Most people are well aware of the globally relevant findings contained in the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC): that the most probable projected increases in global mean temperature to 2100 lie between 1.4°C and 5.8°C while those for rises in global mean sea level to 2100 lie between 9 cm and 88 cm (see *Tiempo*, Issue 38/39, June 2001).

Small islands and the IPCC

But what of the specific findings of the IPCC for the most vulnerable countries, the small island developing states? John Hay of the University of Waikato, New Zealand, presents a small island's perspective on the IPCC's Third Assessment Report.

Small islands, sensitive microcosms of the Earth system, can be considered as a bell weather to the rest of the world. Such a utilitarian view is, however, somewhat short-sighted. What about the futures of the island inhabitants themselves? What about the intrinsic values of the island systems, so often portrayed as the "innocent victims" of global warming?

In the small islands chapter of the IPCC Third Assessment Report on Impacts, Adaptation, and Vulnerability (see page 25 of this issue), we find more focused statements. To paraphrase these statements:

- The projected increase in mean annual temperatures for the Pacific Islands region to the 2050s is 1.6°C and 2.5°C to the 2080s.
- While there will be regional changes in sea level in the future, it is likely that region wide sea levels will continue to track global trends in the longer term.
- Regional trends in precipitation are difficult to predict, but scenarios suggest for the Pacific Islands region an increase of about 5 per cent by the 2050s and 7 per cent by the 2080s.
- Current projections show little change or only small increases in amplitude of El Niño events over the next 100 years.

It is necessary to place a caveat on the last point since recent trends indicate surface temperatures in the tropical Pacific are becoming more El Niño-like. For example, the eastern tropical Pacific has warmed more than the western tropical Pacific, with a corresponding eastward shift in rainfall. Many models project that these trends will continue.

But the huge uncertainties associated with the most crucial projections is sobering. There is, for example, insufficient information to provide conclusive statements as to how global warming will influence tropical cyclones, in many

cases a source of major human and environmental devastation for small islands.

There are, however, findings documented in the Third Assessment Report that are arguably of even greater significance to small island states.

Climate change is no longer a phenomenon we have the luxury to plan for. It is happening now and small island states are in the front line of its adverse impacts. The evidence? Many of the recently observed and now well-documented changes in aquatic, terrestrial and marine environments globally are consistent with recent changes in the global system. Of more direct and hence of more immediate relevance, small island countries are already experiencing disruptive changes, again consistent with many of the anticipated consequences of global climate change.

These consequences include extensive coastal erosion, coral bleaching, persistent alteration of regional weather patterns, and decreased productivity in fisheries and agriculture for reasons such as higher sea levels making some soils too saline for cultivation of traditional crops. Coastal roads, bridges, foreshores and plantations are suffering increased erosion, even on islands that have not experienced inappropriate coastal development, and recent devastating droughts have hit export crops and caused serious water shortages in many Pacific island countries.

Yet another consequence of global climate change is the evidence of more widespread and frequent occurrence of mosquito-borne diseases. These diseases are even being reported in the highlands of Papua New Guinea and the Solomon Islands where previously it was too cold for mosquitoes to survive.

These and other precursors of global climate change impacts experienced by small island states provide some of the more compelling and tangible indications of the seriousness of global warming, certainly more than the often quoted projections of increased global temperature and sea levels. The adverse consequences of climate change are already an unfortunate reality for many small islands people. They highlight the serious and wide-reaching further consequences future climate changes will have on small island countries, changes which will likely exacerbate the existing adverse impacts of the high natural variability of the climate and related systems.

Small island states are likely to be among the countries most seriously impacted by climate change, including sea-level rise, despite being the smallest contributors to human-induced climate change, but they have a seriously limited capacity to adapt to the adverse impacts of climate change.

In regard to these issues the Technical Summary of the Third Assessment Report makes the following observations with reference to small island states:

- The need for adaptation has become increasingly urgent, even if swift implementation of global agreements to reduce future emissions occurs.
- Most adaptation will be carried out by people and communities that inhabit island countries; support from governments is essential for implementing adaptive measures.
- Progress will require implementation of appropriate risk-reduction strategies with other sectoral policy initiatives in areas such as sustainable development planning, disaster prevention and management, integrated coastal zone management and health care planning.
- Strategies for adaptation to sea-level rise are retreat, accommodate and protect – measures such as retreat to higher ground, raising the land, and use of building

setbacks appear to have little practical utility, especially when hindered by limited physical size.

- Measures for reducing the severity of health threats include health education programmes, health care facilities, sewerage and solid waste management and disaster preparedness plans.
- Islanders have developed some capacity to adapt by application of traditional knowledge, locally appropriate technology and customary practice. Overall adaptive capacity is low, however, because of the physical size of nations, limited access to capital and technology, shortage of human resource skills, lack of tenure security, overcrowding, and limited access to resources for construction.
- Many small islands require external financial, technical and other assistance to adapt. Adaptive capacity may be enhanced by regional cooperation and pooling of limited resources.

A concerted effort is required to rectify the current inability to provide detailed characterizations of climate change for small island states. Until recently, planning for climate change has been hampered by a lack of integrated approaches that reflect the highly interdependent nature of natural and socio-economic systems in small island states.

Despite the plethora of needs, and barriers to them being addressed, there is some ground for cautious optimism. Three recent examples will be given here.

Funding mobilized for adaptation

At the recently concluded Sixth Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC), new sources of funds were approved for projects and schemes to help developing countries adapt to the impacts of climate change. The funding streams are the Special Climate Change Fund and a special fund for the Least Developed Countries. European Union countries, Switzerland and Canada have already pledged US $410 million towards the Funds, with an additional US $10 million pledged from Canada specifically to kick-start the Least Developed Countries Fund.

Example of capability enhancement

The Pacific Island Climate Change Assistance Programme (PICCAP) is a Global Environment Facility-funded regional climate change project. It involves ten Pacific island countries (Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Samoa, Solomon Islands, Tuvalu, Vanuatu) and is coordinated and executed by the South Pacific Regional Environment Programme (SPREP).

PICCAP has been designed in such a way as to strengthen the capacities of participating countries, in terms of training, institutional strengthening and planning activities, so as to enable them to meet their reporting obligations under the UNFCCC. Success has been measured, in part, by all the participating countries under PICCAP having submitted their initial national communications prior to the fifth Conference of the Parties to the UNFCCC.

Through its sub-regional approach, PICCAP has fostered greater sharing of information, built up a qualified pool of climate change experts from with the Pacific island region, instituted cross-sectoral climate change country teams with technical and policy-related functions, established a database of climate change information, and assisted with the development of national climate change action plans which have formed the basis for initial national

communications and the implementation of the UNFCCC at a national level.

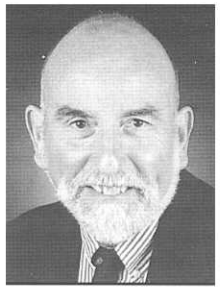
Examples of methodologies and tools

The numerous and well-developed interactions between the natural and human systems of island countries means that integrated assessment tools are of particular relevance. Once such tool that has proved particularly beneficial is VANDACLIM, an integrated assessment model based on the imaginary island country of Vanda. The model was developed by the International Global Change Institute at the University of Waikato in New Zealand, in collaboration with SPREP and the United Nations Institute for Training and Research to support training and other capacity enhancement activities.

The main components of VANDACLIM are: time-dependent projections of global-mean temperature and sea-level change to 2100; a regional climate change scenario generator; and sectoral impact models covering agriculture, the coastal zone, human health and water resources. The user has considerable flexibility in generating scenarios, being able to choose among a large range of projections from greenhouse gas emission scenarios, several global climate model patterns, and the year of interest.

A wide number of models are available for use in vulnerability and adaptation assessments of agriculture, ranging from relatively simple biophysical indices to complex process-based models.

Two methods for assessing impacts of climate change and sea-level rise on the Vanda coast have been incorporated into VANDACLIM. The first method includes a variant of the 'Bruun Rule', suitable for assessing time-dependent erosion of beach and dune systems. The second method includes a simple inundation model ('drowning' concept) suitable for the flat, low-lying deltaic coastal plains.



Health impacts can be examined using a biophysical index which estimates potential incidence of malaria as influenced by temperature and rainfall and a simple threshold index for estimating change in risk of cholera outbreaks as a result of flooding.

For water resources, three models are included: an atmospheric water balance model for assessing the water resource situation for the country as a whole; a water balance-river discharge model that is used for estimating monthly mean discharge for evaluation of wet and dry season river flow, and a discharge-flood area model that is used for the areal extent of flooding.

It is gratifying to witness the increasing mobilization of resources and the other developments that will help assist small island states to both assess and mitigate the adverse consequences of climate change and variability, including sea-level rise. That such efforts also help maintain, if not improve, the quality of life for vulnerable peoples and protect the valued natural systems of these island countries, is an added and welcome bonus.

✍ **Professor John Hay is Director of Professional Training at the International Global Change Institute at the University of Waikato, Hamilton, New Zealand. He was also a lead author of the small Islands chapter of the IPCC Third Assessment Report.**

V1 Global Conference on Environmental Education
New Delhi, India:
06-11-2001 to 10-11-2001

Conference organized by the Indian Environmental Society in association with Friedrich Ebert Stiftung. With a special focus on Rio+10, the organizers hope that the conference will provide new insight on the latest developments in environmental education together with discussion on the achievements of UNCED. Session topics include: environmental education and sustainable development; global warming and climate change; and, education and Local Agenda-21. **Details:** Indian Environmental Society, U-112, 3rd Floor, Vidhata House, Vikas Marg, Shakarpur, Delhi 110092, India. Fax: +91-11-2223311. Email: iesenro@del2.vsnl.net.in.

Predicting Biodiversity in European Landscapes: Mapping, Patterns, Indicators, Monitoring
Vienna, Austria:
18-11-2001 to 20-11-2001

The Biodiversity Workshop aims to, primarily, examine the availability of biodiversity predictors in the rural landscapes of Europe and to discuss their application. Discussion will also examine consequences for the European environmental policy as well as further research strategies regarding biodiversity action plans. **Details:** Simone Matouch, ARGE, Austrian Network Environmental Research, Netnode Biodiversity, Theobaldgasse 16/4, A-1060 Vienna, Austria. Fax: +43-1-58628779. Email: arge.matouch@eunet.at Web: http://nuf.boku.ac at.

Solar World Congress of the International Solar Energy Society 2001
Adelaide, Australia:
25-11-2001 to 30-11-2001

Programme will cover all aspects of renewable energy and energy sustainability including: research and development, industry; applications; education; and socio-economic and political issues **Details:** ISES 2001, c/o Hartley Management Group, PO Box 20, Kent Town, Adelaide, SA 5071, Australia. Fax: +61-8-83634577. Email: ises2001@hartleymgt.com.au. Web: www.unisa.edu.au/ises2001congress/home.html.

1st Intergovernmental Review Meeting on the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities
Montreal, Canada:
26-11-2001 to 30-11-2001

The Global Programme of Action (GPA) meeting intends to undertake a review of progress on implementation of the GPA at all levels. Will include reviews of scientific assessments; review of collaboration amongst regional and global organizations; and, discuss international rules, practices and recommended procedures. **Details:** UNEP/GPA Coordination Office, PO Box 16227, 2500 BE, The Hague, The Netherlands. Email: gpa@unep.nl. Web: www.gpa.unep.org.

Concerted Action for Tradeable Emission Permits Workshop
Venice, Italy:
03-12-2001 to 04-12-2001

Main theme for the CATEP Workshop is "Trading Scales: Linking Industry, Local/Regional, National and International Emissions Trading Schemes" Aims to stimulate debate and discussion on the global issues related to the various proposed emissions trading systems Particular focus will be on the elements that have to be made compatible in order to enable an equitable and efficient linking. **Details:** Monica Eberle, Fondazione Eni Enrico Mattei, Campo S M Formosa, Castello 5252, 30122 Venezia, Italy Fax: +39-41-2711461. Email: eberle@feem.it.

Oceans & Coasts at Rio+10: Assessing Progress, Addressing Continuing and New Challenges
Paris, France: 03-12-2001 to 07-12-2001

An international conference sponsored by UNESCO The aim is to consider and discuss the status of oceans and coasts ten years after the 1992 UN Conference on Environment and Development. Main topics include: implementation of conventions; sustainable development; climate change; resource use and conservation; and pollution. **Details:** Patricio Bernal, IOC, I rue Miollis, 75732 Paris Cedex 15, France. Fax: +33-1-45685810. Email: p.bernal@unesco.org.

International Conference on Renewable Energy for Rural Development
Dhaka, Bangladesh:
19-01-2002 to 21-01-2002

Main aim of the conference is to address all technical issues for the future development of renewable energy sources. The primary energy sources that will be discussed are power generation from offshore wind, waves, current and tidal schemes. The conference will also look at the future technologies possible within both a medium and long-term time frame. **Details:** A K M Sadrul Islam, Department of Mechanical Engineering, Bangladesh University of Engineering & Technology (BUET), Dhaka 1000, Bangladesh. Fax: +880-2-8613046. Email: sadrul@me buet.edu.

Third International Symposium on Non-CO_2 Greenhouse Gases
Maastricht, The Netherlands:
21-01-2002 to 23-01-2002

Symposium will be conducted in two or three parallel sessions. These sessions will focus on three main themes. The first, emission inventories, will deal with scenarios and scientific understanding of sources, sinks and atmospheric processes. The second will deal with technological options The third will cover policy aspects. **Details:** Symposium Bureau, VVM, PO Box 2195, NL-5202 CD Den Bosch, The Netherlands. Fax: +31-73-6216985. Email: vvm@wxs.nl. Web: www.vvm.to/ncgg-3.htm.

conferences

Emissions Trading & Kyoto Mechanisms in the Euro-Mediterranean Area: Policy Design & Commercial Implications
Rome, Italy: 24-01-2002 to 25-01-2002

Organized by the Institute for Economy and the Environment at the University of St Gallen in cooperation with the Gerling Sustainable Development Project, San Paulo IMI and Natsource-Tullett Europe. No further information available at present. **Details:** Josef Janssen, Head of Emissions Trading and Climate Policy, Institute for Economy and the Environment, University of St Gallen, Switzerland. Email: kyoto@unisg.ch. Web: www.iwoe unisg.ch.

Solutions to Coastal Disasters Conference 2002
San Diego, USA:
24-02-2002 to 27-02-2002

International participants will include coastal researchers, managers and scientists with the aim to exchange information about coastal disasters. Discussions will focus on: identifying gaps in information exchange between researchers and managers; demonstrating and improving links between coastal research, engineering, management and decision making; and, projecting of future trends in coastal disaster occurrence and management. **Details:** Lesley Ewing, CCC, 45 Fremont Street, Suite 200, San Fransisco, CA 94105, USA. Email: lewing@coastal.ca.gov. Web: www.asce.org/conferences/cd2002/.

Rural Community Interaction & Workshop on Alternative Ways to Combat Desertification: Connecting Community Action with Science & Common Sense
Cape Town, South Africa:
08-04-2002 to 20-04-2002

Participants will include scientists, land managers, community leaders, researchers and students, and government and non-governmental organizations. Main topics include the role of regional, local and community structures in combating desertification and monitoring and evaluating land use and development. Will incorporate a travelling event visiting various rural communities in the region, including Gobabeb in Namibia. **Details:** Roben Penny, Woodbine, Essex Road, Kalk Bay, 7975 Cape Town, South Africa. Fax: +27-21-7881285. Email: robenpen@jaywalk.com.

World Renewable Energy Congress VII
Cologne, Germany:
29-06-2002 to 05-07-2002

The main theme of this seventh congress organized by The World Renewable Energy Network is "Renewables: World's Best Energy Option." The congress topics include: low energy architecture; photovoltaics; solar-thermal applications; wind energy; biomass conversion; solar materials; fuel cell systems; and energy and gender. **Details:** Ali Sayigh, Congress Chairman, 147 Hilmanton, Lower Earley, Reading RG6 4HN, UK. Fax: +44-118-9611365. Email: asayigh@netcomuk.co.uk. Web: www.wrenuk.co.uk

1st World Wind Energy Conference & Exhibition
Berlin, Germany:
04-07-2002 to 08-07-2002

Conference programme will include plenary lectures focusing on the state-of-the-art in wind energy; targeted international workshops; and, a global exhibition of products and services. Main paper subjects include: global policies and markets; integration and implementation; technology development and certification; capacity building; and, economic, social and environmental issues amongst others. **Details:** Conference Organizer, WIP, Sylvensteinstr. 2, D-81369 Munich, Germany. Fax: +49-89-7201291. Email: wip@wip-munich.de. Web: www.wip-munich.de.

2002 ACEEE Summer Study on Energy Efficiency in Buildings
Pacific Grove, USA: 18-08-2002 to 23-08-2002

An annual study event organized by the American Council for an Energy-Efficient Economy (ACEEE). Main subjects will include: design and performance of buildings; energy and information technologies; human and social dimensions of energy use; role of energy service companies; and, programme design, implementation and evaluation. The 2002 course will also include a technology showcase and roundtable sessions on specific topics. **Details:** ACEEE Summer Study Office, Rebecca Lunetta, PO Box 7588, Newark, DE 19714-7588, USA. Fax: +1-302-2923965. Email: rlunetta@erols.com. Web: http://aceee.org.

Earth Summit 2002
Johannesburg, South Africa:
02-09-2002 to 11-09-2002

The World Summit on Sustainable Development, or Rio+10 as it is otherwise known, will review that progress towards sustainable development which has been made over the past decade since the Rio de Janeiro Earth Summit in 1992. **Details:** Charles Nouhan, UNED UK, 3 Whitehall Court, London SW1A 2EL, UK. Fax: +44-20-7-9305893. Email: cnouhan@earthsummit 2002.org.

International Conference on Sustainable Agriculture for Dry Areas for the 2nd Millennium
Shijiazhuang, PR China:
15-09-2002 to 19-09-2002

Participants from many disciplines will consider how to integrate sound crop production technologies, water saving and irrigation, tillage method, optimum fertilization and reduction of agro-chemicals in the environment for the dry regions of the world. Aims to formulate recommendations for innovative procedures for research and technology transfer in sustainable agricultural management. **Details:** Catherine Vachon, Lethbridge Research Centre, Agriculture & Agri-Food Canada, Lethbridge, Alberta T1J 4B1, Canada. Fax: +1-403-3823156. Email: vachonc@em.agr.ca. Web: http://res2.agr.ca/lethbridge/hebel/confindex.htm.