ministry of Natural Resources and Environment, P.O. Box Private Bag, Apia, Samoa
Email: climatechange@lesamoa.net

● **Taito Nakalevu**, Secretariat for the Pacific Regional Environment Programme, P.O. Box 240, Apia, Samoa
Email: taiton@sprep.org.ws

CONFERENCES

Cuban Convention of Earth Sciences
Havana, Cuba
05-04-2005 to 08-04-2005
The convention and exhibition will incorporate three main technical events. These are: the VI Geology and Mining Congress; the III Geophysics Congress; and the 1st Astronomy Symposium. A number of workshops will be held to focus on issues such as: global changes and coastal modifications; seismicity and geologic hazards; geology, tourism and the environment; and new concepts on the use of rocks and industrial materials.
Email: iturralde@mnhnc.inf.cu
Web: www.scg.cu|geociencias.htm

Fifth International Workshop on Large-Scale Integration of Wind Power & Transmission Networks for Offshore Wind Farms
Glasgow, UK
07-04-2005 to 08-04-2005
Organized by the Royal Institute of Technology, Department of Electrical Engineering in Stockholm with the University of Strathclyde in Glasgow. Topics for discussion will include: advances in on and offshore wind energy technology; power monitoring and prediction systems; IT technology for large-scale integration of wind power, amongst others.
Details: Thomas Ackermann, Royal Institute of Technology, ETS, Teknikringen 33, 10044 Stockholm, Sweden. Fax: +46-8-7906510. Email: offshorewindpower@ets.kth.se
Web: www.ets.kth.se|ees|workshop|offshore

Third International Conference on Water Resources Management
Algarve, Portugal
11-04-2005 to 13-04-2005
Conference will focus on the most recent technological and scientific developments associated with the management of surface and sub-surface water resources. Participants will include engineers, scientists and all professionals involved in the research and development activities associated with water resources, water quality, water management and other important related topics.
Details: Rachel Green, Conference Coordinator WRM2005, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton SO40 7AA, UK. Fax: +44-238-0292853. Email: rgreen@wessex.ac.uk
Web: www.wessex.ac.uk|conferences|2005|waterresources05|

16th Global Warming International Conference & Expo
New York, USA
19-04-2005 to 22-04-2005
Main theme of the 16th Conference is "Climate Change Mitigation vs Extreme Events". There will be a number of symposiums held in New York City as part of this conference. These will include a symposium on Sustainable Environment and Health for the 21st century, a symposium on Extreme Weather Events and Agricultural Systems and a symposium on The Future of Energy and Transportation.
Details: James Roberts, GWXVI International Program Committee, GWIC, PO Box 5275, Woodridge, IL 60517-0275, USA. Fax: +1-630-9101561. Email: jroberts@globalwarming.net
Web: www.globalwarming.net

Green Power Mediterranean
Rome, Italy
26-04-2005 to 27-04-2005
Intended to create a focused venue for networking and knowledge transfer to further the adoption of renewable energy systems and energy efficiency programmes in the Mediterranean region. Forum topics include: sustainable energy financing; regional emissions trading; regional interconnection and transmission; renewable islands; progressive policy and regulation; and presentation of a number of successful renewable energy systems case studies.
Email: info@greenpowerconferences.com
Web: www.greenpowerconferences.com

Carbon Expo
Cologne, Germany
11-05-2005 to 13-05-2005
The Carbon Expo Global Carbon Market Fair & Conference co-organized by the World Bank Carbon Finance Business, the International Emissions Trading Association and Koelnmesse. Anticipated that participants will include: senior managers of corporate strategies and risk management; decision makers; technical experts; business representatives; industry associations; and government representatives.
Details: Koelnmesse GmbH, Sabrina Brauner, Messeplatz 1, 50679 Koln, Germany. Fax: +49-221-8213098. Email: s.brauner@koelnmesse.de
Web: www.carbonexpo.com

2nd International Conference on Integrated Coastal Zone Management
Santiago de Cuba, Cuba
11-05-2005 to 13-05-2005
Main aim of the conference is to share experiences and promote new working relations between those working in related fields. Discussion and debate will focus on international exchange between professors, researchers, managers and social workers as well as those professionals related to the studies of sustainable development and resource management of coastal zones.
Details: Pedro Beaton Boler, Rectorado de la Universidad de Oriente, Avenida Patricio Lumumba s|n, Santiago de Cuba 90 500, Cuba. Email: pbeaton@rect.uo.edu.cu
Web: www.uo.edu.cu|contacto.html

The El Niño Phenomenon and its Global Impact
Guayaquil, Ecuador
16-05-2005 to 20-05-2005
The 1st Alexander von Humboldt International Conference on the El Niño

phenomenon and its global impact is co-organized by the European Geosciences Union and the International Research Centre on El Niño. Main topics include: ENSO in Climate History; Recent major El Niño Events; Teleconnections and Worldwide Impact; El Niño and Global Warming; ENSO Prediction; and Socio-economic Aspects. There will also be an open discussion on "Where to go from here".
Details: EGU Office, c|o Alexander von Humboldt, Max-Planck-Strabe 13, D-37191 Katlenburg-Lindau, Germany. Fax: +49-55564709. Email: egu@copernicus.org
Web: www.copernicus.org|EGU|topconf|avh1

4th International Conference of Renewable Energy, Energy Saving & Energy Education

Havana, Cuba
25-05-2005 to 28-05-2005
Conference is jointly organized by the Technical University of Havana (CUJAE), the University of Matanza, the University of Pinar del Rio and the Central University of Las Villas. Aimed at energy professionals as well as universities and research centres. Forum topics include Renewable Energy Technology, Energy Efficiency, Energy Education, and Business, Market and Police in Renewable Energy.
Details: Conrado Moreno, Technical University of Havana, CUJAE, Marianao 19 390, Ciudad Habana, Cuba. Fax: +537-2671644. Email: cier2005@ceter.cujae.edu.cu
Web: www.cujae.cu|eventos|cier

Asia Oceania Geosciences 2nd Annual Meeting

Singapore
20-06-2005 to 24-06-2005
Meeting aims to act as a catalyst for Asian and international participants to develop partnerships and other professional networking. Scientific sessions will cover such topics as: Oceans and Atmosphere; Hydrological Science; Solid Earth; Planetary Science; Solar terrestrial; and Interdisciplinary Working Groups. Organized by the Asia Oceania Geosciences Society.
Details: Cheng-Hoon Khoo, AOGS Secretariat Office, Meeting Matters International, 5 Toh Tuck Link, 596224 Singapore. Fax: +65-64677667. Email: kch@meetmatt.net
Web: www.asiaoceania-conference.org

Coasts & Coastal People: Scenarios of Change & Responses

Egmond aan Zee, Netherlands
27-06-2005 to 29-06-2005
Meeting is part of the LOICZ II Inaugural Open Science Meeting. Aimed at human dimension and natural scientists, decion makers, managers and user groups in the coastal zone. Main themes include: Vulnerability of coastal systems and hazards to human society; Implications of global change for coastal ecosystems and sustainable development; and Anthropogenic influences on the river basin and coastal zone, amongst others.
Details: Conference Organizer, LOICZ International Project Office, PO Box 59, 1790 AB Den Burg - Texel, The Netherlands. Fax: +31-222-369430. Email: loicz@nioz.nl
Web: www.loicz.org

4th International Symposium on Non-CO_2 Greenhouse Gases: Science, Control, Policy & Implementation

Utrecht, The Netherlands
04-07-2005 to 06-07-2005
Organized by the Clean Air Section of the Netherlands Association of Environmental professionals. Will address the role of non-CO_2 greenhouse gases in human-induced climate change. NCGG-4 will also focus on the implementation of new technologies in industry and society that are seen to be cost-effective options.
Details: NCGG-4 Organizers, Netherlands Association of Environmental Professionals, PO Box 2195, NL-5202 CD Den Bosch, The Netherlands. Fax: +31-73-6216985. Email: cfp@ncgg4.nl
Web: www.ncgg4.nl

2005 ACEEE Summer Study on Energy in Industry

New York, USA
19-07-2005 to 22-07-2005
Theme of the course is "Cutting the High Cost of Energy". Papers and presentations will focus on: Industrial Energy Efficiency Measures and Technologies; Industrial Fuel Diversity; Leadership and Management Practices in Industrial Energy Efficiency; Industrial Energy Efficiency and Sustainability Issues; Role of Government and Programmes in Industrial Energy Efficiency; and, Data, Analysis and Modeling of Industrial Energy Efficiency.
Details: Rebecca Lunetta, ACEEE, PO Box 7588, Newark DE 19711-7588, USA. Email: rlunetta@comcast.net
Web: www.aceee.org

International Conference on Energy, Environment & Disasters

Charlotte, USA
24-07-2005 to 30-07-2005
Participants for INCEED 2005 will include researchers, corporate officials, policy makers, teachers and students. Over 100 sessions, panels and forums featuring keynote lectures, presentations, recorded debates and discussion panels. INCEED 2005 is an outgrowth of the regular ISEG conferences, begun in 1993, with the objective of addressing critical issues in sustainable development.
Details: Hilary Inyang, International Society of Environmental Geotechnology, Global Institute for Energy & Environmental Systems, University of North Carolina, Charlotte, USA. Email: iseg@uncc.edu

Visit www.tiempocyberclimate.org for a comprehensive list of conferences.

Millennium Development Goals

Hannah Reid and Mozaharul Alam describe how climate change will further impede meeting the Millennium Development Goals (MDGs)

In 2000, leaders of 189 nations, along with almost every major international body, agreed on the Millennium Declaration, which outlined eight Millennium Development Goals (MDGs). Four years on, however, it is widely acknowledged that many of these goals are far from being met. For example, the promise made on cutting child mortality by two-thirds in sub-Saharan Africa by 2015, now looks more likely to materialise in 2165. On 16 February 2004, Gordon Brown, the UK Chancellor of the Exchequer, and Jim Wolfensohn, the President of the World Bank, acknowledged in the Guardian newspaper (UK) that "Either resources are made available now to tackle poverty, or targets set in a fanfare of publicity will once again be missed and the world's poor left further behind."

Whilst it is increasingly recognised that meeting the MDGs poses enormous challenges, and in many cases looks unlikely, few have factored in the additional challenges that climate change will pose in this context.

ABSTRACT

- **Hannah Reid** and **Mozaharul Alam describe** the Millennium Development Goals (MDGs) and how climate change will make meeting them more of a challenge than previously anticipated.
- **They explain** the flaws of a target-orientated process such as the MDGs.
- **They conclude** with some practical examples of activities which meet both climate change and development objectives.

Eradicate extreme poverty and hunger (Goal 1)

Poor people are generally the most vulnerable to climate change. This is because they live in areas more prone to flooding, cyclones, droughts etc., and because they have little capacity to adapt to such shocks. They are also more dependent on ecosystem services and products for their livelihoods. A poor family often relies on multiple livelihood activities to gain an income and meet its basic needs. Exploiting natural resources such as fish, grazing land or forests can provide income, food, medicine, tools, fuel, fodder, construction materials etc. Any affect that climate change has on natural systems therefore threatens the livelihoods, food intake and health of poor people.

Climate change means that many semi-arid regions will become hotter and drier, with less predictable rainfall. Climate induced changes to crop yields, ecosystem boundaries and species' ranges will dramatically affect many poor people's livelihoods. Regional food security, particularly in Africa, is expected to worsen.

Climate change induced changes in infrastructure and labour productivity are also expected to alter the path and rate of economic growth. This will increase poverty through

THE MILLENNIUM DEVELOPMENT GOALS AND TARGETS
1. Eradicate extreme poverty and hunger: Halve the proportion of people living on less than a dollar a day and those who suffer from hunger.
2. Achieve universal primary education: Ensure that all boys and girls complete primary school.
3. Promote gender equality and empower women: Eliminate gender disparities in primary and secondary education preferably by 2005, and at all levels by 2015.
4. Reduce child mortality: Reduce by two-thirds the mortality rate among children under five.
5. Improve maternal health: Reduce by three-quarters the ratio of women dying in childbirth.
6. Combat HIV/AIDS, malaria and other diseases: Halt and begin to reverse the spread of HIV/AIDS and the incidence of malaria and other major diseases.
7. Ensure environmental sustainability: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources. By 2015, reduce by half the proportion of people without access to safe drinking water. By 2020 achieve significant improvement in the lives of at least 100 million slum dwellers.
8. Develop a global partnership for development: Develop further an open trading and financial system that includes a commitment to good governance, development and poverty reduction – nationally and internationally. Address the least developed countries' special needs, and the special needs of landlocked and small island developing states. Deal comprehensively with developing countries' debt problems. Develop decent and productive work for youth. In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries. In cooperation with the private sector, make available the benefits of new technologies – especially information and communications technologies.
NB. For each goal one or more targets have been set, most for 2015, using 1990 as a benchmark.

reduced income opportunities. For example, a one-metre sea level rise would displace 600,000 people in Guyana (80 percent of the population) and cost US$4 billion (equivalent to 1,000 percent of the Gross National Product).

Poor people are particularly vulnerable to extreme weather events, which are increasing. During 2001, 170 million people internationally were affected by disasters, 97 percent of which were climate-related. For example, floods in Mozambique in February 2000 destroyed a third of the country's crops, wiped out roads, railway lines and entire villages. Hundreds of thousands of people were made homeless, and the Government of Mozambique estimated that £65.5 million would be needed for reconstruction. Years of development work were simply washed away.

Achieve universal primary education (Goal 2)

Loss of employment and other assets may reduce opportunities for education in several ways. Natural disasters and drought may require children to help more with household tasks leaving less time for schooling. Malnourishment and disease also impairs learning. Weather related disasters threaten school buildings in many poor countries. For example, in 1998, Hurricane Mitch destroyed one quarter of all Honduras's schools.

Education becomes a low priority following the loss of a home or the need to migrate following a flood, storm or drought. More frequent and more severe weather related disasters will increase numbers of environmental refugees. Climate change related disasters already displace more people than war and persecution, and according to Norman Myers of Oxford Uni-

versity, by 2050 up to 150 million people may be displaced by the impacts of global warming.

Promote gender equality and empower women (Goal 3)

Climate change is expected to exacerbate current gender inequalities. Women are usually responsible for fetching water, fodder, firewood and sometimes food in poor households. They therefore bear disproportionate hardship when provision of these vital necessities becomes difficult. In times of extreme stress, men often migrate leaving women and girls behind to cope with increased domestic and work burdens. With more work and more chores to undertake, additional stresses are placed on women's health, and time available to participate in decision-making processes and other income generating activities is reduced.

Health related issues (Goals 4, 5 and 6)

Direct climate change effects include increases in mortality and illness associated with heat waves, particularly amongst the elderly and the urban poor. For example, during the 1982–1983 El Niño, infant mortality rose by 103 percent in Peru. In some regions heat stress may be balanced by fewer cold-related deaths in winter. Extreme weather events will also cause more death an injury. Over 96 percent of disaster-related deaths in recent years have taken place in developing countries.

Women and children are particularly vulnerable to extreme weather events. For example, when the 1991 cyclone hit Bangladesh, 90 percent of victims were women and children. This was due to their lower survival capabilities (e.g. swimming), and socio-cultural beliefs that prevented women with their children from congregating in public cyclone shelters.

The indirect effects of climate change on health are more significant. Climate change may increase the prevalence and distribution of vector-borne diseases such as malaria and dengue fever. Indeed, projected climate changes could lead to an increase in the number of people at risk of malaria in the order of tens of millions annually. Vulnerability to water, food, or person-to-person borne diseases (such as cholera and dysentery) is also likely to increase. Children and pregnant women are particularly susceptible to vector and water-borne diseases. For example, anaemia (resulting from malaria) is responsible for a quarter of maternal mortality.

Climate change will probably cause a decline in the quantity and quality of drinking water, which is a prerequisite for good health. Malnutrition, an important source of ill health among children, could also be exacerbated due to declining natural resource productivity and food insecurity, particularly in sub-Saharan Africa.

Ensure environmental sustainability (Goal 7)

Global warming is likely to shift ecosystem boundaries. This may mean that some protected areas no longer protect species they were designed to conserve. Extinction rates may increase, and for many species, climate change poses a greater survival threat than the destruction of their natural habitat. Shifts in reproductive cycles and growing seasons could also occur. For example, higher temperatures have led to an increase in the number of eggs laid by the spruce budworm, already a serious pest in North America's boreal forests.

The most rapid changes in climate are expected in the far north and south of the planet, and in mountainous regions where species often have no alternative habitats to which they can migrate in order to survive. Other vulnerable ecosystems and species include small populations or those restricted to small areas. Coral reefs have already shown devastating losses as a result of increased water temperatures, and replacement of coral reef communities by non-reef systems is well advanced in the Caribbean region, where climate change has probably exacerbated existing stresses.

Degradation of biodiversity will reduce the availability of many traditional medicines. This will affect poor and rural people who depend more on natural resources for medicine as well as income and food.

Water supplies are expected to drastically decrease in many arid and semi-arid regions. In West and Central Africa, 20 million people in six countries rely on Lake Chad for water,

but the lake has shrunk by 95 percent in the last 38 years.

Slum dwellers will be particularly vulnerable to climate change. For example, during a recent heat wave in Delhi, gastroenteritis cases soared by 25 percent as slum dwellers resorted to drinking contaminated water. Many slums are also located in areas at risk from floods, landslides or sea level rise.

Global partnerships (Goal 8)

Climate change related disasters could be costing the world US$300,000 billion within a few decades. The benefits of investment in development could be entirely absorbed by dealing with the costs of weather related disasters. Many poor countries depend on tourism, but climate change could destroy the beaches, reefs and coastal infrastructure on which this depends. Climate change will also severely impact the agricultural sector. All these factors will affect the Gross Domestic Product, level of indebtedness, state of public finances, and investment in development in poor countries.

Problems with the MDGs

Traditional economic approaches to poverty (for example, survival on less than US$1 per day) have largely been replaced by those that see poverty as incorporating factors such as lack of education and skills, poor health, inadequate access to water and sanitation services, poor quality or insecure housing, weak safety nets to ensure basic consumption can be maintained when income falls or crops fail, inadequate protection of rights, and lack of voice. However, this understanding has yet to be incorporated into the MDGs.

The MDGs make no mention of natural disasters or global warming, and many of the targets are narrow in focus. For example the energy use and CO_2 emissions indicators under MDG seven ignore the current reality of climate change and the need to consider adaptation in addition to mitigation.

Many of the MDG targets and indicators pay little attention to the process by which they are to be met. For example, indicators relating to energy use and CO_2 emissions would be improved if they captured some measure of broader environmental and social benefits. If such considerations are taken into account, investment could shift towards projects with multiple livelihood, ecosystem and climate change adaptation benefits (or at least projects which do no harm in these additional contexts), as opposed to initiatives which simply reduce energy use or CO_2 emissions, regardless of any deleterious effects on ecosystem integrity, biodiversity, climate change adaptation or local livelihoods. Addressing environmental sustainability both at national and international levels is essential. Achieving the MDGs is already proving to be a challenge industrialised countries seem unable to meet, but ensuring that any progress made towards meeting these targets will benefit the poor depends on the process undertaken.

Practical ways to meet development and climate change objectives

Classic 'top-down' approaches to climate change often equate to large infrastructure construction projects. For example, large sea walls may be constructed to support climate change adaptation, and large renewable energy schemes are built to reduce global greenhouse gas emissions. Such projects can significantly damage local livelihoods. For example, plans to build scores of dams with massive hydroelectricity generating potential on the Mekong River will affect the livelihoods of the 52 million people currently using river resources, many of whom live below the poverty line. Dam construction will prevent fish migration, and yet Mekong fish provide 40–60 percent of the animal protein consumed by the population of the lower basin. The nine proposed mainstream dam projects alone would displace 60,000 rural people.

There will be times when such infrastructure is beneficial, but more focus should be given to non-structural alternatives and to 'bottom-up' approaches rooted in existing community-based strategies for managing resources and reducing vulnerability to climatic shocks.

Projects undertaken by companies or nations (for example under the Clean Development Mechanism – CDM) to offset greenhouse gas emissions, rarely incorporate livelihood and poverty issues. This is despite the fact that the CDM is supposed to provide sustainable

SOLAR HOME SYSTEMS IN RURAL BANGLADESH

● The SouthSouthNorth project aims to install Solar Home Systems in 30,000 homes in isolated areas such as coastal districts and floodplain areas over the next five years. It therefore targets some of the poorest households in one of the poorest countries. Installation of Solar Home Systems will save 8,600 tons of CO_2 per year from substitution of existing energy sources. It will also provide each household with two lights and a plug. Light has allowed carpenters, seamstresses, shop-owners and other skilled people to establish and run small businesses after sunset. Power is used to charge mobile phones to rent out and use for pleasure. Servicing and maintaining the Solar Home Systems, and supplying system accessories have increased employment. People can enjoy radio, television and use of fans, and children can study after dark. Reduced dependence on fuels reduces indoor air pollution, and frees up time previously spent fetching such fuels.

development benefits to developing countries hosting CDM projects in addition to global benefits from carbon sequestration. However, some projects aim to provide both livelihood and climate change benefits under the CDM (see, for example, the above box).

Other initiatives provide livelihood and climate change benefits by working with local farmers to encourage the use of techniques that reduce soil and landscape degradation in the face of extreme weather events. Since 1992, PASOLAC (Programa para la Agricultura Sostenible en las Laderas de América Central) has been using participatory processes to help communities in Nicaragua, Honduras and El Salvador increase the agricultural productivity of their hillsides through improved soil and water management. Such hillsides are important for agriculture, but prone to soil and landscape degradation.

In Bangladesh, disaster preparedness measures, introduced following a cyclone in 1970 which killed 500,000 people, saved 2.5 million people in the 1990s at a cost of US$6 per life saved. Wodaabe herders in Niger have systems for managing risks, which provide loans to replace reproductive stock lost to extreme weather events. More formal insurance schemes exist elsewhere.

In Vietnam, the Vietnam National Chapter of the Red Cross has worked with local communities to rehabilitate mangroves and nearly 12,000 hectares have been planted. This cost approximately US$1.1 million, but saves US$7.3 million per year in dyke maintenance. During the devastating typhoon Wukong in 2000, project areas remained unharmed while neighbouring provinces suffered huge losses in lives, property and livelihoods. Some 7,750 families have benefited. Family members can now earn additional income from selling crabs, shrimp and molluscs while increasing the protein in their diets. Mangroves are also a reservoir for carbon sequestration. ■

ABOUT THE AUTHORS

● **Hannah Reid** is a research Associate at the International Institute for Environment and Development (IIED).

● **Mozaharul Alam** is a Research Fellow who works at the Bangladesh Centre for Advanced Studies (BCAS).

CONTACT

● **Hannah Reid,** IIED, 3 Endsleigh Street, London, WC1H 0DD, UK.
Fax: +44 (0)20 7388 2826.
Web: www.iied.org
Email: hannah.reid@iied.org

● **Mozaharul Alam,** BCAS, House no. 10 (3rd Floor), Road no. 16/A, Gulshan-1, Dhaka 1212, Bangladesh.
Fax: (+880-2) 8851417
Web: www.bcas.net
Email: mozaharul.alam@bcas.net

FURTHER INFORMATION

● **In the Cyberlibrary:** The Tiempo Climate Cyberlibrary lists sources of information about the Millennium Development Goals at: www.tiempocyberclimate.org/floor0/theme/t54web.htm

● This article drew heavily on 'The End Of Development? Global Warming, Disasters and the Great Reversal of Human Progress' by the New Economics Foundation and the Bangladesh Centre for Advanced Studies.

The Argentinian compromise

COP10 OUTCOMES

The Tenth Conference of the Parties (COP10) to the United Nations Framework Convention on Climate Change (UNFCCC) over-ran by a day as delegates sought to reach agreement on the format of future negotiations regarding what happens after the expiry of the Kyoto Protocol in 2012.COP10 was held in Buenos Aires, Argentina, December 6th-18th 2004.

A compromise was eventually reached between the United States and Europe, containing a commitment to a single meeting in May 2005. The United States had opposed European plans for a series of informal meetings. "It is a give-and-take exercise and I think on balance we are very pleased with the outcome," said Harlan Watson of the United States State Department.

During the closing session, India, with support from China, Pakistan and Saudi Arabia, called for a guarantee that developing nations would not have to accept emission cuts. But the European Union rejected the demand and the compromise agreement stood.

Throughout the meeting, developing countries argued for stronger commitments on assistance to avert the consequences of climate change.

The Africa Group emphasized the urgency of adaptation and stressed the importance of operationalizing the Special Climate Change Fund. They want funding not only for research but also for the implementation of adaptation measures.

Alberto Cárdenas Jiménez, Secretary of Environment and Natural Resources, Mexico, argued that the lack of action on adaptation limits the economic ability of developing countries to achieve sustainable development. He said that the issue has been addressed in a fragmented manner under the climate treaty and supported an Argentinian proposal for an adaptation work programme.

For the second year running, the Least Developed Countries (LDCs) failed to gain a commitment to full-cost funding for adaptation measures through the LDC Fund managed by the Global Environment Facility.

The problem is that most, if not all, adaptation measures have benefits beyond coping with the impact of climate change and the LDC Fund will not cover the proportion of the costs corresponding to these non-climate benefits. Indeed, even quantifying the proportion that could be considered related to the future impact of anthropogenic climate change poses a major scientific challenge. Moreover, with benefits in many areas, decision-making on funding becomes complex, requiring agreement across a number of sectors.

The challenge for the climate negotiators is to create sufficient institutional flexibility to ensure that adaptation issues can be dealt with effectively under the UNFCCC.

A Pew Center initiative, aimed at bringing the United States into a post-Kyoto agreement with major emitters from the developing world, held its latest round of discussions alongside COP10 in Buenos Aires.

"The rejection by the United States really set off the search for better ways of doing things," said Michael Zammit Cutajar, former Executive Secretary of the climate treaty secretariat, "What seems to be taking shape

is a series of feasible options that respond to different economic and political circumstances." The idea is a 'variable geometry' for emissions control post-2012 that would permit approaches to vary from one country to another.

"Kyoto is a start, but ahead lies a far greater challenge: engaging all the world's major emitters in a long-term approach that fairly and effectively mobilizes the technology and resources needed to protect the global climate," according to Pew Center President Eileen Claussen.

The approaches under consideration include methods that would link emissions targets to economic growth or focus targets on specific activities and economic sectors. National targets may represent purely financial commitments, for example, to cover the costs of emissions controls elsewhere.

Gao Feng, of the Chinese Ministry of Foreign Affairs, favours a "bottom-up approach" with each country determining for itself "what might be technically, economically, socially and politically acceptable." Bill Hare, from Greenpeace, was sceptical, saying that "bottom-up is a euphemism for not doing much at all beyond what would normally happen."

● **Further information:** Tiempo provides coverage of current climate events at www.tiempocyberclimate.org/newswatch/index.htm

Kyoto Protocol comes into force

CLIMATE NEGOTIATIONS

The Kyoto Protocol to the United Nations Framework Convention on Climate Change will come into force on February 16th 2005 following its ratification by the Russian Federation.

Russian President Vladimir Putin signed a bill confirming approval of the Kyoto Protocol on Thursday November 4th 2004. Ratification by the Russian Federation seems to have been triggered by European Union support for Russian membership of the World Trade Organization, and visa-free travel for Russian citizens within the European Union.

United Nations Secretary-General Kofi Annan welcomed the development as a "historic step forward", ending a "long period of uncertainty." The Kyoto Protocol was drafted in 1997.

The United States position on the Kyoto Protocol remained the same. "We do not believe that the Kyoto Protocol is something that is realistic for the United States and we have no intention of signing or ratifying it," said State Department spokesman Adam Ereli.

Australian Prime Minister John Howard said that his nation would meet its emissions targets under the Kyoto Protocol, but would not ratify the agreement.

With the Protocol's entry into force:

1) industrialized nations must meet quantitative targets for limiting their greenhouse gas emissions, reducing their combined emissions of six major gases to 5.2 per cent below 1990 levels by the period 2008-2012;
2) the framework for an international carbon trading market will come into being;
3) the Clean Development Mechanism will move to full operation, encouraging investments in developing country projects that limit emissions and are consistent with sustainable development goals; and,
4) the Adaptation Fund will start preparations to assist developing countries cope with the impacts of climate change and plan adaptive measures.

Health and climate change

A NEW PUBLICATION

Methods of assessing human health vulnerability and public health adaptation to climate change.

Health is often neglected in the assessment of vulnerability and adaptation to climate change. This publication, developed by the World Health Organization, Health Canada, the United Nations Environment Programme, and the World Meteorological Organization, explains the process of assessing the actual and potential health impacts of climate change at local or national scales. It contains practical information for governments, health agencies, and environmental and meteorological institutions in developing countries for assessing and quantifying the impacts of climate variability and change on a range of health outcomes.

Systematic assessments of health effects are needed to inform policy development, and include health in the agendas of sectors such as water, food, housing and trade. Several developed and developing countries have already conducted national assessments to determine their vulnerability to the impacts of climate change and evaluate the capacity of their health infrastructures to adapt. Timely knowledge of health concerns is particularly important, since nations will have to adapt to climate change long before atmospheric greenhouse gas concentrations stabilize.

The document is in two sections. The first section describes the concepts of vulnerability and adaptation as they relate to the potential health impacts of climate change. This section also addresses the process of undertaking the assessment, including the importance of involving stakeholders. The seven steps in conducting the health impact assessment are described.

The second section describes a range of methods and tools that can be applied to specific health outcomes: heat stress (the direct effect of the thermal environment on health); air pollution (outdoor air quality); weather disasters (floods, windstorms); vector borne diseases (such as malaria, dengue, schistosomiasis and tick borne diseases); water-borne and food-borne diseases (such as diarrhoeal diseases); stratospheric ozone depletion (not a direct element of climate change, but a matter of concern); food security; and vulnerable populations. Recommendations are made for the use of certain approaches or data sources to ensure some standardization of assessments between countries and over time. However, not all potential health outcomes are amenable to quantitative risk assessment, and a range of other methods are essential for a comprehensive vulnerability assessment.

● **Further information:**
Anybody interested in undertaking assessments of the health impacts of climate change should contact the authors:
Bettina Menne at the World Health Organization Regional Office for Europe bme@who.it
Sari Kovats at the London School of Hygiene and Tropical Medicine, UK sari.kovats@lshtm.ac.uk or Kristie Ebi at Exponent Health Group kebi@exponent.org
To obtain a copy of the document, email Blessy Corda, Global Change and Health, WHO Regional Office for Europe abc@who.it
The document can be downloaded from www.euro.who.int/globalchange/Publications/20031125_1

Arctic climate impact assessment

ARCTIC RESEARCH RESULTS

Mick Kelly reports on a new assessment of Arctic climate change that concludes that human influence is now "the dominant factor" in regional trends.

The Arctic Climate Impact Assessment study, released November 2004, was commissioned by the Arctic Council and represents the work of close to 300 scientists as well as elders of the region's Native American communities.

"The big melt has begun," said World Wide Fund for Nature climate director Jennifer Morgan. The Arctic ice cap has shrunk by 15 to 20 percent over the past three decades and the report's projections suggest the Arctic could become near ice-free in summer by 2100.

NEWS

Impacts are already occurring as the ice melts, permafrost thaws, buildings are losing their foundations and infrastructure is lost. Irreplaceable habitats for species such as the polar bear and seal are disappearing. There may, though, be some positive effects as oil and gas extraction becomes easier and shipping lanes open.

Responding to the report, leaders of the indigenous peoples of the Arctic called for action to slow climate change and for assistance in coping with climate impacts. "We realize that we will be forced to make some adaptations, as we are already seeing the effects of climate change in our communities. We need to be given the resources to deal with these challenges," said Geir Tommy Pedersen of the Saami Council.

Leaders of the Arctic peoples slammed the United States (US) for blocking international efforts to cut greenhouse gas emissions. "The short-term economic policy of one country should not be able to trump the entire survival of one people," said Sheila Watt-Cloutier of the Inuit Circumpolar Conference.

Foreign ministers of the Arctic Council countries, including the US, met later in November to discuss the implications of the Arctic Assessment. Indigenous leaders called for a "robust" and "strong" declaration from the gathering. "To be honest I don't expect a good declaration," warned Geir Tommy Pedersen. "The United States is the big bad wolf when it comes to climate policy. It blocks efforts to flesh out political recommendations." The report has already led to a rift between the US and European governments.

As it turned out, the conference declaration encouraged "effective measures" to cope with climate change but made no specific recommendations. Opposition from the US made it impossible to reach a stronger consensus. Delegates broke into laughter when Finnish Foreign Minister Erkki Tuomioja announced that "it was the best possible declaration that could be adopted today." Arctic peoples are joining up with small islanders to campaign against global warming. "We are two of the world's most vulnerable areas," commented Sheila Watt-Cloutier. "Linking up makes a lot of sense. We can start working together, mobilizing ourselves at various United Nations forums or global negotiations sessions to turn up as a team," she said. The Inuit plan to petition the Organization of American States, to brand global warming a human rights abuse by the US.

● **Further information:**
The full text of the Arctic Climate Impact Assessment can be downloaded from:
www. amap.no/acia/index.html

A GAUNT VIEW

Tiempo

Issue 54 January 2005
ISSN 0962-7030

Editorial team:
Saleemul Huq,
Hannah Reid, Gerald Leach,
Sarah Granich, Mick Kelly

Editorial office:
Tiempo, International Institute for Environment and Development, 3 Endsleigh St, London WC1H 0DD, UK
Fax: +44 (0)20 7388 2826
Email: hannah.reid@iied.org and saleemul.huq@iied.org

Distribution: Tiempo is available free on request. Write to Tiempo, attn: Mick Kelly, School of Environmental Sciences, UEA, Norwich NR4 7TJ, UK, or email m.kelly@uea.ac.uk

Tiempo is published by: the International Institute for Environment and Development, the University of East Anglia and the Stockholm Environment Institute-York, with financial support from the Swedish International Development Cooperation Agency (Sida).

Production Manager:
Erik Willis
Layout: Lisetta Tripodi
Programme coordinator:
Johan Kuylenstierna
Design: A4
Printed by: PMS Marketing Logistics, York

Priorities for an equitable future

Serious flooding hit parts of Argentina just as thousands converged in Buenos Aires for the tenth annual conference following the United Nations climate convention. Either God or Mother Nature was dropping a big hint. With the start date set for the Kyoto Protocol becoming legally binding, the wider battle lines are also more clearly set.

THE FINAL WORD

Andrew Simms describes the actions which need prioritizing in the global climate change arena if progress is to be just and equitable.

Firstly, it is clear that none of the painfully negotiated international targets for poverty reduction can be met without stopping dangerous climate change, which, for the most vulnerable, is already here. Secondly, the huge challenge to alter economic development models around the world so that they become both climate proof and climate friendly is apparent. The new United Kingdom-based initiative of environment and development groups, coordinated by the new economics foundation and the International Institute for Environment and Development, that produced the Up in Smoke report (http://www.iied.org/climate_change/pubs.html), will re-examine old approaches and could be a model for others to follow.

Thirdly, after twelve years of trying, diplomatic options for persuading a reluctant United States to take part in the international process have been exhausted. Now it is time to use economic pressure allowed within international law and trade rules.

Then we have to ask the question: what price will developing countries demand to participate in a solution to follow the Kyoto Protocol? Such a solution must be based on a global framework and the assumption that we now live in a fundamentally carbon constrained world economy. Their reluctance to even have this conversation is fuelled by breathtakingly perverse priorities among the rich countries and real injustice. The US$0.41 billion annual pledge by rich countries to help all poor countries adapt to climate change is less than one third of what the United States spent on advertizing sports utility vehicles (also known as axles of evil) in 2000, and 178 times less than rich countries spent subsidizing their domestic fossil fuel industries annually in the late 1990s. France spent US$748 million alone adapting its health service after the 2003 heatwave.

Our challenge is to agree the right, per capita equity-based framework to stop climate change. This must work under a precautionary global emissions cap with tradable emissions permits. The longer the delay, the worse the deal for poor countries. To ensure that resources are available for adaptation now, a full assessment of likely costs in poor countries is needed. We must remember that this is not aid, but the polluter paying the polluted.

Andrew Simms is Policy Director of the New Economics Foundation, London, UK.
Email: andrew.simms@neweconomics.org