

Tiempo

#52

- 03 **VULNERABILITY**
Empowering local communities
- 19 **CLIMATE JUSTICE**
Equity implications of adaptation
- 23 **CLIMATE NEGOTIATIONS**
Contraction and Convergence

A bulletin on climate and development

Issue 52 July 2004



**Youth and the
environment** Page 7

03 Empowering the vulnerable

Lareef Zubair discusses coping and adaptation

07 Youth and the environment

Federica Meneghetti reports on an innovative forestry project

14 New life for used wind turbines

Svetlana Volchek describes a novel wind energy industry

19 Justice and equity in adaptation

Neil Adger, M.J.Mace, Jouna Paavola and Jona Razzaque report on justice and equity issues

23 Contraction and Convergence

Aubrey Meyer and Raphaël Hanmbock describe a tool for climate negotiators

13 News

17 Conferences

28 Climate and extreme events

30 The Otin Taai Declaration

32 Adaptation – a Caribbean view



Transporting fish in Sri Lanka.

Empowering the vulnerable

Lareef Zubair discusses how vulnerable communities can be empowered to cope with present-day climate change and adapt longer-term.

There is an immediate and compelling need for climate change information, particularly on the time scale of months to upcoming years. Officials and decision-makers in national ministries, for example, plan months and years ahead rather than for decades and centuries. It is the next few years that are of concern to these people.

The demand for present-day climate change information from vulnerable communities is increasing. In Sri Lanka, for example, at a training programme on climate change in 2002, the Secretary of the Sri Lanka Ministry of Plantations urged scientists to develop climate information. He stressed that this information was needed immediately in order to aid drought-related agricultural plantation management for the upcoming seasons and years.

In December 2003, at a workshop on using climate information for early warning

systems for malaria epidemics in Sri Lanka, regional malaria officers insisted that it was a priority to take care of the season-to-season and year-to-year variation.

With a prolonged period of a nine-month rainfall deficit through late 2003 to April 2004, river basin managers in the central region of Sri Lanka sought immediate information as to how they should manage water resources.

At the same time, there is an increasing

ABSTRACT

● **Lareef Zubair** argues that improving understanding of means of coping with short-term climate variability should be a priority.

● **He suggests** that improved knowledge would be of immedi-

ate benefit and would help the process of longer-term adaptation.

● **He concludes** that practical steps are needed to strengthen local scientific, technological and institutional capacity.

recognition of the risks associated with long-term climate change in the tropics. In many low-lying areas and in most small island developing states, climate change is regarded as a security issue. In other vulnerable regions, such as the Sahel region in Western Africa, the consequences of longer-term climate change are disastrous. Yet, in general, throughout many of these vulnerable regions of the tropics there is only a hazy understanding of the local risks and consequences of the climate threat.

At the level of international negotiations, policy making, editorializing, funding and consciousness, the concerns about climate change have more visibility than the shorter-term issue of climate variability. Yet the order of magnitude of season to annual climate variability is several times larger than climate change signals in most places. Even to deal with the latter, one needs a handle on the former.

Information on both short-term climate variability and long-term climate change is needed at the local and regional level. The need is particularly urgent in fields such as disaster-management, water resources, fisheries, energy, agriculture and health.

Lessons from a series of projects in Sri Lanka aimed at developing comprehensive climate services focused on climate variability are presented in this article. The work was conducted in collaboration with many Sri Lankan scientists.

Enhancing climate science and technology capability

Climate science and technology capability should be developed *in situ* in the vulnerable regions. It is only when this occurs that science and technology are likely to be fully contextualized to the specific locality. Adequate knowledge is then likely to be disseminated in the appropriate languages, idiom and formats to decision-makers, policy forums, professionals and scientists. Such knowledge emanating from local sources is more likely to be understood, trusted and integrated into action plans and educational programmes.

To develop capability in climate, one should start with a good understanding of local climatological information, add on information on climate variability, and then establish projections for climate change. Some key steps in developing such capability include the following.

- Climatological information on rainfall,

temperature, streamflow, soil moisture and vegetation along with the likely historical variations of these parameters is useful and can provide guidance in the first instance. Essential data sets on climatology and historical variations must be widely available.

- Rainfall, temperature, streamflow, soil moisture and vegetation patterns can be monitored and this information used alongside climatological knowledge to predict various parameters. For example, rainfall patterns in the upstream of longer rivers are very useful in estimating floods in the downstream. Similarly, snow melt and soil moisture information can be useful for watershed management. Yet often the information systems needed to obtain, assimilate and disseminate the information in appropriate formats to potential users are not available.
- Climate variability in the coming season and year may be anticipated by understanding the dynamics of the regional climate. The relationships of the regional climate to land and ocean conditions may be used to anticipate climate variability.
- There could be a greater use of remotely sensed information which is available over the Internet. Often, the information may be too coarse for relevant application but for some purposes, one can glean useful information. Global seasonal climate predictions can be evaluated locally for skill, coverage and applicability.

Empowering local scientists and technologists should include support for improving local science and technology institutions, networks and research and funding opportunities.

Improving vulnerability studies, impact analysis and adaptation assessments

Understanding the sensitivity and vulnerability of the environment and society to climate change is as critical as understanding climate. Expertise that links local understanding of disasters, health systems, water resources, agriculture, energy and fisheries is essential if climate information is to be translated into meaningful parameters for decision-makers, policy-makers and the general public.

Climate, its impacts and adaptation to it, is a multidisciplinary and wide-ranging umbrella that needs a variety of resources available in a variety of disciplines. Often, engendering multi-disciplinary work is difficult unless there is an immediate practical problem and a specific target that a group can work towards. Project-oriented studies provide such a target. They ensure that the synthesis from a multi-disciplinary group meets the test of relevance.

Immediate projects to address the implications of climate variability and climate change in an actual setting and which develop adaptation approaches are a concrete practical approach to developing capacity.

A project-based, problem-solving approach provides a concrete focus for collaboration between participants who may have relevant but diverse expertise. Attempting to bring together such expertise on practical issues is much more likely to yield more meaningful collaboration and insight than collaboration on conceptual issues.

Data on projects where climate information is used to develop mitigation and adaptation strategies would provide a particularly important component of an information base for management, coping and adaptation strategies.

Harnessing the lessons from coping with climate variability

Understanding and coping with short-term climate variability provides a testable means of developing adaptation for long-term climate change. Similarly, impact studies for shorter-term variability provide a test-bed for assessing impacts to longer-term changes.

If the suite of tools, training modules and data sets to deal with climate variability are developed they can be applied to climate change issues. For example, the methodology that is in use for downscaling from global climate model outputs to a fine grid is similar whether it is for a shorter or a longer term. There is a similarity in linking analysis of agricultural systems to climate. Thus, the work of interpreting impacts of climate variability remains relevant, although not exclusive, to the longer-term issues of climate change.

Of course, preparing to cope with climate variability alone is enough to adapt to climate change. Climate change is a threat to human and ecological survival in a way that climate variability alone is not. There are some methodological differences in adaptation to longer-term climate change that need to be addressed starting immediately.

An enabling infrastructure for climate science

Although there is often funding from external sources for concrete projects, the infrastructure needed to sustain science is left to national sources that are under-funded. Some scientists within national organizations are awarded external grants. These are often focused on concrete deliverables that do not include broad involvement.

In many instances, there is a section in project proposals about the communication of results to stakeholders, but the necessary handing out of flyers or invitations at project meetings is insufficient where the scientific infrastructure in general is poorly funded. Continued external funding of scientists without appropriate safeguards naturally leads scientists to be externally oriented rather than engaged locally.

While projects should be awarded on a basis of merit of the proposal and the capability of team members, it should also be important to ensure that such projects meld into institutional plans. All the funding for projects by itself would not ensure the



Young scientists from the Sri Lankan Climate Assessment, Prediction and Adaptation Group.

Photo: Lareef Zubair

development of scientific capability unless resources are provided for the basic scientific infrastructure as well.

In too many of the vulnerable nations, facilities for those working on this issue are inadequate. In order to achieve some success in their work, scientists and researchers need library facilities, inter-library loan facilities, proper cataloguing systems, internal communication, regional or national journals, facilitation of regional meetings and small grant facilities. Computer facilities and internet access are also crucial in providing necessary tools for scientists and researchers. Although, in recent years, access to these has been tremendously improved, more needs to be done, especially for those working in the provinces.

Empowering younger scientists

Younger scientists are our people who can provide the dynamism and continuity need-

ed to ensure that our communities will be able to adapt to climate change over coming decades. But in many tropical countries, there are few opportunities for new graduates to undertake research due to diminishing funding and support for the science and technological infrastructure. This has resulted in a sadly increasing sense of disillusionment.

Providing younger scientists with opportunities would ensure that there is a greater representation of female scientists, as there appears to be a better gender parity among more recent graduates.

It is often the case in the tropics that only senior scientists have their name recognized and subsequently gain access to metropolitan centres of funding. When any funding and evaluation of capacity building programmes in the South is provided remotely from metropolitan centres in the North, there is often undue focus and repeated opportunities given to older established scientists.

Some established scientists are conscientious and will mentor younger colleagues and will assist in providing them with the necessary exposure. Sadly, this is not always the case. There are some scientists who exhibit little responsibility in their work on climate change assessments and projections and this irresponsibility will usually only be proven after they retire.

The older established scientists are usually located in capital cities that already have better facilities than those in the peripheral

regions even within the country. Just as there needs to be a vastly improved regional capacity to undertake science and research, there also needs to be an empowerment of scientists in peripheral regions within countries. The reaching out to younger scientists may help in this regard but it may not be entirely adequate.

Summing up

Vulnerable communities need to be empowered to cope with climate variability and climate change. As part of this process, there must be practical steps taken to support, strengthen and empower local scientific, technological, societal and institutional capabilities.

It is important to contextualize climate information in terms of other biophysical, socio-economic and cultural information for the area of its application. In developing application methodologies, one may gain much by focusing on immediate practical problems in a pilot or demonstration project mode and learning from their implementation.

Coping with climate variability provides lessons, tools and a robust training ground for dealing with longer-term adaptation to climate change. External funders should focus on providing direct support to younger scientists. This would go far in helping support equity and the long-term robustness of any regional, national and local scientific capability. ■

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FURTHER INFORMATION

● **In the Tiempo Cyberlibrary:** Lareef Zubair discusses saving weather data for Sri Lanka in a recent Tiempo article, available at www.cru.uea.ac.uk/tiempo/floor0/recent/issue49/t49a4.htm

● **On the Web:** Further information on the issues covered in the present article can be found on the Sri Lanka Meteorology, Oceanography and Hydrology Network website at www.climate.lk

● **Newswatch:** For weekly news and more on the climate negotiations, related issues and weather events worldwide, visit Tiempo Climate Newswatch, www.cru.uea.ac.uk/tiempo/newswatch/

Youth and the environment

Federica Meneghetti reports on an innovative project involving young people in the three countries of Argentina, China and Mozambique.

In 1994, aware that the livelihoods of over 1.2 billion people were threatened or were at risk because of drought and desertification, the Parties to the Rio Convention adopted the United Nations Convention to Combat Desertification (UNCCD).

The UNCCD mandate attempts not only to tackle the impacts of desertification but also to mitigate the effects of the resulting droughts. This process is undertaken through policies and measures to be directly implemented in dryland areas which are vulnerable to over-exploitation and inappropriate land-use as a result of poverty, political instability, deforestation, overgrazing and poor irrigation techniques.

Over the past two decades, the problem of land degradation in dryland regions has continually worsened. The Convention represents, therefore, a much needed political and operational consensus on the measures

for preventing and rehabilitating degraded land.

In recognition of the principles of participation, partnership and decentralization, the Convention advocates a spirit of partnership as the basis upon which the states affected by desertification and donor countries should cooperate. The Convention requires its parties to guarantee that all relevant 'actors' will cooperate in setting priorities, develop-

ABSTRACT

- **Federica Meneghetti** discusses a project aimed at job creation for youth in the forest sector.
- **She shows how** the work will strengthen synergies in the forest sector between the three Conventions on Bio-

diversity, Climate Change and Desertification.

- **The project will** result in substantial carbon sequestration and immediate socio-economic benefits as well as long-term advantages.

ing long-term programmes and implementing them. These 'actors' comprise of local communities, women and youth groups, non-governmental organizations, national governments, donor agencies and scientific research institutions.

The bottom-up approach of the Convention helps to significantly strengthen relationships between governments and local communities, particularly in larger countries. This approach favours the decentralized involvement of the stakeholders and the end users of natural resources.

Experience gained so far in trying to tackle poverty, land degradation, climate change and loss of biodiversity, suggests that synergistic approaches are the most effective in the development and implementation of activities that would help to meet the broad objectives of the Rio Conventions. It has been widely recognized that forestry offers a good deal of opportunity for a synergistic

approach. It is important, therefore, to promote carefully designed forestry activities to enable the fostering of cooperation and coordination among these Conventions. It is important also to identify synergies as a tool to achieve sustainable development as stated by the World Summit on Sustainable Development.

In view of the foregoing, the Italian Ministry for the Environment and Territory and the UNCCD agreed to launch an innovative initiative in Argentina, China and Mozambique. The initiative aims to target job creation for youth and to seek to strengthen synergies in the forest sector between the three Conventions of Biodiversity, Climate Change, and Desertification.

The objectives of the projects are to rehabilitate degraded land, create income-generating activities, sequester carbon and restore and protect biodiversity. At the same time, the projects will endeavour to raise awareness and strengthen the role of youth and civil society organizations through the promotion of sustainable development in these fragile ecosystems.

In a broader view, the general objective of the projects is to enhance the capacity for implementing sustainable development policies at the local level. This will promote community awareness and will involve the participation of young people in safeguarding the environment. To achieve this objective, a bottom-up approach has been adopted which will mobilize the youth to undertake

reforestation activities at the same time as providing them with experience and employment opportunities.

The projects will also increase the capacity of these communities for implementing sustainable development policies, particularly those related to the UNCCD process under the participating countries' National Action Programmes to Combat Desertification and Drought.

Through the afforestation and reforestation of an average of 3,000 hectares in each country with native species, the projects will specifically contribute to:

- sequestering carbon, thereby mitigating climate change;
- creating job opportunities and improving socio-economic conditions within the area of influence of the forest; and,
- increasing environmental awareness, particularly among the youth.

The projects will be implemented in areas where they can address, through the implementation of reforestation schemes, the issues of poverty, land degradation, carbon sequestration and loss of biodiversity at the same time.

The areas are the Province of Santiago del Estero (Argentina), Aohan County of Chifeng Municipality of Inner Mongolia (China) and Tete Province (Mozambique). All three areas are severely degraded in one way or the other. This degradation is due to either heavy agricultural use, overgrazing and uncontrolled clearing, or natural land degradation. Fur-

thermore, all three projects are located in poverty stricken areas.

Environmental youth groups, Santiago del Estero Province, Argentina

The goals of the project are:

- the establishment of 12 environmental youth groups in 12 rural communities as well as the establishment of a permanent regional environmental network;
- the training of 240 young people in environmental and social organization issues together with offering 120 young people employment opportunities;
- eight tree nurseries to be established thus providing seedlings for national and provincial reforestation/afforestation programmes;
- the afforestation/reforestation of 3,000 hectares through the conversion of pastures or degraded areas into woodlands thereby resulting in a net increase of the carbon stock in the biomass; and,
- implementing the first "Sinks in Clean Development Mechanism" project in Argentina.

The project will be implemented in the province of Santiago del Estero, located in the north of Argentina, in one of the poorest and least developed areas in the country.

The region suffers from the effects of El Niño. Large salt pans of calcium carbonate are evidence of severe land degradation due to poor irrigation practices. Intensive agri-

cultural exploitation, overgrazing, and deforestation have contributed to the degradation of further vast tracts of land.

The irrational exploitation of the natural forests alone has resulted in the destruction of nine million hectares over the last hundred years. Wood products from these forests were mostly burned instead of being utilized. Once farming was no longer profitable, the land was set aside or simply abandoned, a practice that continues to date. Furthermore, native forests are not being managed sustainably even though the potential for non-wood forest production is very high.

Santiago del Estero has substantial environmental comparative advantages. There are several areas that are appropriate for the development of sustainable productive activities that would allow for the reversing of the current state of environmental deterioration and the associated poverty.

Unemployment is of great concern. Government agencies, non-governmental organizations and the private sector are working together to meet the demands of job creation, thereby fostering income-creating activities for young people.

The project will be carried out in ten municipalities of Santiago del Estero Province. These were selected on the basis of their potential and capacity to reflect different provincial realities, with a view to progressive replication of the experience to the rest of the province. They constitute the big municipality of Santiago del Estero City, the

medium-sized municipalities of Fernandez, Loreto and Termas de Rio Hondo, and the small municipalities of Beltran, Campo Gallo, Colonia El Simbolar, Pinto, Selva and Tintina. The total population of these ten municipalities is around 280,000 inhabitants.

The forestation activities will be carried out in the two locations of Colonia El Simbolar and Campo Gallo. Thirty-six plots in Colonia El Simbolar will be used for tree plantation activities. Small farmers own 35 of them. The Province owns the odd one, which is a bigger plot.

Plantations will also be established in three

- to improve the awareness of youth and women in environmental protection and to promote the effective use of land resources;
- to generate limited employment. Approximately 4,000 youth and women will participate in planting activities during the first year, while a much lower number will tender the plantation over five years;
- to increase local farmers' income both from that earned during planting activities and from future harvests;
- to facilitate technology transfer from research institutions to the grassroots level;

“The irrational exploitation of the natural forests alone has resulted in the destruction of nine million hectares over the last hundred years.”

plots in Campo Gallo which are owned by big-size farmers. Nurseries will be established in the other eight municipalities. These nurseries will supply both the project and the local market. The total area to be forested through the project is 3,018 hectares.

Youth participation in plantation establishment for combating desertification in Aohan County, Northern China

The goals of the project are:

- the establishment of 3,000 hectares of plantations with different tree and shrub species;

and,

- to implement the first “Sinks in Clean Development Mechanism” project in China. The project will be implemented in Aohan County, in Northern China. Aohan lies at the southern end of the Kerqin Sandy Land. The land is a Euro-Asian grass region and includes many nurseries. The total land area of the county is 800,000 hectares which includes 13 state forest farms. The proposed project covers (but not wholly) nine state forest farms.

Over the past few decades, the forested land area in Aohan has expanded to 352,700 hectares. This accounts for 42.5 per cent of the

total land area. An ecology system dominated by forestry has been established in a basic form. There are, however, still over 200,000 hectares of eroded land, 80,000 hectares of desertified land and 120,000 hectares of degraded grassland that need urgent attention. Severe wind erosion and desertification have caused extensive loss of water and soil.

The ecological rehabilitation task continues to be extensive and urgent. Afforestation activities for the purpose of combating desertification will be the central task in the effort to rehabilitate the ecology over a long period of time. Good progress in the development of forestry ecology has made forestry an effective safeguard in the economic, social and ecological development of Aohan. It has helped the development of forestry, agriculture and animal husbandry progress on a sustainable and harmonious track. Plantation establishment based on national action plans has also become an extensive programme.

The plantations will result in many agricultural benefits. Intercropping with high-quality grazing grass will produce grass seeds and provide large amounts of feed for animal husbandry. The average net income for grazing grass is over 750 Yuan/hectare. Therefore, the total area of 3,000 hectares will bring a net annual income of 2.25 million Yuan.

After the trees become mature, it will be possible to harvest timber, seeds and firewood. It is calculated that the gains will be over 750 Yuan/hectare and the average annual gains would be another 2.25 mil-

lion Yuan. The proposed project will not only control sand-wind erosion as well as desertification, but will also bring economic benefits. These economic benefits are greater than they would be if the land were used for farming.

As the plantations will be established on barren land that has almost no vegetation cover in a region plagued with sand storms they will do much in preventing further erosion. They will also sequester carbon in a manner that is both compliant with the Clean Development Mechanism of the Kyoto Protocol, or that can be sold on other carbon markets which, in turn, can earn the project participants some extra income at the same time as benefiting the global environment. Furthermore, the project will employ young people which will provide them with additional job opportunities and income as well as raising their environmental awareness.

Youth forestry programme, Tete Province, Mozambique

The goals of the project are:

- the establishment of a forest plantation of 3,000 hectares to include fruit trees that have a longer life span so as to provide food security, income and employment opportunities;
- to build awareness among the youth on the issues of conservation, rehabilitation and protection of the environment;
- to strengthen capacity building in the management of forestry resources, pro-

viding the necessary technical know-how and appropriate technologies; and,

- the implementation of the first Clean Development Mechanism project in Mozambique.

The project will be implemented in the Tsangano district in the Tete province of Mozambique. Tsangano district covers a total land area of 3,649 km² and has a population of 106,557 inhabitants. The centre of the district is located some 191 kilometres away from Tete, the capital city of Tete Province.

The project activities, covering some 3,000 hectares, will be specifically located in the eight villages of Bungue, Calipale, Chiya-dame, Chicomas, Chiphole, Chitambe, Magumbo and Mapanje. The area lies in a mountainous zone with a cool climate. The mean annual temperature is 24°C. The average annual precipitation is more than 1,200 mm. The soils are characterized as ferrasols of heavy texture and the main crops include maize, potatoes, wheat, tobacco and beans.

The current Tsangano district was initially an administrative post within Angónia district. As an administrative post Tsangano was a new frontier waiting to be exploited for large agricultural projects by the then colonial power. The first agricultural activities started in 1953 under the colonial Portuguese government causing large tracts of miombo forests to be cut down. Agricultural expansion and deforestation continued until 1974, a year before Mozambique's independence and when the Portuguese fled the country.

Upon independence, the agricultural infrastructure and farms that had been established under colonial rule were taken over by a para-statal company known as Complexo Agro-Industrial de Angónia. The main crops produced at the time were Irish potatoes, maize and fruits which were supplied to local markets in the whole country and also exported to Malawi. Complexo Agro-Industrial de Angónia operated until 1989 at which time the government decided to abandon the scheme.

By 1989, an estimated 15,000 hectares of miombo forests had been destroyed and soil erosion and loss of soil fertility were obvious problems. These problems continue to date. Local authorities believe that cross-border migration between Mozambique and Malawi during the second half of the 1980s due to civil war in Mozambique also contributed significantly to deforestation in Tsangano district.

Tsangano was seen as a new heaven for fuelwood supplies. It is important to note that most of the deforestation occurred in what is now Ntengo-Wa-Mbalame Administrative Post. According to oral accounts from local elders, the current Administrative Post of Tsangano, which covers the villages of Chiyandame and Chitambe, was never forested. It is anticipated that project activities in Ntengo-Wa-Mbalame Administrative Post will focus on reforestation while those in Tsangano Administrative Post will focus on afforestation efforts.



Creation of fodder banks on uncultivated land, Tete Province, Mozambique.

Photo: © Patrick W. Matakala

The project will contribute to the country's sustainable development. The expected outcomes include the following:

- income from sale of vegetables;
- income from sale of high-value fruits;
- improved soil fertility and increased crop yields;
- mitigation against soil erosion;
- improved livestock feeding strategies;
- sale of wood products such as fuelwood and poles for construction;

- carbon sequestration which will contribute towards climate change mitigation; and,
- youth employment.

Current status

Joint missions of the UNCCD and the Italian Government were fielded to all three participating countries between July and November 2003. The purpose of the missions was to establish the framework for implementing

the projects under the Clean Development Mechanism rules at the same time as adhering to the mandate of the UNCCD and promoting biodiversity.

Based on the findings of the field visits, the three projects were deemed viable. Carbon sequestration is also viable, in varying degrees, in all three cases. This concurrent viability does not contravene environmental or socio-economic targets. In fact, it is in conformity with, and complements, these targets. The three projects are, therefore, categorized as “carbon sequestration through afforestation and reforestation and restoration of degraded land”, that is, sinks in the Clean Development Mechanism.

The results of the missions have been circulated in the form of mission reports. In addition, project design documents have been discussed and revised during the first Steering Committee meeting.

In revising the project design documents, the Steering Committee has recommended that project participants should strictly follow the stipulations of document UNFCCC/SBSTA/2003/L.27 on the definition and modalities for including afforestation and reforestation activities under article 12 of the Kyoto Protocol together with the Intergovernmental Panel on Climate Change’s 2003 Good Practice Guidance on Land Use, Land Use Change and Forestry (LULUCF).

In addition, project participants were requested to ensure that the projects were developed within the framework of the Na-

tional Action Programme to Combat Desertification and Drought, and in accordance with the synergistic approach of the environmental conventions. Project participants were also requested to provide a detailed description of the site preparation activities as soon as possible in order to start the implementation phase forthwith. The projects should last for five years.

Field implementation of the projects will be funded through a special contribution of the Italian Ministry for the Environment and Territory. Looking at the project’s budget over the total duration of five years (excluding the carbon modelling component), the investment for establishing the plantations ranges approximately from US\$ 300 to 315 per hectare. This cost is well below those sought by forestry economists for establishing similar plantations.

The projects would allow for achievement of very substantial targets in terms of carbon sequestration. In addition, there are very significant immediate project-generated socio-economic benefits, encompassing, amongst others, job opportunity creation and direct revenues for farmers. Long-term benefits are also targeted through the expected income generation from wooden products. In some cases, the projects will also contribute to reducing the migration from unproductive areas, the illicit exploitation of natural forests, and the practice of bush burning and its negative effects. ■

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FURTHER INFORMATION

● **In the Tiempo Cyberlibrary:** Tiempo Climate Newswatch, www.cru.uea.ac.uk/tiempo/newswatch/ provides access to the ongoing negotiations around the climate, biodiversity and desertification treaties.

ACKNOWLEDGMENTS

● **The author would like** to acknowledge the Italian Ministry of Environment and Territory, Department of Environmental Research and Development, the Italian regional University of La Tuscia – Department of Forest Environment Science and its Resources, the National Coordinating Bodies and the relevant national institutions cooperating in this initiative in Argentina, China and Mozambique, and colleagues in the UNCCD secretariat, in particular, Massimo Candelori and Goodspeed Kopolo, for the information and the support extended in the preparation of this article.

ADAPTATION

Southern speakers stress the need for local knowledge to be taken into account to facilitate adaptation.

A workshop on impacts, vulnerability and adaptation was held at the 20th Session of the Subsidiary Bodies to the United Nations Framework Convention on Climate Change in Bonn, Germany on 16-25 June, 2004. Anthony Nyong of the University of Jos, Nigeria, said that developing successful adaptation measures requires consideration of local stakeholders' views. Ahsan Ahmed, of the Bangladesh Unnayan Parishad Centre for Water and Environment emphasized the importance of discussions on indigenous solutions.

Read more:
www.iisd.ca/climate/sb20/

CHINA

Rapid urbanization is increasing south-eastern China's warming rate at a much faster rate than other regions, according to a new report.

The mean temperature over southeastern China has risen by 0.05°C a decade since 1979, with night time low temperatures rising at a greater rate than daytime highs. "Human-induced changes in land use ... may have changed climate as much as greenhouse gases over some particular regions of the land", says Liming Zhou, a researcher at the Georgia Institute of Technology.

Read more:
www.sciencedaily.com/releases/2004/06/040623084435.htm

ARCTIC

"There is dramatic climate change happening in the Arctic right now ... about two to three times the pace of the whole globe"

said Robert Corell, chairman of the Arctic Climate Impact Assessment (ACIA). As a result of the warming, Inuit hunters are reported to be falling more frequently through the thinning ice, buildings on permafrost are being destabilized and ecological habitats are being disrupted. There may be benefits, though, as a sea route from the Pacific to the Atlantic opens up and Russia gains easier access to oil and gas.

Read more:
<http://|europe.cnn.com/2004/TECH/science/05/25/global.heat.reut/index.html>

FLOODS

The number of people vulnerable to floods could rise to two billion by 2050 according to a warning from experts at the United Nations University (UNU).

The projected doubling in the number of people at risk is due to climate change, rising sea levels and deforestation. "Greater global capacity to monitor and forecast extreme events" is needed to adapt to the changing threat, says Janos Bogardi, head of a new UNU institute in Bonn, Germany. It is estimated that, worldwide, floods presently affect over 520 million people each year, resulting in 25,000 deaths.

Read more:
www.sciencedaily.com/releases/2004/06/040614081820.htm

STANDARDS

Standards for certifying multi-benefit carbon dioxide reduction land use projects are being put forward by the Climate, Community and Biodiversity Alliance for peer review and comment.

The Alliance plans to help organizations identify projects that combat biodiversity loss, reduce poverty and fight climate change. The standards will work in developing, developed or emerging economies and can be used for projects with private or public investment.

Read more:
www.celb.org/xp/CELB/programs/climate/ccba.xml

New life for used wind turbines

Svetlana Volchek describes the innovative transfer of used wind turbines from Denmark to Russia to kickstart an indigenous wind energy industry.

Over the past five years, the Danish government has supported increases in the size of wind turbines in the country. Smaller wind turbines were taken down even though these turbines were operating successfully.

As a result, a number of second-hand wind turbines have become available in Denmark that can work well for another ten to 12 years. Refurbishing these turbines and installing them in Russia is a more cost-effective method of introducing wind turbine technology than the purchase of new wind turbines.

The St Petersburg and Leningrad regions in Russia have high wind speeds and a considerable potential for the implementation of wind energy technology. In 2001, there was a good opportunity for realizing a project to integrate a wind turbine into the energy supply of an industrial company in St Petersburg. Private financing made it possible to

undertake the project, based on one of the used wind turbines from Denmark.

A private company, Krasnoe, and the St Petersburg State Technical University were the initiators of the project, which included the buying and installation of the used Danish wind turbine – the *Wind Matic* 75 kW.

The Danish Folkecenter for Renewable Energy supported the project. It also assisted in selecting, purchasing and packing the wind turbine, and contributed a new computer for integration into the original control system.

ABSTRACT

- **Svetlana Volchek** describes how used wind turbines from Denmark are being used to develop the Russian wind energy industry.
- **She discusses** the challenges that had

to be overcome and the process of transferring relevant knowledge.

- **The success** of the project has led to more wind turbines being recycled.

The wind turbine *Wind Matic* was bought by the company Krasnoe in Denmark after 13 years of operation. This was an experimental project on the basis of which all questions regarding the optimal exploitation of such wind power plants could be resolved.

Krasnoe, who produce different kinds of building materials, decided to install the



Arrival in St Petersburg. Photo: © Svetlana Volchek



Assembling the tower.

Photo: © Svetlana Volchek

turbine on their own premises to reduce their energy expenses. At the same time, their own consumption of the electricity was and still is the only way to make the project feasible, since there is no payment for power fed into the Russian grid.

When we started realization of this project, we expected various problems – they began to appear immediately. This kind of equipment has never been delivered before in Leningrad oblast. Therefore, nobody knew

clearly the mechanism of conveyance and customs requirements.

We were taking the first steps on this path as pioneers, and of course we faced risks. For instance, the contract for buying the wind turbine was changed five times in order to meet the requirements of customs.

Finally, after overcoming the customs barriers, we got *Wind Matic* together with new challenges. The workers who were going to install the wind turbine knew only that this



Installing the rotor.

Photo: © Svetlana Volchek

machine could produce electricity by using wind. This was all they knew. At this stage of the project, Folkecenter for Renewable Energy was our consultant, and provided training and complete technical know-how for installation, operation and maintenance.

The transfer of know-how partly took place when we were in Denmark, and continued during the following implementation phase. In this way, we could educate the group of people involved in this project. They did all of



Ready for operation.

© Svetlana Volchek

the work, starting with building the foundation, then integrating the new computer into the control system, and finishing by putting the *Wind Matic* into operation.

After all of the complications introduced by the lack of on-site experience with the installation of such equipment were overcome, the wind turbine successfully started operation on 26 April 2002. The period from agreement with seller to installation of the wind turbine in St Petersburg was ten months.

After one year of successful operation, calculations showed that the average energy savings during the summer period were 27 per cent, while the energy savings during the winter period, when the wind speeds are higher, were around 45 per cent. Economic calculations show that the pay back time for the wind turbine is 4.5 years at the present cost of electricity.

The project was presented as one of the contributions from Leningrad Oblast at the national energy-savings competition in Moscow in 2003. Both Krasnoe and the St Petersburg State Technical University received awards.

This first experience helped us to buy the next wind turbine, *Vestas V19 90 kW*, in Denmark. The wind turbine was installed in 2003 for a private investor, also in the St Petersburg region. The third wind turbine is already in St Petersburg, and will be installed in the near future. ■

ABOUT THE AUTHOR



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FURTHER INFORMATION

● **In the Tiempo Cyberlibrary:** Links to theme sites concerned with alternative energy can be found at www.cru.uea.ac.uk/tiempo/floor0/theme/t3839web.htm

● **On the Web:** A report on a Danish Folkecenter for Renewable Energy wind power project in Kaliningrad, Russia, is available in Acrobat format (1.2 Mb download) at www.folkecenter.dk/en/wind/FC_kaliningrad_final_report.pdf

Visit WindturbineWarehouse.com at www.windturbinewarehouse.com for details of refurbished wind turbines, including recycled Danish turbines (www.windturbinewarehouse.com/Windturbines_Europe_9.03.pdf).

ACKNOWLEDGMENT

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CONFERENCES

Bjerknes Centenary 2004: Climate Change in High Latitudes

Bergen, Norway
01-09-2004 to 03-09-2004

Main focus: climate change in polar and sub-polar regions. Will also commemorate centenary of the publication "1904: The problem of weather forecasting as a problem in mechanics and physics", a pioneer publication by Vilhelm Bjerknes. Topics include abrupt climate changes and extreme weather events, carbon cycle and high-latitude processes, and ocean, land and sea ice response to atmospheric variability.

Details: Beatriz Balino, Bjerknes Centre for Climate Research, Allegaten 55, 5007 Bergen, Norway. Email: conference2004@bjerknes.uib.no
Web: www.bjerknes.uib.no/conference2004/

8th International Global Atmospheric Chemistry Conference

Christchurch, New Zealand
04-09-2004 to 09-09-2004

Theme is "Atmospheric Chemistry in the Environment". Issues: atmospheric chemistry in distinct regions, e.g. the marine boundary layer, stratosphere, cryosphere and urban areas. Also, trans-boundary transport effects and global biogeochemical cycling.

Details: Conference Innovators, PO Box 13494, Christchurch, New Zealand. Fax: +64-3-3790390. Email: kim@conference.co.nz
Web: www.IGAConference2004.co.nz

Coastal Zone Asia Pacific Conference 2004

Brisbane, Australia
05-09-2004 to 09-09-2004

Theme: "Improving the quality of life in coastal areas". Topics for presentations and discussion: coastal poverty and sustainable livelihoods; community participation; coastal ecosystem management; coastal resource economics; coastal area planning; integrated coastal management; and, coastal communities and cultures.

Details: Sally Brown Conference Connections, PO Box 108, Kenmore, Qld 4069, Australia. Fax: +61-7-32012809. Email: sally.brown@uq.net.au
Web: www.coastal.crc.org.au/czap04/index.html

19th World Energy Congress

Sydney, Australia
05-09-2004 to 09-09-2004

A major international energy-oriented event. The main technical programme will focus on key energy issues covering a wide range of topics within the energy industry. The Congress will also launch the new World Energy Congress Global Coal Study intended to review issues and developments in the worldwide coal industry to date. Will also include oral and poster sessions, workshops, tutorials, symposia and panel sessions.

Details: 19th World Energy Congress Managers, GPO Box 128, Sydney, NSW 2001, Australia. Fax: +61-2-92480894. Email: energy2004@tourhosts.com.au

Web: www.tourhosts.com.au/energy2004/

Challenges and Opportunities for Sustainable Rice-based Production Systems

Torino, Italy
13-09-2004 to 15-09-2004

Conference will take place at the University of Torino's Faculty of Agriculture in Grugliasco which is 10km from Torino. Organized by the Medrice Network. Will focus on scientific and technical issues of rice cultivation, spanning agronomy and crop management, environment and ecology, genetics and breeding, and grain quality and nutrition. Last day will be a field trip to visit farms and milling plants.

Details: Roberto Busi, Dipartimento di Agronomia, Selvicoltura e Gestione del Territorio, Via Leonardo da Vinci 44, 10095 Grugliasco (TO), Italy. Email: info.medrice@unito.it
Web: www.medrice.unito.it/Torino_conference/Invitation_1.htm

2nd International Ukrainian Conference on Biomass for Energy

Kyiv, Ukraine
20-09-2004 to 22-09-2004

Conference is intended to encourage the use of biomass for energy production and promotion of the sustainable development of bioenergy technologies in the Ukraine. Programme will include plenary lectures on state-of-the-art and prospects of biomass technologies plus oral and poster presentations on specific research,

development and commercial projects as well as technical excursions.

Details: Georgiy Geletukha, Institute of Engineering Thermophysics, National Academy of Sciences of Ukraine, 2a Zhelyabov St, Kyiv 03057, Ukraine. Fax: +38-044-4566091. Email: conference@biomass.kiev.ua
Web: www.biomass.kiev.ua

Offshore Wind Farms and the Environment

Billund, Denmark
21-09-2004 to 22-09-2004

Organized by the Environmental Group which comprises of Elsam Engineering, Energi E2, The Danish Forest and Nature Agency and The Danish Energy Authority. Open to all environmental protection agencies, developers and decision-makers of offshore wind farms interested in the marine environment. Will focus on the environmental impacts of offshore wind farms and the use of measures and methodologies to create monitoring systems and surveys.

Details: Elsam A/S, Overgade 45, DK-7200 Fredericia, Denmark. Fax: +45-76-221962. Email: elsam@elsam.com
Web: www.ens.dk or www.hornsrev.dk

Energy Education Conference

Copenhagen, Denmark
21-09-2004 to 22-09-2004

Conference to take place at the Danish Innovative Centre for Education which includes an experimental school and an energy and environmental training house. Conference is in

EVENTS

CONFERENCES

relation to two specific ongoing projects. One is the Evaluation of Energy Efficiency Information, Education and Training programme together with the Children and Development Best Practice (kids4energy). The other is the Solar Schools Forum which has recently started.

Details: Kare "Core" Albrechtsen, European Sustainable Energy Education Forum, c/o OVE, Dannebrogsgade 8a, 8000 Arhus C, Denmark. Email: info@school4energy.net Web: www.school4energy.net

4th EMS Annual Meeting

Nice, France

26-09-2004 to 30-09-2004

Organized by the European Meteorological Society. Main themes for this years conference include: atmosphere and the water cycle; instruments and methods of observations; computing in atmospheric sciences; and, information provision and education. The 5th European Conference on Applied Climatology will be held concurrently.

Details: Werner Wehry, 4th EMS Annual Meeting, Applied Synoptics, Carl-Heinrich-Becker-Weg 6-10, 12165 Berlin, Germany. Fax: +49-30-7919002. Email: wehry@met.fu-berlin.de Web: www.emetsoc.org/ems_4th_annual_meeting_html

6th EGU Plinius Conference

on Mediterranean Storms

Mediterranean Sea, Italy

17-10-2004 to 24-10-2004

Organized by the European Geosciences Union, subtitled "Catching Storms in the Mediterranean". Will take place on board the Mediterranean Shipping Cruises' vessel "Opera", the newest addition to its fleet and comparable to highest quality hotel with all expected facilities. Main topics in dealing with extreme events are: observation; diagnosis; modelling; and, risk assessment, disaster management and mitigation strategies. *Details: Luca Ferraris, CIMA - Università od Genova and Basilicata, Via Cadorna 7, I-17100 Savona, Italy. Fax: +39-011-9862612. Email: plinius@cima.unige.it Web: www.copernicus.org/EGU/topconf/plc_head.htm*

Making Connections: Cross-boundary Coastal Management

Dunedin, New Zealand

18-10-2004 to 20-10-2004

Organized by the New Zealand Coastal Society. Conference will incorporate a LOICZ workshop in association with the NZ IGBP Committee. Discussion topics will focus on: state of the coast environment reporting and coastal monitoring; coastal hazard management methodologies; regional coastal plans and aquaculture management areas; and the impact of port operations on coastal communities. *Details: Mike Hilton, c/o Department of Geography, University of Otago, PO Box 56, Dunedin, New Zealand. Email: mjh@geography.otago.ac.nz*

Web: www.cae.canterbury.ac.nz/jzncs/conference2004.htm

World Rice Research Conference

Tokyo, Japan

04-11-2004 to 07-11-2004

This conference will be one of the most important scientific events in this, the International Year of Rice. Main themes will be: innovative technologies for boosting rice production; perspectives on the place of rice in healthy lifestyles; adaptable rice-based systems to improve farmers' livelihoods; and, the role of rice in environmentally sustainable food security.

Details: K Toriyama, Japan International Research Centre for Agricultural Sciences, Ohwashi, Tsukuba, Ibaraki 305-8686, Japan. Fax: +81-29-8386342.

Email: wrrc2004@ml.affrc.go.jp

Web: www.irri.org/wrrc2004.htm

7th Asian Fisheries Forum

Penang, Malaysia

30-11-2004 to 04-12-2004

The theme for the triennial meeting is "New Dimensions and Challenges in Asian Fisheries in the 21st Century". Conference to include special symposia, plenary sessions, technical sessions, plus five post-conference field visits. Forum topics will cover all related issues such as technology needs, participation of the poor, aquatic ecosystem health, and management of small-scale fisheries.

Details: The Secretariat, 7th Asian Fisheries Forum, School of Biological Sciences, Universiti Sains Malaysia, 11800 Minden, Penang, Malaysia. Fax: +60-4-

6565125. Email: 7aff2004@usm.my

Web: www.usm.my/7AFF2004

Tenth Session of the Conference of the Parties to the UNFCCC

Buenos Aires, Argentina

06-12-2004 to 17-12-2004

Intended that the Tenth Conference will take place at the "La Rural" exhibition and conference centre in Buenos Aires. No further details on the agenda are available at present.

Details: Climate Change Secretariat, PO Box 260 124, D-53153 Bonn, Germany. Fax: +49-228-8151999. Email: secretariat@unfccc.int

Web: www.unfccc.int

International Statistical Conference

Peradeniya, Sri Lanka

28-12-2004 to 31-12-2004

Purpose of conference is to bring together statisticians from developed and developing countries to present their latest research findings and interact and exchange ideas. It is hoped that such a forum will initiate interaction, networking and stimulate research. Conference to be held at the Post Graduate Institute of Science. *Details: Conference Organizer, Post Graduate Institute of Science, PO Box 25, Peradeniya, Sri Lanka. Fax: +94-81-2389026. Email: info@pgis.lk*

Web: www.pgis.lk

Justice and equity in adaptation

Neil Adger, M. J. Mace, Jouni Paavola and Jona Razzaque report on the outcomes of a strategic assessment of equity and justice implications of adaptation.

Climate change has implications for equity and justice because the impacts of climate change, and resources for addressing these impacts, are unevenly distributed. While a great deal of effort has been spent on understanding the potential burdens of climate change mitigation on countries and economies, issues relating to equity in adaptation to climate change have been largely ignored. Poor people in developing countries face the greatest impacts of climate change and have a low capacity to deal with these impacts. Yet they are least responsible for climate change. For this reason, it is essential that the equity and justice implications of adaptation strategies and decisions are recognized and addressed at international, national, regional and local levels, both in policy-making and in implementation, particularly as adaptation grows in importance in international negotiations

under the United Nations Framework Convention on Climate Change (UNFCCC).

The Tyndall Centre for Climate Change Research, the Foundation for International Environmental Law and Development (FIELD), the Centre for Social and Economic Research on the Global Environment (CSERGE) and the International Institute for Environment and Development (IIED) conducted a strategic assessment of equity and justice implications

ABSTRACT

● The project's main conclusions are that:

(1) fair adaptation requires reducing the vulnerability of the most vulnerable; (2) present day adaptation strategies frequently reinforce inequities;

(3) the right to avoid dangerous climate change requires fair process; and (4) progress in mitigation of greenhouse gas emissions and other issues is tied to justice in adaptation and other issues.

of adaptation. This culminated in an international seminar in September 2003, which brought together leading scholars from a variety of disciplines to think through the role of justice in adaptation to climate change and its relationship to sustainable development.

Participants agreed that issues of both distributive and procedural justice must be addressed in order to achieve equity and justice in adaptation. Distributive justice focuses on the distributional consequences of environmental decisions, ranging from the uneven spatial and social impacts of climate change to the variable impacts of response strategies. Procedural justice concerns how and by whom decisions on adaptive responses are made. Critical issues for procedural justice include who is recognised and heard in decision-making, who controls decision-making processes at different levels, and what the relative power of different groups to influence decisions is. These questions are important

at the international level (for example under the UNFCCC), but they also matter at the local level in the context of 'everyday' decisions on adaptation.

Distributive and procedural justice are often intertwined in the key substantive justice issues of adaptation to climate change. These include who defines categories of countries and communities as vulnerable or as least developed and how; who defines terminology such as 'appropriate burden sharing' and 'dangerous' and how; who decides which burdens (for example public versus private burdens) will be addressed; and whose knowledge counts and how that knowledge is provided and accessed (for example through democratic models, bottom-up and top-down models) at international, regional, national and community levels.

These and other issues of justice in adaptation need to be considered within the UNFCCC's legal framework, and within the overall UNFCCC process. For example, preparation of National Adaptation Programmes of Action (NAPAs) by the 49 Least Developed Countries of the world provides an opportunity for applying principles of equity and justice to ensure that the voices and priorities of the communities that are most vulnerable to climate change are incorporated into the UNFCCC process on adaptation. NAPAs must prioritise adaptation activities and ensure stakeholder involvement, both of which are exercises in equity. Elsewhere under the UNFCCC, fair assessment of where capacity building, tech-

nology transfer and awareness raising activities should be focused is important.

The UNFCCC naturally takes standpoints regarding equity and justice when it makes distinctions among Parties and differentiates between responsibilities of the Parties. Nevertheless, many gaps and challenges remain and require elaboration in the Convention's framework on adaptation. Failure to successfully address equity and justice concerns would lead to disproportionate impacts on vulnerable countries and communities. Key challenges ahead include identifying and prioritising adaptation measures among and within countries, addressing disparities in institutional and negotiating capacity, and addressing interlinkages with other convention processes, mitigation activities and sustainable development.

One central challenge is to ensure that adaptation funding is adequate, predictable

Equity and justice are also important outside the UNFCCC process. For example, other international legal frameworks contain thresholds already agreed among nations on issues that relate to the concept of 'danger' in the context of climate change. Domestic legal frameworks also provide guidance on rights, responsibilities and personal or group liability. Such liability and compensation frameworks are one possible route for addressing burden sharing and existing 'ecological debt'. Models based on responsibility for past emissions, or per capita rights (such as the 'contraction and convergence' model discussed in this issue) are also useful for considering how funding for adaptation activities should be allocated and how responsibilities for reducing emissions should be divided. Collective loss-sharing and risk transfer frameworks, such as insurance, provide other opportunities to reduce the bur-

“Failure to successfully address equity and justice concerns would lead to disproportionate impacts on vulnerable countries and communities.”

and driven by developing country needs. The governance framework for adaptation must be permitted to evolve in a manner that not only assists developing country Parties in determining, prioritising and expressing their adaptation needs, but also responds to these needs in an organised manner which shares burdens transparently and equitably.

den of climate change on the poor.

While responsibility and insurance approaches certainly have a role in just adaptation to climate change, public adaptive responses are also needed to reduce vulnerability and to assist rural communities with adaptation. Effective governance of environmental resources, improvement of

access to and functioning of markets, and the provision of public services to maintain and enhance human capital are examples of measures that would benefit the most vulnerable groups in developing countries. These public responses must harness potential contributions from local communities and users, but they must also incorporate an element of state-building and enhancement of state capacity to be sustainable.

The main conclusions of the project can be summarized as follows:

1. *Fair adaptation requires reducing the vulnerability of the most vulnerable.* This conclusion can be drawn on the basis of legal and empirical analysis of adaptation governance and practice. The application of this principle requires reducing the vulnerability to climate change of specific populations. This poses a number of challenges, not least the ability to define vulnerability at different scales. The principle of supporting the most vulnerable first is also currently at odds with rhetoric on distributive justice within the climate change regime, which almost exclusively focuses on utilitarian principles (adaptation which makes the greatest difference to the most people).
2. *Present day adaptation strategies frequently reinforce inequities.* This conclusion can be drawn from empirical observations regarding adaptation strategies in many countries and contexts. Evidence suggests that adaptation decisions and plans do not benefit all stakeholders equally. Rather,

they often benefit those who are not particularly vulnerable and those who are well placed to take advantage of planning and regulatory processes. For example, when recovering from the impacts of weather-related hazards, the status quo in terms of wealth and access to decision-making is often reinforced. It is therefore wrong to assume that adaptation will happen smoothly and without cost. The political economy of adaptation is in fact directly tied to the underlying determinants and drivers of vulnerability. Adaptation to climate change can potentially heap further injustice on past injustice.

3. *The right to avoid dangerous climate change requires fair processes.* One possible approach to climate justice is to define it as a set of rights, akin to human rights. Rights-based climate justice would necessarily focus on the right to an absence of danger. Danger is not universal or experienced in the same way by all people affected by climate change impacts. A rights-based approach to climate justice therefore requires a process that allows diverse notions of danger to be recognised and transformed into collective decisions. The only way to reach agreement on danger is through science along with mechanisms that judge the unfairness of danger irrespective of who suffers it or when.
4. *Progress in mitigation of greenhouse gas emissions and other issues is tied with justice in adaptation and other issues.* Many

participants in the UNFCCC negotiations back this finding. Indeed, the UK Chief Scientist, David King, reiterates the centrality of justice concerns in his article in *Science* in 2004 (issue number 303, page 176) by stating: 'Any alternative [to Kyoto] needs to accept that immediate action is required and needs to involve all countries in tackling what is a truly global problem. And developing countries would need to be brought into the process ... embedded in a framework that recognizes that issues of justice and equity lie at the heart of the climate change problem'.

Emerging themes that would benefit from further research include:

1. *Funding of adaptation.* How should funds be raised for adaptation at international and national levels? What can be learned from the development and disbursement of UNFCCC funds for adaptation? How are these funds likely to succeed or fail in addressing the needs of the most vulnerable countries and communities? To what extent does existing funding reflect responsibility for the impacts of climate change, and what strategies might lead to more equitable burden sharing of the costs of adaptation? What is the role of compensation and liability schemes in the climate change context? How might insurance mechanisms be used to fund adaptation or reduce economic vulnerability? How might funding for adaptation be equitably channelled?

2. *National Adaptation Planning and NAPAs.* What can be learned from experiences with the NAPA process to date, both at international and national levels? How does the NAPA process, and the different outcomes of this process, differ between developing countries facing different national circumstances? How do the bottom-up results from the NAPA process contrast with other formally adopted top-down national priorities? How might frameworks be developed for the prioritisation of adaptation activities at local, regional, national and international levels? What information does the NAPA process provide for evaluating the potential and value of stakeholder participation in adaptation decision-making and national planning processes?
3. *Justice, climate impacts and vulnerability.* How can adaptation build upon existing

risk management strategies? What links exist between climate change and development issues? How might physical and socio-economic vulnerability to extreme weather events be reduced in developing countries to assist with adaptation to climate change? Could insurance approaches be tailored to enhance resilience and increase adaptive capacity?

In conclusion, justice, both of outcome and process, is intertwined at different levels of decision-making within institutions and collective action for adaptation. The traditional framework of distributive justice is thus inadequate for a comprehensive analysis of justice in adaptation. Human life and health, security, and the integrity of global ecosystems are all important justice imperatives, which can and often ought to be considered independently of economic welfare. A comprehensive

approach to the study of justice in adaptation must acknowledge procedural issues relating to recognition, participation, fair process and the use of power. These procedural issues are particularly important because of the multi-level nature of adaptation and because of the multiple objectives of international cooperation under the UNFCCC.

Differential vulnerability to climate change should be a central concern. Climate change impacts on vulnerable ecosystems and on vulnerable individuals and communities require just adaptation. This can often be best achieved by reducing the vulnerability of the most vulnerable and least advantaged. Current principles and practices diverge from this principle and all of us involved in climate change related action need to seek equitable and legitimate solutions if we are to be part of a transition to sustainable development. ■

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FURTHER INFORMATION

● **On the web:** Further information on the issues covered by this article can be found at www.tyndall.ac.uk/research/theme3/website_v03

Contraction and Convergence

Aubrey Meyer and Raphaël Hanmbock describe Contraction and Convergence, a flexible and equitable response to climate change after the Kyoto Protocol.

In May 2004, the New York Times wrote “Without international action – a new Manhattan Project to develop low-impact energy technologies and a revolutionary commitment to global equity – climate change promises social and economic collapse”.

Some senior advisors to the United Kingdom’s (UK) Prime Minister, Tony Blair, know this very well. Sir John Houghton, ex-head of the UK Meteorological Office, has described climate change as “a weapon of mass destruction” that is “already upon us” (The Guardian, 28th July 2003). Sir David King, the UK government’s chief scientific adviser, has called climate change a far greater threat than international terrorism (BBC News, 9th January 2004). Mr Blair himself declared on 27th April 2004, when launching the Climate Group, that “the issue of climate change is now very, very critical indeed.” He is right. Humanity is increasing rather than reducing

its emissions of the greenhouse gases that are changing the world’s climate.

To avoid disaster, a comprehensive response is urgently required. The global community must negotiate a plan to bring emissions down rapidly using the flexible, science-based Contraction and Convergence (or c&c) framework. It is difficult to think of any other effective approach in the battle to avoid dangerous rates of global climatic change.

ABSTRACT

● **The authors** argue that Contraction and Convergence is the only effective and comprehensive response to climate change.

● **They state that** it is based on science and logic, and is

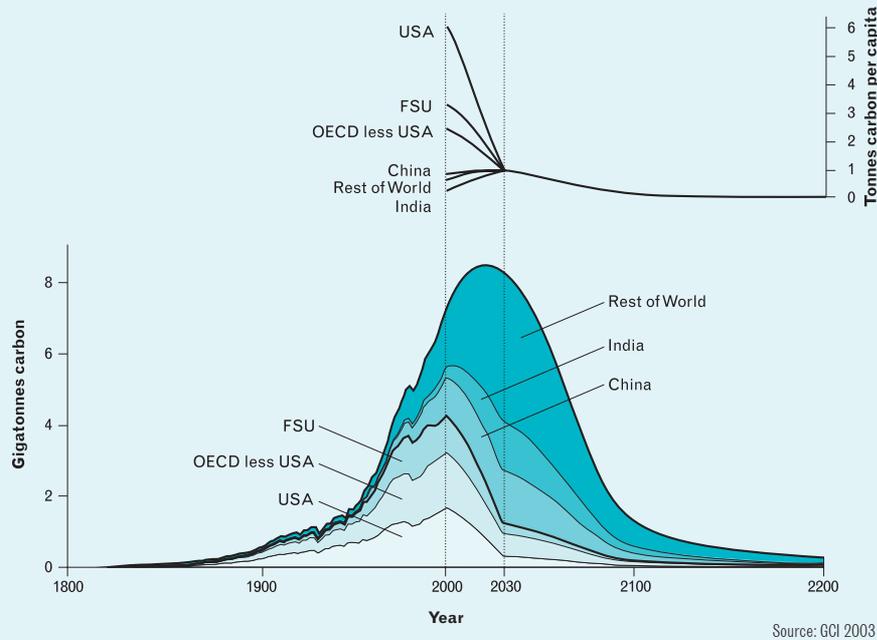
therefore robust.

● **They add that** it is Africa’s proposal for dealing with climate change and conclude that it must be vigorously supported by next year’s G-8 meetings and other international fora.

The Global Commons Institute (GCI) first proposed the principle of Contraction and Convergence to the United Nations in detail in 1996. c&c was adopted by the Africa Group the following year. The basic principle behind the approach is that international negotiations must aim at securing safe and stable atmospheric greenhouse gas concentrations using the principles of precaution and equity agreed under the United Nations Framework Convention of Climate Change (UNFCCC).

In essence, the framework provides a means of calculating any number of possible future global greenhouse gas emission scenarios within the overall conditions that (1) annual emissions contract by some future date to a (much) lower level than today, and (2) there is convergence from the current huge range of per capita greenhouse gas emissions to a situation where everyone on the planet has equal emission rights. Emissions rates can be calculated for every country and future

CONTRACTION & CONVERGENCE: A SCENARIO EXAMPLE



Source: GCI 2003

● One of many possible developments of global greenhouse gas emissions and associated per capita emissions calculated by the Contraction and Convergence model. In this case, convergence to equal per capita emission shares occurs in 2030. FSU refers to countries that constituted the 'former Soviet Union'; OECD to the rich, industrialised countries within the Organisation for Economic Cooperation and Development.

year. The rate of global emissions for full contraction, the year when this is achieved, and the year when per capita emission rights

converge, can all be set independently. The c&c model thus provides a very flexible tool for climate negotiations.

Guided by the Intergovernmental Panel on Climate Change (IPCC) Working Group One, the c&c model can embody crucial elements of climate change science as well as generate critical factors for international climate negotiations. It can calculate:

1. Any full-term contraction budget for a specified tonnage of annual global emissions consistent with stabilising atmospheric concentrations of greenhouse gases at a pre-agreed concentration maximum.
2. How this budget might be shared through international and constitutional agreements as 'tradable emissions entitlements'. This results from a (negotiable rate of) convergence to equal emissions shares per person globally by an agreed date within the full-term contraction/concentration budget.

Contraction and Convergence, therefore, has an advantage over alternative proposals, like the Kyoto Protocol, that somewhat arbitrarily invent targets as they proceed. The GCI is currently of the view that greenhouse gas concentrations higher than a level equivalent to 450 ppmv carbon dioxide are not safe. It thinks that contraction budgets should be drawn up now, and that convergence should be completed around a third of the way through the proposed contraction budget.

This proposed scenario is fair because, historically, most greenhouse gas emissions originated from developed countries. It would mean, for example, that in the year 2030 (or around a third of the way into a

100 year budget), convergence of per capita emission entitlements should have occurred. National emissions entitlements can, perhaps, be calculated using a population base year as part of negotiated c&c agreements. Any agreement reached should be rights-based, where, subject to appropriate rules, emissions entitlements are considered tradable.

The historic debt of climate change limits the progress of development in the South. It is, therefore, important to recognize that the sooner the date for which full convergence to equality of future entitlements is agreed, the sooner and better this historic debt can be settled. If the date is set sooner rather than later, developing countries will also receive a greater share of tradable emissions entitlements. This is made possible under c&c, because convergence is simply a share issue of emissions-entitlements rather than emissions per se. Subject to agreed c&c limits, emission trading can ease and hasten the transition.

Some people say, untruthfully, that c&c imposes reduction targets on developing countries. Particularly in view of the scenario described above, the opposite is in fact true. Much depends on the rates of emissions contraction and convergence that are negotiated. Moreover, accelerating convergence relative to a specified rate of contraction is safer for all parties than our present behaviour of delaying contraction as a consequence of denying convergence. The current scenario is typified

by delay, which means that the cost of climate damages is rising potentially beyond our ability to pay or to adapt.

GCI realises that as scientific understanding of the relationship between an emissions-free economy and concentrations develops, agreed rates of c&c will need to be subject to periodic revisions. Concentrations and temperature will, however, be rising throughout the period of contraction. So in view of the increasingly dangerous conditions under which this will be happening, the prime virtue of having a formal and revisable c&c agreement is that revisions can be negotiated within the same overall architecture.

GCI proposes that UNFCCC negotiations for this primary c&c agreement should occur principally between the North and the South as blocks. Further negotiations over sharing entitlements could continue between and within regions (such as the European Union, the Africa Union and the United States),

for by The Foundation for the Economics of Sustainability.

Amongst the oldest and strongest supporters of the c&c approach has been the Africa Group of nations. In 1997, when it championed c&c at the Third Conference of Parties to the UNFCCC, the group consisted of sixteen Anglophone African countries that were well aware of how devastating climate change already was for Africa. They knew that c&c protected the global climate and their share of the valuable tradable equity being created. Then, supported by many in and around the negotiations, their initiative was kept vigorously alive right through the Kyoto negotiations. At the climax of these, when the subject of emissions trading was being negotiated, their demand for c&c was tabled again, with support from the key Southern players.

The United States delegation – under pressure to win acceptance of emissions-trading

“The current scenario is typified by delay, which means that the cost of climate damages is rising potentially beyond our ability to pay or to adapt.”

while the collective course to stabilisation is maintained and revised as necessary. GCI also suggests that the inter-regional, international and intra-national tradability of these entitlements should be transacted in a resource-standard global currency, such as the Emissions-Backed Currency Unit argued

– responded by saying that Contraction and Convergence could be the basis of the next agreement. In 2000, when the IPCC concluded that “Contraction and Convergence takes the rights based approach to its logical conclusion”, the United States withdrew from implementation of the Kyoto Protocol.

So Contraction and Convergence is a stiff challenge to those who seek to manage the global climate account under the Kyoto Protocol. So far, the price at which permits are to

ing from the pain caused to others, is legally dubious.

Contraction and Convergence is constitutional and based on science and logic. It is a

“To stop the climate changing, we have to solve the problem collectively and faster than we create it. In this respect, the Kyoto Protocol is worse than inadequate.”

be traded under the Protocol does not begin to reflect the equivalent unit of damage from the emissions that change the climate. And while a few people gain rights, most actually lose them. Moreover, lives, real estate and other assets are being lost as well.

To stop the climate changing, we have to solve the problem collectively and faster than we create it. In this respect, the Kyoto Protocol is worse than inadequate. It disguises the severity of the problem. It has no agreed maximum of global carbon dioxide concentrations or emissions and so lacks the focus and structure required for any sustainable solution. Furthermore, the lucrative tradable emissions entitlements it creates are globally quite arbitrary. Creating equity-share – only for some – at the expense of climate stability and the poor and the vulnerable, can only promote conflict and disaster. No one can unilaterally create ownership of the global commons by assertion and succeed. Moreover, to trade what you do not own, prosper-

full-term, universal, rights-based framework designed to shrink emissions by focusing on the already dangerous rising greenhouse gas concentrations. As required by the UNFCCC, it is a rational and transparent global structure of precaution and equity that forces and finances the transition to sustainability for all parties from available renewable energy technologies and techniques. Contraction and Convergence gives us a way to enact our collective contract between present and future generations in a new economic paradigm for making sustainable development possible for all in the 21st century.

Those who rely on the Kyoto Protocol do not merely fail these tests; they refuse to take them. The original Kyoto Protocol was massaged to try to keep the United States on board. So now that the United States has withdrawn from the Protocol, why does anyone maintain allegiance to the drastically weakened targets insisted on by the United States before it withdrew from it? And more

importantly, why do parties continue with this failed model of negotiation? The truth is that, with their focus on the economy, the Kyoto Protocol's defenders do not count the things that matter; they count short-term profit and status before precaution and equity.

The accelerating rise of greenhouse gas concentrations in the atmosphere demonstrates how inadequate the Kyoto Protocol is in the short-term. Just one year of serious sink-failure numerically swallows the Protocol's theoretical 'gains'. Even in a good year, the Protocol's procedures do not even slow the upward acceleration of emissions, let alone decelerate the rise of concentrations. And in terms of rising temperatures, expectations are low, as changes have barely begun.

The UNFCCC set out to defend the planet against the devastating uneconomic growth of the rich. The Kyoto Protocol reversed this trend in favour of those whose interests are vested in this growth at the expense of the poor and the planet. Former consultants to the Small Island States now broker emission permits under the Protocol, while the homes of their former island clients are made uninhabitable by the rising seas.

Former climate action radicals, who denounced the original Kyoto Protocol at its birth in 1997 as a tragedy and farce, now defend its horse-trading and weakened revisions as a basis on which to continue to the Kyoto Protocol's second commitment period.

The weakening of the Protocol's 'targets' is problematic in itself, but the lack of architecture is a greater defect. It is the absence of this architecture that disqualifies the Kyoto Protocol, and its variants, as a basis for the future.

The Kyoto Protocol's government and non-government stakeholders have colluded in inadequacy and evasion. They have ignored the science and the obvious concept of equal rights to the global commons. Many actors promote the next commitment period of the Kyoto process and describe the first commitment period, which ends in 2008-2012, as a great achievement. This is rhetoric. The Kyoto Protocol is at best symbolic of our intent. Numerically, it is a measure of growing confusion and failure, not success.

Tough but true: 'Kyoto-for-some' will either be superseded by 'Contraction and Convergence-for-all', or climate change will supersede us all. Since 1990, we have all faced a simple but urgent survival challenge. Can we cooperate and commit globally to solving the problem of human-induced climate change? In 1992, those who ratified the UNFCCC committed themselves to answering "yes". By adopting it they said they could, and, on the basis of precaution and equity, they would meet this challenge. Ratification committed signatories to solving the problem faster than they created it.

Both the science and the logic decree that the UNFCCC stands for the 'United Nations Framework Convention for Contraction and

Convergence'. We have to have a greenhouse gas concentration target with a globally equitable framework and institutions to match, if we are to survive.

Many eminent institutions including the UK's Royal Commission on Environmental Pollution, the German Advisory Council on Global Change, the international insurance industry, the nuclear industry and the World Bank, now use the c&c methodology to make this point.

Advised by scientists who support Contraction and Convergence, the UK's Prime Minister, Mr Blair, is also correct when he said in his April 2004 Climate Group speech that, even if the Kyoto Protocol is fully implemented, "it falls significantly short of what we will need over the next half century if we are to tackle this problem seriously and properly". In the same speech, Mr Blair also correctly affirmed that the cost of not acting is "so overwhelmingly greater than any short-term cost of action that we have to act and we have to act now".

With senior Africans, Mr Blair has created the Africa Commission, to which Africa's climate, debt and development submissions will be made. He has also pledged the G-8 agenda next year, above all things, to climate change and to Africa. He has called Africa's plight a scar on our conscience. We know that. Now he must ensure it doesn't get worse and he must help to heal it by supporting Africa's proposal. ■

ABOUT THE AUTHORS



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FURTHER INFORMATION

● **On the web:** An animated demonstration of Contraction and Convergence is on-line at:

[www.gci.org.uk/images/CC_Demo\(pc\).exe](http://www.gci.org.uk/images/CC_Demo(pc).exe)

● A data-rich, 'zoomable' example of Contraction and Convergence as a pdf file is on-line at: http://www.gci.org.uk/images/Contraction_and_Convergence_Bubbles.pdf

● Support for Contraction and Convergence is on-line at:

<http://www.gci.org.uk/consolidation02.html>

Climate and extreme events

NEWS

SYMPOSIUM REPORT

Eileen Shea summarizes outcomes from the March 2003 Symposium on Climate and Extreme Events in Asia-Pacific: Enhancing Resilience and Improving Decision-Making.

Disaster losses can jeopardize investments made by society to achieve development goals such as: ameliorating poverty and hunger; providing access to education, health services, safe housing, drinking water and sanitation; and protecting the environment as well as economic investments providing employment and income. In addition, the drive for economic growth and social improvement can generate new disaster risks. These insights highlight the critical need for integrating disaster management into the sustainable development agenda. In Asia, where hydro-meteorological conditions are responsible for 80 per cent of the region's natural disasters, climate risk management assumes special urgency.

National governments, regional organizations and international scientific, devel-

opment and donor agencies increasingly recognize the importance of enhancing resilience to climate-related extreme events as an integral component of sustainable development planning. Dialogue on how to integrate adaptation to climate variability and climate change into poverty reduction programmes is increasing. In this context and as part of the 20th Pacific Science Congress, the East-West Center, the Asian Disaster Preparedness Center and the Pacific Science Association convened the Symposium on Climate and Extreme Events in the Asia-Pacific: Enhancing Resilience and Improving Decision-Making.

During the Symposium, presentations on national and sectoral experiences with the development and use of climate variability forecasts confirmed the exposure and sensitivity of the Asia-Pacific region to climate-related extreme events. Presentations also highlighted opportunities in a number of key sectors, including: agriculture, food security, drought, flood and fire management, disaster management, tourism, health, water and other natural resources management and fisheries. Presentations and working

group discussions reinforced the central importance of establishing and sustaining a highly collaborative participatory process, through which scientists and decision-makers share responsibility for the development and application of useful climate information designed to enhance the resilience of Asia-Pacific communities. Discussions highlighted the following points that might be considered 'guiding principles' for a climate information system designed to enhance resilience and improve decision-making:

- Integrate climate and society, focusing on understanding vulnerability and enhancing resilience.
- Focus on climate-related extreme events. This can provide opportunities to address current problems while planning for the future. Climate risk management could be a valuable framework for building science-policy partnerships and guiding climate information systems.
- Recognize the central importance of water resources in most Asia-Pacific communities and give priority to this climate-sensitive sector in order to promote resilience in other sectors.

- Emphasize proactive planning in the near and long-term future through the integration of climate risk management considerations in current disaster management programmes and sustainable development planning.
- Start with a clear understanding of existing decision-making frameworks and contexts to help guide information design, development, delivery and application.
- Choose tools, technologies and information sources that are appropriate in a given place and context (ranging from the traditional to the high-tech).
- Emphasize processes as well as products.
- Build on/leverage existing systems, institutions, programmes, relationships and networks.
- Promote opportunities to enhance communications both within and between individual teams and networks in various regions and/or sectors.
- Document and share experiences in order to develop understanding of lessons learned and guiding principles, and facilitate shared access to expertise, tools and technologies.
- Recognize that training, education and outreach are essential components of a successful programme.
- Acknowledge the importance of an integrated, multi-disciplinary programme of observations/monitoring, forecasting, assessment and application.

During his opening Symposium keynote speech, Mickey Glantz highlighted the importance of addressing the integrated ‘climate-society system’. If we are, in fact, interested in improving the effectiveness and efficiency of this integrated system, then we are compelled to undertake a collaborative programme that is as interested in societal context, decision-making frameworks and information needs, as it is in enhancing the ability to monitor, understand and anticipate changes in the physical climate system. Creating and sustaining the kinds of partnerships required for such an endeavour is both a grand challenge and an unprecedented opportunity for the multi-disciplinary community of scientists interested in climate adaptation as well as the governments, resource managers and businesses for whom adaptation to climate change represents a

matter of survival and sustainable development. ■

● **Further information:** The Symposium report can be accessed via the East-West Center website www.EastWestCenter.org. Additional details along with Symposium presentations and background material can be found at www2.EastWestCenter.org/climate/extreme.

For enquiries and a copy of the full Symposium report, contact Eileen Shea, Climate Project Coordinator, East-West Center, 1601 East-West Road, Honolulu, Hawaii 96848, USA.

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The Otin Taai Declaration

CHURCHES' STATEMENT

A Statement and Recommendations from a meeting of the World Council of Churches (WCC) and WCC Member Churches in the Pacific, 6-11 March, 2004, Tarawa, Kiribati.

NEWS

The impacts of human-induced climate change are already visible on Kiribati. The sea level is rising, people's homes are vulnerable, shores are eroding and coral reefs are becoming bleached. Water supplies and soil fertility are being threatened by salt water intrusion.

Many other Pacific island nations are experiencing similar impacts. Our peoples, who number about seven million, are already suffering and are vulnerable to future impacts.

We, participants in the Pacific Churches' Consultation on Climate Change, feel called by God to:

- Affirm our commitment to care for the earth as our response to God's love for creation.
- Declare as forcefully as we can the urgency

of the threat of human-induced climate change to the lives, livelihoods, societies, cultures and ecosystems of the Pacific Islands.

- Dedicate ourselves to engaging our churches in education and action on climate change.
- Commit ourselves to ecumenical collaboration among our churches and with other religious and secular bodies in the Pacific and beyond, that will increase the effectiveness of our national and regional efforts.
- Call on our sisters and brothers in Christ throughout the world to act in solidarity with us to reduce the causes of human-induced climate change. We issue this call particularly to churches in the highly industrialized nations whose societies are historically responsible for the majority of polluting emissions. We further urge these countries to take responsibility for the ecological damage that they have caused by paying for the costs of adaptation to anticipated impacts.
- Invite church-related specialized ministries for emergency-response, development and advocacy to integrate climate

change and adaptation projects into their policy-development, education and advocacy.

- Express appreciation to the wcc for its support of the Pacific churches on the issue of climate change and request that the voices of the Pacific become increasingly reflected in the wcc Climate Change Programme and in the next wcc Assembly in 2006.
- Pressure all countries to ratify and implement the Kyoto Protocol, especially highly-industrialized nations such as the United States of America, Australia and the Russian Federation, which to date have not ratified the Protocol.
- Encourage companies that are major producers or consumers of fossil fuels to support a transition towards less carbon-intensive economies, reduced energy usage and the development of cleaner, renewable energy sources. ■

● **Further information:** The WCC Office in the Pacific, PO Box 2079, Govt Buildings, Suva, Fiji. Fax: (679) 331 6916. Email: fkt@wcc-coe.org. Web: www.wcc-coe.org

Issue 52 July 2004
ISSN 0962-7030

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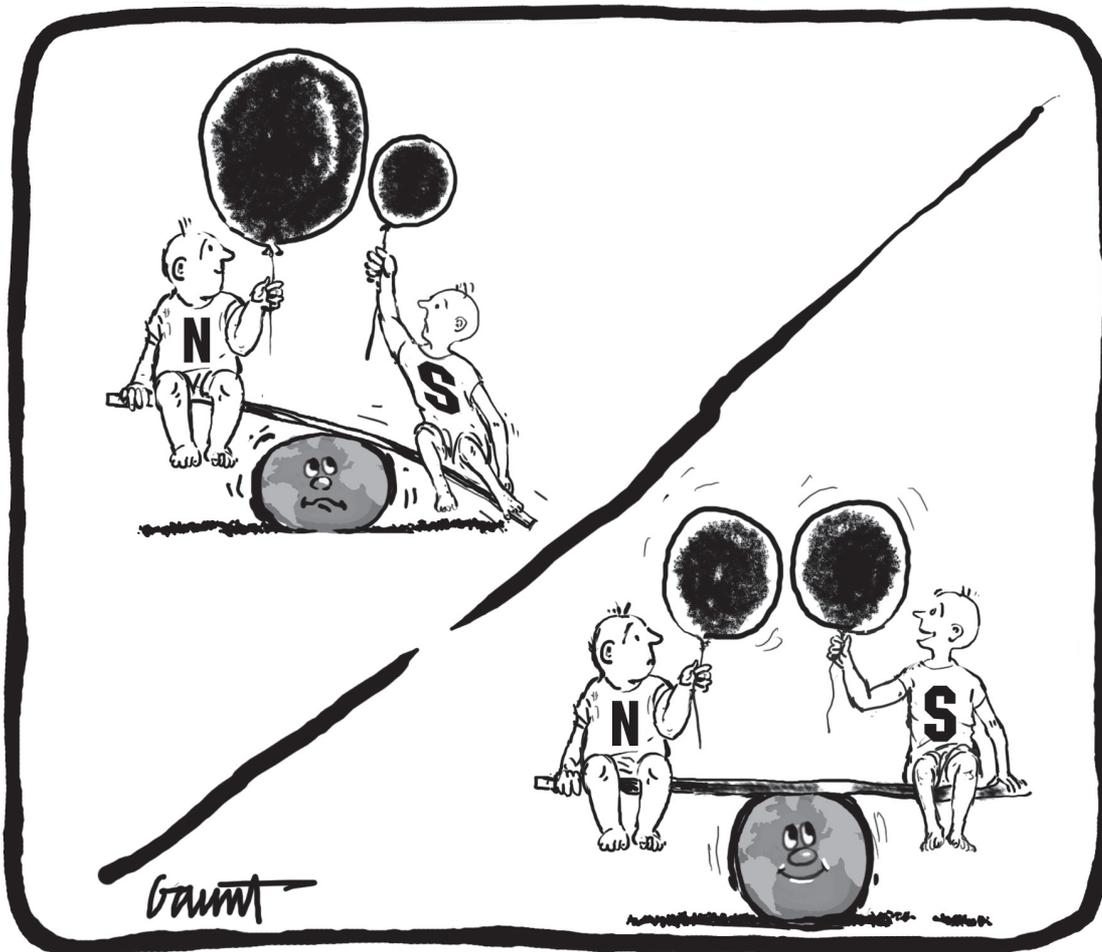
Distribution: Tiempo is available free on request.

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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).

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Johan Kuylenstierna
Design: A4
Printed by: PMS Marketing
Logistics, York



Adaptation – a Caribbean view

The Barbados Programme of Action, articulated at the Small Island Developing States (SIDS) conference (1994), identified climate change as a priority issue for the small island and low lying coastal Caribbean states. Caribbean countries have focused their response to this threat on building national capacity for adaptation, while pressing at international fora for increased mitigation efforts from Annex 1 countries.

Disasters threaten development efforts in the region by diverting scarce development resources to disaster response activities. Most disasters are linked to climate, and underline the existing vulnerability of the region to climate variability. Floods, droughts, forest fires and landslides are all associated with the El Niño phenomena.

Average regional annual temperatures increased by at least 0.5°C between 1900 and 1995. Precipitation is decreasing, and sea level rise threatens coastal areas, where most

people live and work. Although the extent of future climate change risk is unclear, it is certain that climate change will exacerbate present day regional vulnerability to climate variability. Serious loss of lives and livelihoods from recent heavy rainfall and floods in Haiti and the Dominican Republic provide evidence of this. Immediate action is required to increase current resilience to risks arising from climate variability, in order to improve capacity to respond to long-term climate change and ensure sustainable development in the region.

Adaptation in the region is informed by the urgent need to respond to risks arising from climate variability. This approach has been adopted by the GEF-funded Caribbean Planning for Adaptation to Climate Change project, and the preparation of National Adaptation Plans of Action. Regional and national consultations have improved understanding of perceptions of vulnerability to climate variability, capacity to cope and effective current responses. We

have learnt that adaptation is not a novel science; many solutions (such as Integrated Coastal Zone Management, Integrated Water Resources Management, Land Use Planning) have existed for some time. Only the resources and the commitment to implement them are missing. The need to institute and finance these solutions becomes more urgent with the threat of climate change.

Most SIDS suffer from a lack of capacity and limited availability of data for rigorous climate and vulnerability studies. The 'bottom-up' approach to adaptation therefore provides a valuable alternative to approaches now in vogue. The region looks forward to the availability of resources to facilitate reduction of vulnerability to climate variability – a legitimate approach to the longer-term goal of adaptation to climate change.

THE FINAL WORD

Neville Trotz argues that responding to climate change requires increasing current resilience to climate variability.



Neville Trotz spearheads Caribbean efforts to build capacity for adaptation to climate change under the auspices of projects funded by the GEF and CIDA.