

Oceanic Waves



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START is the acronym for Global Change SysTEm for Analysis Research and Training. It was launched by international scientists to build indigenous capacity world-wide to cope with scientific and policy aspects of environment change and development. The International START Secretariat was established in Washington DC, in 1992. START website address is: www.start.org



START-Oceania is one of six START regional networks. START is sponsored by the International Geosphere-Biosphere Programme (IGBP), International Human Dimensions Programme on Global Environmental Change (IHDG) and World Climate Change Research Programme (WCRP). The START programme assistant is also the Liaison Officer for the Asia-Pacific Network for Global Change Research (APN). START-Oceania website is at: www.usp.ac.fj/start

Global warming increases chances of extreme rains and flash floods

Fiji should strengthen its disaster preparedness, as scientists have predicted that the country will experience more frequent heavy rainfall events similar to those that caused major flash floods in April this year.

Scientists have stressed that Fiji should strengthen its disaster preparedness efforts and formulate adaptive strategies to reduce weather-related loss to life and economy.

The unusually heavy rainfall in Suva and adjoining areas in April are in line with global findings that extreme weather events have become more frequent world-wide over the past decade, due to global warming. In addition to sea-level rises, effects of global warming include enhanced frequency of heavy rainfall in the tropical region.

These conclusions were drawn in a research paper on 'Extreme Weather Events in Fiji', written by Professor Kanayathu Koshi, Professor Murari Lal and Mr Melchior Matakai, from the University of the South Pacific's (USP) Pacific Centre for Environment and Sustainable Development (PACE-SD).

In April this year, a tropical depression over Fiji resulted in heavy rainfall which caused devastating floods in Rewa/Navua/Serua areas on April 15. The



Navua town was submerged under water during flash floods due to extreme rainfall earlier in the year. (Photo source: Fiji Red Cross Society)

heavy rainfall occurred in spite of earlier weather forecasts of 'near average' rainfall for the March-April-May 2004 period for Fiji and neighbouring countries, by The Island Climate Update, March 2004, published by the National Institute of Water and Atmospheric Research, New Zealand.

Unusually heavy rainfall spells were also recorded on April 8 this year, caus-

ing extensive damage to property and infrastructure in just a few hours. "The Fiji Disaster Management committee (DISMAC) confirmed 11 deaths, 9 missing and \$F5.6 million in infrastructure damage from these inclement weather incidents," the research paper states.

An analysis of rainfall data over the past

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START fellowship and visiting scientist program

The International START Secretariat recently announced Round 13 of the START Fellowship/Visiting Scientist Program.

This capacity-building program is open to undergraduate/postgraduate students and to scientists researching in global change related areas from Africa, Asia and Oceania.

The program is funded by the Ministry of Foreign Affairs of Netherlands (DGIS), and is designed to increase the number of developing country scientists who serve as active partners in global change research in START regional

networks and in the Joint and Core Projects of the Earth System Science Partnership programme.

START fellows may work under senior mentors in leading international laboratories or institutions, where research is conducted on regional aspects of global change.

The duration of the fellowships is for one or two semesters (4-8 months).

A parallel activity, the START Visiting Scientist Award, allows senior scientists from developing countries the opportunity to undertake short-term visits to major international laboratories

to become acquainted with recent advances in research and develop long-term programmatic linkages and partnerships. The duration of these awards is usually 1-2 months.

Both the fellowship and visiting scientist awards will provide economy-class airfare and a subsistence allowance.

Further information and the application form for the program is available from the START website (www.start.org). Deadline for the awards is December 1, 2004. For further information and assistance, please contact Ms Mosmi Bhim on email: startoceania@usp.ac.fj

From the Secretariat desk

Greetings from the START-Oceania Secretariat and from the Programme Assistant, Mosmi Bhim.

The previous issue of the *Oceanic Waves* came out in June. A lot of activities have taken place since then. One major activity was the two-week Pacific Island Training Institute on Climate and Extreme Events which was held from 15-26 June at the University of the South Pacific's Laucala Campus, Suva, Fiji.

This training received substantial funding from the Asia-Pacific Network for Global Change Research (APN) through the APN CAPABLE programme.

Director of START-Oceania Secretariat, Professor Kanayathu Koshy, was co-director of this institute, with Dr Jim Salinger from the National Institute of Water and Atmospheric Research and Ms Eileen O'Shea from the East-West Center.

The START-Oceania website has been recreated and was quietly launched in September.

A number of local and regional meetings have taken place with relevance to the environment and climate

change. Brief coverage of these meetings is provided inside.

This issue also features stories on some climate-change related projects being held in the Pacific region.

We have started a new column on page 5, called the 'Young Scientists Forum' and this issue features the projects of two participants from the June Training Institute. The participants' are Mr Riibeta Abeta, environment officer at the Department of Environment in Kiribati and Ms Debbie Kapal, research officer at the National Agricultural Research Institute in Papua New Guinea (PNG). Mr Abeta discusses the waste stream problem in Kiribati, while Ms Kapal shares information on new agricultural strategies being used by PNG to prepare for a possible drought.

The START-Oceania Regional Committee meeting will be held in Noumea, New Caledonia from 1-2 December. It will be hosted by the Institute of Research and Development (IRD) in Noumea.

We encourage you to view our website at www.usp.ac.fj/start and we welcome your feedback.



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SPREP meeting decides on new name

The 15th South Pacific Regional Environment Programme (SPREP) Meeting of Officials (15 SM) took place in Pape'ete, French Polynesia, from 13-16 September. This was followed by the 5th Environment Ministers Meeting, held on 17 September 2004.

The meeting was attended by about 100 delegates representing member countries of SPREP, donor agencies, CROP agencies, Universities, NGOs and special interest groups from French Polynesia.

Professor Kanayathu Koshy attended the meeting as a representative of the Pacific Centre for Environment and Sustainable Development (PACE-SD).

Among the most important decisions made in the meeting were:

- There has been a name change: the new name for the Organisation is "Pacific Regional Environment Programme" (while retaining the acronym

SPREP) and the Secretariat will be called "Secretariat for the Pacific Regional Environment Programme (SPREP).

- The meeting strongly endorsed a new action plan for managing the environment of the Pacific islands region. This plan is a blueprint for work in the Pacific environment over the next five years and highlights natural resources management, pollution prevention and climate change as the most critical issues facing the region.

Increasing populations, struggling economies, and a surge in natural and induced hazards - such as extreme weather events, are underlining the vulnerability of the fragile ecosystems that the seven million Pacific island inhabitants rely on. Director of SPREP, Mr Asterio Takesy, said at the meeting. The new action plan is designed to help reduce this vulnerability.

Travel award for young scientists

The International START Secretariat recently announced information on the Rupert Ford Travel Award, under which travel support is provided to young scientists for research in 2004/2005.

The travel award is for research areas related to meteorology and associated physical oceanography. Applicants must be 30 years old or less on 31 December 2005, in order to be eligible for the award.

The travel award will be made from the Rupert Ford Fund, which is being administered by the Royal Meteorological Society.

The Rupert Ford Fund was set-up by family, friends and colleagues of the late Dr Rupert Ford, to honour his name and brilliant scientific career, which was cruelly cut short by illness.

The Fund will be used to sponsor travel by outstanding young scientists from any part of the world to enable them to undertake research work or study in meteorology or associated physical oceanography (air-sea interaction) at a centre of excellence outside their own countries. Applications are invited for

the Rupert Ford Awards for 2004/2005 from scientists who will be 30 years of age or less on 31 December 2005.

The form for applications is available from the Royal Meteorological Society website on www.rmets.org

Applications must be submitted to the Royal Meteorological Society's offices by 1700 GMT on Friday 31st December 2004.

Applicants do not need to be members of the Royal Meteorological Society.

Full details on eligibility for the Award are available on the website: <http://www.rmets.org/news/detail.php?ID=39>

Up to three awards may be made in 2004/2005. The value of each award for 2004/2005 may be about £3,000 (USD4,500 or Eu4,700).

Applications may be made at any time over the next twelve months. However, due to the availability of limited funds, an early application is advised. To allow time for applications to be processed, they must be made at least three months before the intended start date of the travel to be undertaken.

Global warming may increase extreme rains and flash floods

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43 years (from 1961 to 2003) reveals that on five previous occasions during the month of April, Suva experienced rainfall of higher magnitude than was experienced on April 8 this year.

"However, the total rainfall recorded in Suva during the period from April 8 to 14 this year, has surpassed the monthly total rainfall amount for April on 15 occasions in the past 43 years," the paper states.

The sequence of unusual rainfall events in Suva and adjoining region during the second week of April 2004 only strengthens the findings of the Intergovernmental Panel on Climate Change (IPCC) on the likelihood of more extreme weather events in the future, the paper states.

In fact, extreme weather events have already become more frequent the world over during the past decade as a consequence of global warming primarily due to human-induced emissions of greenhouse gases, the paper further says.

"While human-induced global warming and associated sea-level rise are expected to continue through the 21st century, effects also include enhanced frequency of heavy rainfall events in the tropical region," the paper states.

The research has found that there is no significant trend in the annual mean rainfall recorded in Suva over the period 1961 to 2003. The interannual variability

in rainfall - including the extreme rainfall events during the 43-year period - could largely be attributed to El Nino events and intra-seasonal oscillations in the mean position of the South Pacific Convergence Zone, the paper explains.

"The climatological (1961-1990) rainfall normal for the month of April in Suva is 390.7mm. During the period from April 8-14 this year, Suva experienced a cumulative rainfall of 285.1mm, out of which 152.8mm rain occurred on April 8. The historical rainfall records suggest that on five previous occasions in the past 43 years (from 1961 to 2003) during the month of April, Suva experienced rainfall of higher magnitude than was experienced on April 8 this year.

"On 3rd April 1980, a record heavy rainfall of 307.8 mm was observed in Suva. However, the total rainfall recorded in Suva during the period from April 8 to 14 this year has surpassed the monthly total rainfall amount for April on 15 occasions in the past 43 years.

"In Fiji, there has been a steady increase in the number of days per year with warmer nighttime temperatures in recent decade. The rise in annual mean surface air temperature over Suva is ~ 1.2°C over the 43 year period at a statistically significant increasing rate

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WWF Climate Witness Program

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will be showcased at the international meeting of Parties to the UN Climate Change Convention, to be held in Buenos Aires in December.

The stories were collected in community workshops and through one-to-one interviews. WWF has also prepared a Climate Witness Community Toolkit which includes background materials as well as information on activities to be undertaken to educate and assist the communities in identifying climate change effects and adaptation measures. The information collected will be shared with partner agencies to advise them on actions communities are already undertaking to cope. The stories will also be used at the international level to help drive changes in the energy sector, which consumes the highest amount of fossil fuels and thus is the largest contributor to global warming.

"It is important that people in developed countries are aware of the impact their fossil use is having on the lives of people all around the world. We will share the stories gathered from Kabara, with WWF offices and other partner organisations at the global level, to help drive our global Power Switch campaign," Ms Mcfadzien said.

The South Pacific component of the project is being coordinated by Ms Mcfadzien and a full-time project officer Mr Francis Areki. A team of USP students, led by Ms Monifa Fiu, is also conducting marine coral bleaching baseline studies and providing marine science training to Kabara communities.

(Sources of information for this article are Ms Diane Mcfadzien and Mr Francis Areki of WWF Pacific.)

Solomon Is seek funding to restore coastlines

Communities on two islands in the Solomons are seeking funding to construct a seawall which will prevent further erosion of their already shrinking coastline, which is already eroding into a primary school and its playground.

The Kwai and Ngongosila Islands are twin islets with a population figure put at 690 in the 1997 Village Resources Survey. This figure increases each year in December when school children and holiday makers return to the islands.

A project proposal by the director of the National Disaster Management Office (NDMO) of the Solomon Islands, contends that rising sea levels due to greenhouse gas emissions is causing this negative effect on the two islands.

The NDMO is requesting funds to buy tools, equipment and transport costs for the construction, reclamation and restoration work. Basic labour for the construction and the collection of natural materials such as rocks and soil, will be provided cost-free by the villagers. The villagers would also provide assistance and meals to workers hired for the necessary parts of the project.

"In twenty years, all the white sandy beaches of both islands has been eroded and washed away. The effect of this erosion caused by ocean currents and high waves and rising seas levels resulted in diminishing land areas for both islands," director of the NDMO, Mr Loti Yates says.

"As recently as January and February 1999, rising sea levels reached an unprecedented level causing flooding throughout a good part of the two islands as a result of huge waves sweeping through both villages.

Mr Yates explains that although the

fringing reefs provide protection against the currents created by winds and waves, these prove no better when the tide is high.

"The movement of sand follows the flow of local currents. As it were, sand washed away from the erosion goes from Kwai to Ngongosila," Mr Yates said.

"Although these are expected to be deposited at Ngongosila, they eventually end up in the deep at the west end of the island.

"With construction of the walls, it is hoped that a barrier or a catchment will be created and the moving sand will be retained and build up as part of the reclamation," Mr Yates explained.

In the case of Kwai, the most affected area is to the north of the island. Because of its direct exposure to the ocean waves, erosion rate is greater than the rest of the island including Ngongosila. This part of the island provides the venue for the only primary school serving both islands.

The shoreline has eroded away into the school ground and now the water comes in so that it is only a few feet away from the nearest classrooms on the beach.

"Due to pressures of diminishing land areas and growing population, the families are often forced to live together in crumbed homes - a situation not conducive to raising children. The growing population also put undue pressure on land use and has therefore significantly contributed to the environmental degradation on both the islands," Mr Yates says.

"A forced increase in population has also resulted from people moving back from Guadalcanal, due to the civil un-

rest there over the past two years."

The population growth rate for the Solomon Islands is 3.4 per cent. About 60 per cent of the population is less than 20 years of age, which means more than half of the population is of school age.

The National Disaster Management Office (NDMO) has been working on proposals to seek funding for the project, which aims to protect and save the two islands from soil erosion resulting from the greenhouse effect.

The project also has a secondary aim of reclaiming and beautifying both islands.

Under the project, seawalls will be constructed around the islands from rocks and stones taken from nearby reefs.

The rocks are intended to be arranged to create a strong wall so that effect will be reduced from the ocean currents and impounding waves, and so that it will naturally act as a catalyst to gather sand and thereby will speed up the process of reclamation.

Under phase one of the project, stones and rocks will be gathered and broken into smaller pieces, they will be transported to relevant areas and seawalls constructed, trees will be planted on the fringes of both islands for restoration and beautification. Those trees will be selected that can grow in salty waters and provide a natural habitat for marine life and integrate with the local ecology.

Under phase two of the project, some land and beaches that were lost, will be restored. For further information, contact Mr Loti Yates, Director, National Disaster Management Office, Solomon Islands, on ph: (677) 27936, fax: (677) 27937, or email: ndc@solomon.com.sb

Apia workshop explores opportunities for adaptation and CDM projects

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implementation across a range of sectors and stakeholders, to assess current status and identify opportunities for effective implementation of CDM in the region, and to identify ways for future collaborative actions in facilitating adaptation and CDM.

CDM (Clean Development Mechanism) is one of the mechanisms under the Kyoto Protocol to reduce Greenhouse Gas Emissions (GHG).

Under CDM, developed countries will provide funding to clean-up unnecessary emissions in developing countries.

Through CDM, developed countries can provide assistance to developing countries to undertake CDM activities, such as planting trees (afforestation and reforestation) and mangroves to absorb carbon dioxide, and renewable energy and energy efficiency projects.

CDM activities are targeted at cleaning

emissions, reducing emissions and increased fuel efficiency. Between the years 2008-2012, developed countries need to reduce their GHG emissions to 5.2 per cent to their 1990 levels. To achieve this target, developed countries can buy the GHG emissions reduced within the developing countries, under the CDM mechanism.

Projects funded under CDM are expected to assist developing countries to achieve sustainable development, generate investment from the private sector and promote the transfer of environmentally-friendly technologies.

CDM projects are not automatically realised which is why the UNEP Risoe Centre is conducting the Capacity Development for CDM (CD4CDM) project.

The project has received financial support from the Dutch government. The CD4CDM project aims to generate a

broad understanding of the opportunities offered by CDM in participating developing countries; and to develop the necessary institutional and human capabilities that allows them to formulate and implement projects under CDM.

Twelve countries from the four developing regions - North Africa and Middle East, Sub-Saharan Africa, Asia, and Latin America - have already been selected to participate in the CD4CDM project.

At the Apia workshop, the issues, experiences and recommendations from the CD4CDM project highlighted by Myung-Kyoon Lee of UNEP Risoe Centre include:-

- the progress of CDM projects depend on various factors including a high level political commitment; initial capacity related to climate change; capability of country teams, political connection and private network; precise identification

of national key players; plans based on needs assessment

- coordination among and participation of relevant ministries is important

- a market-oriented, customer-oriented approach

- awareness raising particularly for policy-makers

- in the initial decision-making process of a country, a top-down approach is normally more efficient than a bottom-up approach

- integrating the climate process into national development strategies to give a higher priority to climate change

- mobilising the existing expertise

- political stability and predictability

- stability of professional staff for institutional memory

- transparency and efficiency and low transaction costs.

Pacific communities assist to identify effects of climate change

Communities in Pacific island countries are helping to select the best adaptation ways to deal with the worst effects of climate change on their livelihoods, under a South Pacific Regional Environment Programme (SPREP) project. In the initial phase, pilot sites have been chosen in the four countries Cook Islands, Fiji, Samoa and Vanuatu, whereby the pilot communities use the new climate vulnerability and adaptation (CV&A) guidelines to analyse their options and decide on the best course of action.

The new CV&A guidelines have been developed by Mr Taito Nakalevu, SPREP's climate change adaptation officer, as a simple and systematic way of assessing the vulnerability of communities to climate change effects and the actions and capacity to adapt.

"The Pacific's unique combination of geographical, biological, sociological and economic characteristics make the region particularly vulnerable to climate change, increased climate variability and weather extremes," Mr Nakalevu said. The work is being carried out under the project 'Capacity Building for the Development of Adaptation Measures in Pacific Island Countries (CBDAMPIC), which is being executed by SPREP for the Canadian International Development Assistance (CIDA) programme.

For a start, core teams visit pilot sites and explain climate change and the purpose of the exercise to the community.

Groups are formed that identify, list and prioritise climate-related problems and their effects on livelihoods. The three most significant problems are analysed to find their causes and effects. Adaptation options are developed and then the whole community chooses the highest priority problem as the proposed adaptation project.

The primary goal of the project is to enable a broad cross-section of an island society to understand how best to minimise impacts from an increasingly changing climate, and to mobilise communities into building their capacities to adapt to climate change. The project aims to strengthen the capacities of national expertise to enable them to identify, consider and evaluate adaptation options and measures.

The project intends to utilise regional and national expertise to develop methods and strategies for understanding and assessing adaptation measures. The project is especially emphasising that understanding and assessing must be undertaken at the community/local level, as that is where the impact of cli-



SPREP staff recently visited the Lateu community on Tegua Island, the Torres Group, Vanuatu as part of their Community Vulnerability and Adaptation project.

mate change will be most significant.

"The most important part of the work is building a team of national staff to ensure that the knowledge stays in the country, as well as giving ownership of the project to the national and community levels," said Mr Nakalevu. "We have also carried out training on the guidelines in the four project countries and formed core teams, which actually go to the pilot communities to carry out the assessments."

Frank Wickham, SPREP's human resources development officer, assisted in the training. "The training activity was able to develop and strengthen collabo-

ration among national agencies and stakeholders in assisting communities assess their vulnerabilities and identify adaptation options," he said. "Greater participation by the host community in the training and related follow-up activities is critical."

Mr Nakalevu cites the work in Vanuatu as a good example of the impact of the method. Teams comprising of project staff, government and non-government groups visited three pilot locations in

Lateu, Luli and Panita and assisted communities to identify high priority actions using the CV&A guide.

In Lateu, coastal flooding was creating unhealthy living conditions and damaging housing. It was concluded that the whole settlement should be relocated and the number of rainwater tanks and catchment facilities should be increased. Assistance was sought from the Church of Melanesia, and they agreed to assist in the relocation of the community's church building. The Northern Health Office has agreed to help relocate the community aid post and provide

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People from remote Kabara take part in WWF Climate Witness Programme

To increase awareness of developed countries on the negative impacts their use of fossil fuels is having on the lives of people around the world, WWF South Pacific Programme has launched a Climate Witness Program to document stories of people in communities already suffering from effects of climate change.

WWF staff are working globally to collect stories in the countries Fiji, Australia, Nepal, India and the Arctic area. Personal stories such as how a changing climate has altered the lives of an Australian farmer, a Fijian chief and an Inuit Shaman, are being documented to show the human face of climate change and the effect it is having on people's everyday lives.

"Climate witnesses are selected from vulnerable communities around the world, who are already starting to feel the impacts of climate change. This is normally from communities who depend very much on natural resources for their livelihoods, and are often the first to start observing changes to these resources," Regional Climate Change Coordinator, Ms Diane McFadzien said.



These children are busy reading the new information booklet on climate change, produced by WWF.

Internationally, WWF is working with farmers in Australia who have been impacted by severe droughts, Inuit communities from the Arctic and glacier communities in Nepal. In the Pacific, WWF is working with local communities in Kabara, Fiji, who are isolated from the urban centre and are also very dependent upon their natural resources. After completion of work on Kabara, the project may be extended to other locations in the South Pacific.

WWF South Pacific Programme's work in Kabara has a two-pronged purpose:

- to raise awareness amongst communities so they better understand how climate change is affecting them, and to help them develop community-based adaptation plans to increase their resilience to these impacts.

- to share stories of the impact climate change has on their lives with the international community in order to highlight

the urgency of the need to switch to cleaner energy and reduce global climate changing gas emissions.

An initial assessment by the programme in June 2003 found that up to 99 per cent of people surveyed in Kabara had never before heard of the term climate change. While people were able to provide anecdotal evidence of changes in their environment that were consistent with impacts scientifically known to arise from climate change, they were not aware that it was a human induced problem happening globally.

During a second visit to Kabara in February 2004, WWF staff conducted awareness workshops on climate change to explain links between human activities and over use of fossil fuels to the communities, and how these caused the impacts they were experiencing. In another visit in September 2004, they worked with communities to assess their vulnerabilities to the impacts of climate change and to develop strategies to increase their resilience.

"What came out most strongly was the need to address long term water needs. Climate change may bring about changes to future rainfall patterns and may potentially affect the availability of fresh water to local communities," Ms McFadzien said.

The Kabara communities have compiled a five-year action plan that includes strategies for conserving their water supply. This is part of the project's longer-term strategy to empower communities to identify and adopt measures to sustain their traditional way of life and livelihood.

Climate witness stories were also collected during this visit. These stories

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AIACC Regional Workshop for Asia Pacific is held in Manila

The Second AIACC Regional Workshop for Asia and the Pacific took place from 2-5 November 2004, at the Tradewinds Hotel in Manila, Philippines.

The Assessments of Impacts and Adaptations to Climate Change (AIACC) project is executed jointly by START and the Third World Academy of Sciences on behalf of the United Nations Environment Programme (UNEP).

AIACC is funded by the Global Environment Facility (GEF), the US Agency for International Development, the Canadian International Development Agency and the US Environmental Protection Agency.

Agency.

The Manila workshop is sponsored by AIACC and locally hosted and organised by the Environmental Forestry Programme at the University of Philippines, which is home of the AIACC regional study entitled "An Integrated Assessment of Climate Change Impacts, Adaptation, and Vulnerability in Watershed Areas and Communities in Southeast Asia," and led by Dr Rodel Lasco.

Currently, over two dozen AIACC studies are being conducted in developing regions of the world.

In the South Pacific, the AIACC project is being conducted by the Pacific Centre for Environment and Sustainable Development (PACE-SD) at the University of the South Pacific (USP), in conjunction with the University of Waikato's International Global Change Institute (IGCI) and the South Pacific Regional Environment Programme (SPREP).

The South Pacific AIACC study is titled 'Integrated Methods and Models for Assessing Coastal Vulnerability and Adaptation to Climate Change in Pacific Island Countries'. The project

manager Mr Melchior Matak and the project research assistant Ms Roshni Lata attended the Manila meeting and made presentations on its progress.

For more information and workshop documents please visit: www.aiaccproject.org/meetings/meetings.html

Further information on the workshop can be obtained from the AIACC Science Director Dr Neil Leary on email: nleary@agu.org, or from Ms Laisha Said-Moshiro on email: lsaid-moshiro@agu.org, at the International START Secretariat.

START-Oceania regional committee to meet in Noumea

The START-Oceania Regional Committee meeting is planned to be held from 1-2 December in Noumea, New Caledonia.

This year's meeting will be hosted by the Institute of Research and Development (IRD) in Noumea.

The meeting will be led by current chair of the regional committee, Professor Nick Harvey, who is the Head of Geographical and Environmental Studies at the Adelaide University, Australia.

Professor Harvey will officially welcome the new member of the regional committee, Mr Graeme Sem from Papua New Guinea.

Current START-funded activities in the region will be reviewed at the meeting. Director of the START-Oceania Secretariat, Professor Kanayathu Koshy will present make a presentation on the Secretariat's activities.

A presentation will also be made by

START-Oceania Programme Assistant and APN Liaison Officer Ms Mosmi Bhim.

The meeting will attempt to identify gaps in research and training on global change in the Oceania region

On the second day of the meeting, strategies, funding and potential projects for the future will be discussed.

Current members of the START-Oceania Regional Committee are: Professor Harvey from the University of Adelaide, Australia; Dr John Campbell from the University of Waikato, New Zealand; Professor Mike Hamnett from the University of Hawaii; Mr Taito Nakalevu from the South Pacific Regional Environment Programme; Dr Alexandre Ganachaud from the Institute of Research and Development in Noumea and Professor Koshy from the University of the South Pacific (USP).

APN's 2003/2004 annual report highlights global change research

The Asia Pacific Network for Global Change Research (APN) recently uploaded its 2003/2004 Annual Report on the website.

Director of the APN Secretariat Mr Sombo T. Yamamura says that the 2003/2004 Annual Report is APN's first official publication to summarise and highlight recent APN efforts at promoting global change research.

"Moreover, it is auspicious that we launch this report in time for APN's tenth anniversary," Mr Yamamura said. APN will celebrate its tenth anniversary, early next year.

Mr Yamamura described the year 2003/2004 as a memorable one for APN with the launch of a new pillar of activity, CAPaBLE (Scientific Capacity Building/Enhancement for Sustainable Development in Developing Countries) as APN's follow-up to the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002.

"As you know, scientific capacity building has been one of the major objectives of APN and the CAPaBLE Programme will provide a suitable platform for APN to pursue scientific capacity building in a more effective and successful manner," Mr Yamamura said.

Mr Yamamura described 2003 as the year they started in earnest, preparations for APN's tenth anniversary and in particular, the evaluation of APN and the development of its second strategic plan. The contents of the 2003/2004 Annual Report include a Summary for Policy-Makers, APN Projects for 2003/2004, Networking and Capacity Building Programme, Synthesis Activities, APN Achievements and Partnerships, and Future Outlook for 2004/2005. The Annual Report is available on the web address: <http://www.apn.gr.jp/en/products.html>

A major goal of the APN is to strengthen the interaction among scientists and policy-makers and provide a scientific input to policy decision-making.

In 2003/2004, APN strived towards achieving this goal, particularly through the launch of its five-year CAPaBLE programme under the APN framework, the annual report states.

"CAPaBLE is a Type II partnership initiative which was registered by Japan at the WSSD. One of its expected results is the scientific capacity enhancement of leading researchers in developing countries to produce comprehensive scientific information on climate change impacts, vulnerabilities, adaptation and mitigation opportunities which will be available to their policy-makers and will contribute to international scientific exercises."

"The Initial Synthesis Report on Land-Use and Land-Cover Change was also published in 2003/2004 and one of the major conclusions in the report is that APN strategies for future projects and for leveraging current results to the benefit of policy-makers should be built on the framework of existing projects in the region. Further efforts that will facilitate land-use and land-cover decision support systems are also highlighted for policy-makers' attention.

"Systems include a standard land-cover classification system, baseline datasets and land-use and land-cover change detection analyses, assessment of areas of most rapid change, models of the drivers of change with both diagnostic and prognostic capabilities, risk assessment and environmental indicators," the annual report states.

Other achievements for APN in 2003/2004 include the initiation of APN evaluation/review and beginning of preparations for a new strategic plan; initiation of the second synthesis on coastal zone management; and successful participation at the Pacific Island Summit.

The October 2004 edition of the APN Newsletter has also been uploaded and can be accessed on the web address: <http://www.apn.gr.jp/products/nl.html>

AIACC participants to co-author IPCC's 4th Assessment Report

Participants of the Assessment of Impacts and Adaptations to Climate Change (AIACC) project have been selected to co-author the 4th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

One of the objectives of the AIACC project is to foster greater participation by scientists from the developing world in the assessment reports of the IPCC. AIACC has been represented by several of its technical committee members and science directors at meetings convened in 2003 by the IPCC to begin planning for the 4th Assessment Report. Thirty-three AIACC investigators have been selected by the IPCC to be authors and review editors of the 4th Assessment Report.

Through their participation in the IPCC,

AIACC investigators will contribute important developing country knowledge and perspectives to this influential report. Their participation is also likely to result in incorporation of AIACC research in the IPCC's report.

Over two dozen AIACC regional studies are being conducted in the developing regions of Africa, Asia, Latin America and Small Island Developing States (including Oceania). AIACC was established to fill gaps in knowledge and capacity through regional research activities in the developing world.

For more information contact the AIACC Science Director, Dr. Neil Leary on email: nleary@agu.org or Ms. Laisha Said-Moshiro on email: lsaid-moshiro@agu.org at the International START Secretariat.



Mr Simon McGree from Fiji Meteorological Office (right), Mr Shaun Williams and Mr Dean Solofa from Samoa's meteorology division, at a training session on generating climate scenarios.



Roshni Lata, an AIACC research assistant, explains the project to participants during a field trip to Navua. Situated next to one of Fiji's biggest rivers and on flat, low-lying coastal land, the area is prone to flooding. The hospital in the background was submerged under two-metres of water during recent floods.



This coastal area, which is prone to coastal erosion, sea level rise and flooding, was visited during the field trip to Navua. The area is a research site for the START-sponsored AIACC project.



During a field trip to Navua, participants were shown this squatter settlement area which was flooded during an extreme rainfall event earlier in the year. The area is a research site for the START-sponsored AIACC project.

Training Institute strengthens

The Pacific Island Training Institute on Climate and Extreme Events has created a new regional network of individuals and institutions dedicated to working together to enhance the resilience of Pacific Island nations to climate-related extreme events such as droughts, floods and tropical cyclones.

This is the view of the co-directors of the Training Institute, Professor Kanayathu Koshy of the University of the South Pacific's Pacific Centre for Environment and Sustainable Development (PACE-SD), Dr Jim Salinger of New Zealand's National Institute of Water and Atmospheric Research (NIWA) and Ms Eileen O'Shea from the University of Hawaii's East-West Center (EWC). The institute was held from 15-26 June 2004 at USP's Laucala Campus, Suva, Fiji.

In their final report, the co-directors say that the institute gave them insights into a number of critical aspects of managing climate risks, such as: understanding climate processes and consequences, importance of history and context, role of traditional knowledge, communications challenges and opportunities (including the special role of the media), assessing vulnerability and exploring adaptation options, variety of tools and technology available, and building partnerships.

The co-directors recommend that the partnerships formed should be sustained through the creation and support of a PITICEE network. They recommend that support for research and documentation of traditional knowledge relating to weather and climate should be pursued possibly through a regional workshop and that the integration of traditional knowledge into climate early warning systems should be explored.

Another recommendation is that development and support for application projects should be pursued for key sectors in individual countries (such as the Fiji sugar project) and regional comparative studies undertaken. Finally, the report recommends that opportunities for climate risk management education and training should be enhanced.

The Training Institute was jointly organised by PACE-SD, EWC and NIWA. The Asia-Pacific Network for Global Change Research (APN) CAPaBLE Programme and the US National Oceanic and Atmospheric Administration (NOAA) were the major sponsors with additional contributions from USP, EWC and NIWA.

The Training Institute aimed to enhance

the understanding of participants about current and future patterns of climate-related extreme weather events such as droughts, floods and tropical cyclones. It also intended to develop participants' understanding of weather events such as El Nino and ENSO and of climate variability, climate vulnerability and adaptations.

Altogether, about 40 people (including trainers) participated in the workshop from the countries Fiji, Cook Islands, Papua New Guinea, Tonga, Samoa, Vanuatu, Federated States of Micronesia, Tuvalu, Kiribati, Niue and Tokelau. The participants represented national meteorological services, government ministries addressing climate sensitive sectors such as water resource management, agriculture, forestry and fisheries, disaster management, environmental management and conservation and education and scientific institutions. Nineteen participants were provided with financial support.

Background of the Training

Small Island Developing States (SIDS), including those in the Pacific region are considered among the most vulnerable to the vagaries of climate variability, change and other associated extremes:

- Year-to-year variability such as ENSO has significant consequences for Pacific Island nations;
- Economic plans for most Pacific Island nations are dependent on climate-



Ms Kay Gregory from TV One, New Zealand, interviews Mr Mac Mokoroa from the Cook Islands National Disaster Management Office, during the media component of the training.

sensitive sectors such as agriculture and tourism, and resources such as coral reefs;

- Water resources are already stressed in many jurisdictions and many low-lying atoll nations are totally dependent on rainfall; and
- Climate-related extreme events such as droughts, floods, tropical cyclones and high temperatures already present significant challenges to public safety and community infrastructure.

According to the 2002 World Disaster Report, the International Federation of Red Cross and Red Crescent Societies,

ens regional network to deal with climate extremes

the number of people in the wider Pacific region affected by weather-related disasters has increased from 1.2 million to 18 million over the past 30 years. Droughts make up one of the largest components of such disasters, and the experiences during the 1997-1998 El Niño event highlights the significant consequences that such climate-related extreme events can have for Pacific Island countries.



Mr Robson Tigona (left), a climate officer in Vanuatu, is congratulated by the training institute's co-director Professor Kanayathu Koshy, after receiving his certificate. Looking on is USP's Acting Vice-Chancellor Professor Rajesh Chandra.

Increasingly, the disaster management community and development organizations like UNDP, ADB, the World Bank and national development agencies are recognizing the importance of managing climate risk as an essential element of comprehensive emergency management programmes and development planning.

More recently in Fiji a tropical depression devastated parts of Fiji on the eve of Easter causing devastating floods in Rewa/Navua/Serua. The Fiji Disaster Management committee (DISMAC) confirmed 11 deaths, 9 missing and \$F5.6 million damage bill from the above inclement weather incidents. With recovery and rehabilitation, this figure may even go much higher than these estimates.

Cyclone Heta caused severe damage in five countries - American Samoa, Cook Islands, Niue, Samoa and Tonga - earlier this year.

According to recent studies done on supercomputers at the Commerce Department's Geophysical Fluid Dynamics Laboratory in Princeton, N.J, Global warming is likely to produce a significant increase in the intensity and rainfall of hurricanes/cyclones in coming decades.

This most comprehensive computer analysis done so far reveals that by the 2080's, seas warmed by rising atmospheric concentrations of heat-trapping greenhouse gases could cause a typical hurricane to intensify about an extra half step on the five-step scale of destructive power, says the study, and rainfall

up to 60 miles from the core would be nearly 20 percent more intense.

Against this backdrop and drawing on a February 2001 Training Institute on Climate and Extreme Events in the Asia-Pacific Region supported by APN, START and NOAA (APN project 2000-03), the Pacific Islands Training Institute on Climate and Extreme Events was designed to create a regional network of scientists, decision makers and institutions skilled in the use of climate information and services to support practical decision-making in key sectors such as agriculture, water resource management, public health and safety, tourism and community planning and resource development.

In this context, the training institute contributed directly to two of the three objectives of the APN CAPaBLE program:

- Capacity building through sharing of knowledge, experience, scientific information on climate change impacts, vulnerabilities, adaptation and mitigation; and, through the dialogue initiated at the Training Institute,
- Improvement of informed decision-making in developing countries by dissemination of the outcomes of research activities to policy-makers and civil society.

The training comprised an intensive, two-week program of lectures, hands-on experience with climate forecasting and risk assessment tools, small group discussions, media training, and shared exploration of adaptation and mitigation policy options.

As part of a two-phase APN CAPaBLE project, the two-week training institute at USP be followed by the development and testing of a modular, in-country training programme that could be implemented throughout Oceania. The institute organisers are also exploring the possibility of continuing a Pacific Islands Training Institute on Climate and Extreme Events as a sustained on-going education programme of PACE-SD.

Welcome

The Training Institute was officially opened through a welcome address by USP's Acting Deputy Vice-Chancellor Professor Konai Thaman and a keynote address was presented by Hon Joji Natadra Banuve, the Assistant Minister for Local Government, Housing, Squatter Settlement and Environment for the Fiji government. Opening remarks

were made by Professor Koshy, Dr Salinger, Ms O'Shea, Chargé-d-Affaires of the US Embassy Mr Hugh Neighbors, a New Zealand High Commission representative and Deputy Director of SOPAC Dr Russell Howorth. In his opening speech, Hon. Banuve described the Training Institute as a timely and worthwhile initiative designed to enhance the capacity of Pacific Island jurisdictions to understand, anticipate and effectively respond to the consequences of climate variability and climate-related extreme events such as droughts, floods and tropical cyclones, both today and in the future.

"Our small physical size, isolation, limited natural and human resources, isolation, high economic sensitivity, high population growth, and poorly developed infrastructure contribute to the vulnerability of our island countries," Hon. Banuve said.

"There is documented evidence that many Pacific Island states are already experiencing the effects of current inter-annual variations in oceanic and atmospheric conditions.

"Sea level rise will have a higher impact on low lying islands and coral atolls, such as the Federated States of Micronesia, Tuvalu and Kiribati, than on high volcanic islands such as Fiji, Solomon Islands and Papua New Guinea. However, in all Pacific Island countries, vital infrastructure and ma-

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USP's Acting Vice-Chancellor Professor Rajesh Chandra (left) and training co-directors Ms Eileen O'Shea and Mr Jim Salinger, at the graduation.



Ms Tupeope Samani (right) conservation officer in Tonga, with Mr Poimatagi Okesene from Niue's quarantine division and Mr Johnson Elimo from the Chuuk weather office, at the training.

A Pre-Forum session held on climate change and sea level rise

A special Pre-Forum Session was held from 3-4 August 2004 by the Forum Officials Committee, to discuss Agenda Item 6(b)(i), which was to deliberate on the paper 'Progress on Developments Concerning Climate Change, Climate Variability and Sea Level Rise'. The session was held prior to the 35th Pacific Islands Forum Leaders meeting in Apia, Samoa.

The paper was the result of close collaboration between the Forum Secretariat, South Pacific Regional Environment Programme (SPREP), South Pacific Applied Geoscience Commission, other regional agencies and relevant stakeholders. It covers the Report of the Pacific Ad-Hoc Working Group on Climate Change, recent regional, national and global developments.

The Pacific Ad-Hoc Working Group on Climate Change, Climate Variability and Sea Level Rise met at the Forum Secretariat's headquarters in Suva, Fiji on 14 June, 2004. The purpose of the Ad-Hoc meeting was to review the Pacific Regional Framework on Climate Change, Climate Variability and Sea Level Rise ('the Framework') and forward its recommendations for the 2004 SPREP meeting for its consideration.

The 'Review of the Pacific Islands Framework on Climate Change, Climate Variability and Sea Level Rise', submitted by the SPREP Secretariat, together with the Framework and other submissions from the participants, formed the basis of discussions.

Summary of the key points from the discussion include:

- A shorter Framework document to be prepared with focus on Priorities for Action;
- Need to continually update the Matrix of climate change, climate variability and sea level rise activities;
- Adaptation to the effects of climate change, climate variability and sea level rise and mitigation of emissions of greenhouse gases shall be treated separately for political reasons;
- 'Means of implementation' section should take into consideration the progress on the funds for adaptation activities and Kyoto Mechanisms.
- It was suggested that the terminology and title 'Framework on Climate Change, Climate Variability and Sea Level Rise', be changed to 'Climate Change, Sea Level Rise, Extreme Weather Events and Climate Variability'.
- The revised paper will be finalised at a second session in 2005.

The paper requested the Forum Officials Committee to:

1. recommend that Leaders note the developments that took place in 2004;
2. recommend that Leaders affirm their Governments' commitment to participating at the High-Level Segment of the 10th session of the Conference of Parties (COP10) in Argentina; and
3. endorse the reconvening of the Ad-Hoc Working Group Meeting on Climate Change, Climate Variability and Sea Level Rise in 2005 to finalise its review of the Revised Framework on Climate Change, Climate Variability and Sea Level Rise.

PNG uses agricultural strategies to prepare for possible drought

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warning sent through the media, has triggered a chain of actions that NARI is part of.

"We are planning provincial visits where the strategies will be presented verbally and promoted through materials such as information bulletins, brochures, CDs, rain gauges, planting materials and samples of irrigation systems," Ms Kapal said.

A provincial visits planning meeting was held at the NARI Head Office in Lae, Morobe Province on 24 September, where provinces were allocated priority according to their vulnerability and a schedule of activities was drawn up, Ms Kapal said. The provinces will be visited by a team conducting awareness.

Sectors that NARI is collaborating with to implement the strategies are the National Weather Services, Department of Agriculture and Livestock, National Disaster and Emergency Services and the media. NARI has received funding assistance from AusAID to promote coping strategy awareness.

The program itself had four components to develop strategies to reduce the impact of droughts and frosts on food supplies from subsistence gardens.

Under the first component, crops and cultivars tolerant to drought and frost were identified and the recommended crop varieties are being promoted. This involved surveys and collections of those crops and cultivars that survived the 1997/98 drought, and evaluation of crops to identify varieties tolerant to drought.

The crops sweet potato, cassava, banana, yams and taro were collected. Separate evaluations had been conducted for highland and lowland varieties.

The second component involved soil and water management technologies including simple irrigation systems. Under this component, soil and water management practices currently being utilised were assessed for effectiveness through surveys and trials. Low cost irrigation systems were identified and procured for demonstration to farmers. One such low cost irrigation technology is the rope and washer pump and drum kit drip, which has been imported from India.

Component three involved early warning and contingency plans. The suitability of PNG rainfall data for drought prediction was assessed using the Rainman software, through training from the Queensland Centre for Climatic Applications (QCCA), Australia. Coping strategies were compiled for incorporation in contingency plans for vulnerable areas and published as an information bulletin titled 'Drought response: On-Farm Coping Strategies' and brochures and CDs containing the information.

Under technology demonstration, which was the fourth component, multi-location testing of crop varieties was conducted. The technology demonstration also involved multiplication and distribution of planting materials of the recommended crop varieties, and the production and demonstration of simple irrigation systems. These have become ongoing activities.

Global warming increases chances of extreme rains and flash floods

>> continued from page 2

of 0.25°C per decade which is almost twice as compared to the trends in global average temperature increase during the past century.

"The rate of increase in annual mean surface air temperature at Nadi is only 0.07°C per decade.

"An examination of the changes in the frequency of extreme temperature events suggested that significant increases have taken place in the annual number of hot days and warm nights both for Suva and Nadi, with decreases in the annual number of cool days and cold nights at both the locations.

"No trend has been observed at either of the location in annual mean rainfall. The fraction of annual total rainfall from extreme events (events exceeding the 1961-1990 95th percentile) has, however, increased at both the locations.

"Annual mean warming of between 3.0 and 3.5°C are projected for the Fiji Islands by the end of this century. In general, the projected surface warming

would more or less be uniform during the two seasons.

"Seasonal variations of projected warming are likely to minimal. No significant change in diurnal temperature range is likely with rise in surface temperatures. An increase in mean temperature would be accompanied by an increase in the frequency of extreme temperatures. The climate models simulate only a marginal increase or decrease (less than 10 per cent) in annual rainfall over the Fiji Islands. During summer, more rainfall is likely on an annual mean basis.

"An increase in daily rainfall intensity during summer (but lesser number of wet days) leading to more frequent heavier rainfall events should also be expected.

"This calls for a need to strengthen disaster preparedness efforts and formulation of adaptive strategies to reduce the weather related loss to life and economy," the paper states.

Pacific island communities assist to identify effects of climate change

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materials to improve the community's sanitation.

At Luli, the assessment showed that the shortage of reliable water supplies was the main vulnerability. Being on the windward side of the island, the small settlement suffers severe water shortages and depends entirely on a single underground well. Rainwater is the only other water source, however, the settlement is exposed to salt spray and volcano-induced acid rain which makes the rainwater itself acidic and iron roofing impractical for collecting water. Thus, the greatest priority identified for Luli, is to establish a reliable water supply system for the community.

In Panita, the highest priority threat comes from coastal erosion and flooding, which is threatening the settlement infrastructure and human life. Again, the only alternatives identified were to relocate the settlement and its rainwater storage facilities to higher ground. The Presbyterian Church of Vanuatu has

agreed to fund the construction of a new church building on the approved relocation site.

"In all of these locations the CBDAMPIC Climate Change Core Team is continuing consultations with the provincial authorities, government departments, churches and NGOs for assistance in implementing the pilot projects," Mr Nakalevu said.

"The method is already working in all four pilot sites, it can be extended to any other Pacific country and Caribbean collaborators have also expressed an interest in adapting the guide to their region."

Several approaches exist to assess the effects of climate change. SPREP believes that their greatest strength is that they are able to enlist community concerns to accurately predict the most serious effects of climate change on the people and their livelihoods. Another effective strength is that the capacity of local staff is being built to continue the in-country work.

Kiribati undertakes projects to combat waste stream problem

The Oceanic Waves is introducing a Young Scientists Column. This issue features the projects of two participants from the recent Pacific Island Training Institute on Climate and Extreme Events. They are Riibeta Abeta from Kiribati and Debbie Kapal from Papua New Guinea.

By Riibeta Abeta

Many decades before independence, our forefathers enjoyed living in the natural setting and richness of our tiny atoll islands in Kiribati.

In those times, refuse wasn't a problem, instead a valuable resource to them. This was due to the fact that their waste stream was no more than rotten leaves and food remains from their own indigenous terrestrial and marine resources. These eventually turned into important composting materials, or ended up as their livestock feed and degraded well in the environment.

Over the years, globalisation invaded our shores and we became part of their circle. This led to a substantial shift in our lifestyles - from subsistence to economic. There is now a growing dependence on imported foods and other western made materials. These all contribute to the inorganic garbage components of our waste.

The island communities aspired to this new lifestyle and adopted it without se-

riously considering the related impacts. An old man rightly said, "These imported goods not only increase cases of diabetes and related diseases but also introduce new kinds of wastes."

On a daily basis, the consumers were generating more inorganic garbage after consuming the contents of each product they bought. The wastes accumulated over time creating an unpleasant sight and stress to the environment and population. This was partly because the new wastes were non-degradable or had a longer life span than what is needed to be able to degrade safely into the environment. Combating this issue is a difficult challenge for an atoll with limited land mass and resources. However, thanks to several organisations, programs are now being carried out to ease the waste stream problem in Kiribati, particularly in the densely populated island of South Tarawa.

A recycling program was trialed on the island by the non-government organisation, Foundation of the South Pacific



Waste litters this area, situated near government residences in South Tarawa, Kiribati.

(FSP), where cardboards/papers, aluminium cans and plastic bottles were used as recyclable wastes. Funded by the United Nations Development Programme (UNDP), this recycling project managed to be sustainable.

The International Waters Program (IWP) is also running a pilot project on reducing waste stream in a small village on Tarawa. Findings of this project could be used as a model for improving waste problem on other islands of

Kiribati.

The Government of Kiribati has dedicated money and other resources to address this issue through a special project called SAPHE. Through this program, landfills were established on South Tarawa to cater for waste disposal and more refuse collection trucks were procured. The town council will play a very important role in managing the facilities of this project in the long run. The program also enabled awareness activities on waste management.

Those activities have been very instrumental in

combating the waste stream problem in Kiribati. This project is a long-term challenge and it will take some time before it has a positive impact on its target - to improve the environment.

It is accepted nowadays that our once beautiful island is now a mess with inorganic and mostly western-made waste materials. It is hoped that existing combat mechanisms and other external assistance will help restore our island to its original natural setting and richness.

PNG uses agricultural strategies to prepare for possible drought

The people on the southern coast of Papua New Guinea (PNG) will be using new agricultural strategies to prepare for an impending drought, after a national warning for a weak El Nino was issued through the media.

Warnings have been issued by the PNG National Disaster and Emergency Services and the National Department of Agriculture and Livestock, for people to prepare for next year's dry season, when the effects of the forecasted weak El Nino will really be felt.

The warnings were issued after the El Nino was forecasted through models used by PNG National Weather Services.

PNG's most recent experience of a bad drought was during the 1997/98 El Nino event, which resulted in extreme food and water shortages and led to devastating impacts on agriculture and most other sectors of the economy.

"People were dying from food shortages and some due to health-related problems resulting from the drought," said Ms Debbie Kapal, Research Officer at the PNG National Agricultural Research Institute (NARI). "A lot of money was spent by the PNG government, Australia and other donors, to distribute water and food to places that were suffering."



This helicopter, provided by AusAid, was used to deliver emergency food supplies during the 1997 drought in PNG. (Photo source: D. Wissink)

Agriculture was the worst hit sector and food shortages resulted due to dryness and frost caused by the drought. Peoples health was affected through outbreaks of diseases (such as diarrhoea, typhoid and malaria), education was disrupted as schools closed due to food and water shortages, disruptions in hydro-power meant that electricity supply was also disrupted, and activities dependent on water were also affected. A lot of money was spent on importing rice, Ms Kapal said.

NARI is hoping to assist the provinces develop their own drought contingency

plans, particularly for agriculture.

Mulching of gardens, maintenance of planting materials and cultivation in wet areas are the pre-drought coping strategies being promoted to farmers by NARI. Harvesting strategies, fire, livestock and water management and use of cash savings are among the mid-drought strategies being promoted. The post-drought strategies being promoted are planting early maturing crop varieties and not utilising all planting materials at the same time.

Measures being promoted for strategic preparedness are drought tolerant crop

varieties, processing and storing food and simple irrigation systems.

"Some provinces have taken the initiative in starting this process and many more are likely to follow suit," says Ms Kapal.

"The rewarding bit of this work is seeing people physically ready with bags of rice and wheat, blocks of recommended crops with irrigation systems set up, containers of seeds, to name a few, for the possible drought. That is basically what we strive to achieve, to see our people ready to face disasters, whichever they may be," Miss Kapal said.

NARI is assisting farmers through the implementation of a World Bank-funded El Nino Drought response project, aimed at mitigating drought effects after the bad experience in 1997/98. The project aimed to develop and adapt technologies through research into drought tolerant crops, simple irrigation systems, weather monitoring and other measures.

Research activities under the project were completed in 2002, however, the demonstration and awareness component of the project is now being implemented.

Ms Kapal says that the EL Nino

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Fiji conducts first National Waste Forum

Fiji's first-ever National Waste Forum was conducted on 31 August at the Holiday Inn in Suva, Fiji. The one-day event was organised by the Department of Environment of Fiji's Ministry of Local Government Housing, Squatter Settlement and Environment.

Professor Kanayathu Koshy attended this meeting as a facilitator and Director of the University of the South Pacific's (USP) Pacific Centre for Environment and Sustainable Development (PACE-SD), together with Research Fellow Dr Fabrice Mathieux.

The main objective of the Forum was to establish the content, direction and responsibilities to be undertaken for the development of a National Waste Management Strategy.

The first draft of the National Waste Management Strategy for Fiji has been produced by Fiji's Department of Environment and PACE-SD.

A new waste strategy for Fiji is expected to set a direction for developing sustainable waste management practices. The strategy will be produced after widespread consultations and through a

process of partnership with the main stakeholders involved in the production and management of waste. Through the Waste Forum and Working Groups, expertise will be drawn from the industry, NGOs, academia and specialist bodies.

A second waste forum is expected to be held in Fiji's Western Division in November, a third one is to be held in April 2005 and the fourth one is expected to be held in June 2005. By June 2005, a National Waste Management Strategy is expected to be produced.

A Pacific disaster risk reduction plan developed

The South Pacific Applied Geoscience Commission (SOPAC) hosted the Pacific Regional Stakeholders Planning Workshop at the Warwick Hotel between 28-30 June 2004 to develop a Pacific Regional Strategic Disaster Risk Reduction Action Plan to assist the Pacific Island region's preparations for the second World Conference on Disaster Reduction which will be held in Kobe, Japan from 18-22 January 2005.

To ensure that the interests of the Pacific region are represented in Kobe, over 40 participants representing 16 countries as well as regional and national organizations attended the regional planning workshop.

The workshop has been designed to provide a platform through which participants can contribute ideas towards regional policies that will support disaster risk reduction decision-making to reduce the vulnerability of the Pacific Small Island Developing States (SIDS) and strengthen their national sustainable development planning.

Ms Mosmi Bhim attended this meeting and gave a presentation on APN and START activities in the region related to the workshop theme.

SIDS Consortium meeting decides on MOU

The SIDS 'Consortium Development Workshop' took place at the Sports and Fitness Centre, University of the Virgin Islands, St. Thomas, Virgin Islands, USA, from August 3-6 2004.

Professor Kanayathu Koshy represented the University of the South Pacific (USP) through funding from UNDP. About 22 participants representing University of West Indies, USP, University of Virgin Islands, University of Malta, University of Mauritius, National University of Samoa, University of Hawaii, University of Belize, University of Arcadia, UNESCO, UNDP, UNDESA and Ambassador Jagdish Koonjul - Chair of AOSIS - attended the meeting.

The initial concept of the Consortium emerged at the SIDS Ministerial meeting held in Montego Bay, Jamaica in May 2002 as part of the preparations for the World Summit on Sustainable Development (WSSD).

At an expert meeting organized by the Pacific Centre for Environment and Sustainable Development (PACE-SD) on 'Capacity Building for the Sustainable Development of SIDS' held from 3-8 December 2003 at USP, the Consortium concept was further developed. Consortium partners met again during the Nassau SIDS inter-regional meeting and the PrepCom for BPOA+ 10 at the UN headquarters in New York.

The main purpose of the workshop was

to identify common interests, evaluate possibilities for collaboration, consider potential modalities for programme offer, and to draft a plan of action for approval at the Mauritius International Meeting in January. It was expected that the outputs from the workshop would focus on how the Tertiary Institutions can best assist capacity building in SIDS to achieve the goal of BPOA as well as the expected outcomes from Mauritius. Training areas relevant for the sustainable development of SIDS have been identified to be offered by the Consortium. A draft MOU will be prepared and the University Heads will hold a mini PrepCom in November to finalise details before the Mauritius meeting.

Pacific leaders to participate in BPOA+ 10 and COP10

The Thirty-fifth Pacific Islands Forum was held in Apia, Samoa, from 5-7 August 2004 and was attended by Heads of State and Governments of Australia, the Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Nauru, New Zealand, Niue, Papua New Guinea, Republic of the Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu and representatives of Palau and Vanuatu. Representatives from New Caledonia, French Polynesia and Timor-Leste also attended as observers. In the Forum Communiqué, Leaders expressed the wish that the Pacific Plan, intended to be the main instrument for promoting their new Pacific vision, deliver real benefits for the Pacific peo-

ples by proposing concrete plans for the enhancement of economic growth and sustainable development. Leaders approved the Terms of Reference for the preparation of the Pacific Plan.

Leaders noted the importance of the BPOA+ 10 Review and in particular, the new and emerging issues in order to achieve sustainable development, and that the draft AOSIS Strategy will be further negotiated during a third round of Informal/Informals meeting in October 2004 and during the International Meeting to be held in Mauritius.

Leaders encouraged member country participation at the highest level in the BPOA+ 10 Review to be held in Mauritius, 10-14 January, 2005. Leaders

noted the progress in the implementation of the Pacific Islands Regional Ocean Policy and this and the Pacific Islands Regional Ocean Forum-Integrated Strategic Action (PIROF-ISA) Framework will be submitted to the BPOA+ 10 as a major regional initiative for funding and development of partnerships.

Leaders noted the regional and global developments concerning climate change, climate variability and sea level rise since they met in 2003 and the work that is being progressed. They affirmed their commitment to participating at the High-Level Segment of the 10th session of the Conference of Parties in Argentina (COP10).

Tsunami Awareness Workshop conducted

The South Pacific Tsunami Awareness Regional Workshop was held from 1-3 July, 2004 at the Forum Secretariat, Suva, Fiji. The workshop was organised by the South Pacific Applied Geoscience Commission (SOPAC), the International Tsunami Information Centre and the Intergovernmental Oceanographic Commission.

The workshop was held in terms of sessions where presentations were made on the theme and discussions held. On the third day, group sessions were held to prepare a draft document titled Strategic Recommendations for Addressing Tsunami Risks.

SOPAC is expected to consider these recommendations in relation to the development of the Pacific Regional Strategic Action Plan for Disaster Reduction. Presentations were made by experts and country reports were presented by the National Disaster Management Officers (NDMO) of various countries.

At the end of this workshop, a Draft Strategic Recommendations for Addressing Tsunami Risks was prepared which sets out a framework whereby Pacific countries' capacity can be built for tsunami risk identification, preparedness and reduction.

Ms Mosmi Bhim attended this workshop.

A National Sustainable Development Framework for Tuvalu

A National Summit on Sustainable Development (NSSD) was held in Funafuti, Tuvalu from 28 June-9 July 2004. Professor Kanayathu Koshy attended this meeting from 1-8 July, as a facilitator on behalf of the University of the South Pacific (USP). Representatives from Forum Secretariat, SOPAC, SPC and SPREP also participated.

Since the expiry of the "Kakeega o Tuvalu 1995-1998", Tuvalu has been without an up-to-date set of agreed national development priorities and strategies, or a prioritised public sector in-

vestment programme. The NSSD was intended to correct this situation and to provide a clear set of national priorities and guidelines, policies and a strategy framework, for the future development of Tuvalu over the period 2005-2015.

At the Summit, plenary sessions were held on the seven thematic areas followed by working group discussions. An average of about 250 people from across the sectors participated.

Side events were held on most evenings and at one side event, Professor Koshy made a presentation with Mr John Low

from the Forum Secretariat and Mr Bhaskaran Nair from SOPAC, on the theme "Capacity Building for Sustainable Development", placing special emphasis on the development challenges identified during the Summit.

A detailed Summary matrix highlighting the key challenges of each thematic area, key policy outputs and key performance indicators will be one of the major outputs of the Summit. In addition, there will be a National Sustainable Development Framework containing a 10-year performance based vision.

Fiji's surface ozone levels are safe: data reveals

The surface ozone for Fiji is currently at safe levels compared to levels in developed and highly industrialised developing countries, according to data from the ozone monitoring research currently being carried out at the University of the South Pacific (USP).

The monthly average data for Fiji from 1997-2003 has shown that surface ozone levels range from 5-30ppbv (parts per billion by volume). This level is safe compared to developed countries such as America who frequently have a surface ozone level of about 100-200ppbv, says Anand Chandra.

Mr Chandra started collecting data for the project since 2001, for his graduate research. He is currently a tutor and Master of Science student at USP's Chemistry Department.

To measure the ozone levels, a balloon filled with helium has been regularly released, with an ozone-measuring unit (ozonesonde) attached.

The balloon gradually ascends so that ozone can be measured from zero to about 30-35 kilometres altitude in the atmosphere. After drifting for a few hours, the balloon finally bursts at that height. The ozonesonde descends with the burst balloon via an attached parachute.

"Apart from ozone, the unit also measures other ambient parameters such as temperature, pressure, humidity, altitude and balloon rise rate. Ozonesonde measures ozone and this is attached to the radiosonde which measures the am-

bient parameters and transfers radio signals back to us," Mr Chandra said.

The radio signals being transferred back to the ground is picked up by a radio receiver attached to an antenna and stored in a computer. The signals comprise the ozone concentration and other parameters. There is a return address on the fallen unit and upon returning the device, the finder can collect a \$30 reward.

The ozone-monitoring project started in 1997 as part of NASA's Pacific Exploratory Mission to the Pacific (PEM-Tropics) to provide ground based ozonesonde measurements of the vertical profile of ozone. The project was initiated under the Southern Hemispheric Additional Ozonesondes (SHADOZ) program. Similar ozone monitoring projects are also being carried out in Samoa, Tahiti and Galapagos. The project is being funded by NASA, NOAA and USP.

The project, led by Professor Kanayathu Koshy, is conducted in conjunction with the USP Chemistry Department. START-Oceania Secretariat is providing assistance through a living allowance for the graduate assistant. Professor Koshy is the principal supervisor



Anand Chandra (left) is assisted by a fellow chemistry student to fill the balloon with helium, for a recent launch.

for the project research.

The data collected under the project are stored in the NASA/NOAA archives for international reference. Mr Chandra is currently utilising the data for his Masters thesis.

As part of his Masters research, Mr Chandra is examining surface ozone, tropospheric ozone trends and variations for Fiji. He is also examining the trends in Samoa, Tahiti, Galapagos and the

South Pole through data obtained from the NASA/NOAA archives.

"I am trying to see the effects of biomass burning, solar cycle, stratosphere-to-troposphere exchange and the South Pacific Convergence Zone (SPCZ) positions on seasonal variations in ozone levels at the above sites. I am also conducting UV-B measurements for Fiji to see if any variations in stratospheric levels are leading to an increased flux of UV-B to the surface," Mr Chandra said.

"Because the Pacific basin is a relatively data sparse region, the SHADOZ program was initiated to develop a long time data set which could be available to the international community for various purposes such as policy formulation, future projections using models, development of climate change scenarios and further research," Mr Chandra explained.

The data for the Fiji project also reveals a tropospheric average ranging from 10-40 DU (Dobson units) and a stratospheric average ranging from 210-260 DU.

According to Mr Chandra, it is okay to have a 10-40 DU tropospheric average. However, he revealed that some ozone enhancements occasionally occur during summer, which could result in occasionally higher tropospheric levels. This, he says, could have a greater implication for global warming and climate change.

Apia workshop explores opportunities for adaptation and CDM projects

A three-day workshop on adaptation to climate change and the Clean Development Mechanism (CDM) organized jointly by the Institute for Global Environmental Strategies (IGES), Japan and the UNEP Risoe Centre (URC), Denmark was recently conducted in Apia, Samoa.

The workshop was held from 12-14 October at the Training and Education Centre of the South Pacific Regional Environment Programme (SPREP) and was attended by experts, policy-makers and other stakeholders from the Asia-Pacific region. It received local support from SPREP and additional financial support from the governments of Japan, New Zealand and Australia.

The workshop was held in the context of the high vulnerability of South Pacific Island countries to climate change and sea-level rise and the frequent occurrence of extreme damaging weather events, such as tropical cyclones, droughts, and floods. The reliance on one or two economic sectors exacerbates this vulnerability.

The Intergovernmental Panel on Climate Change (IPCC) in 2001 projected

a global mean rise in sea level of upto 88 centimetres in the next century. Adaptation to climate change and integration of pragmatic adaptation policies in national development planning, have been identified as crucial.

In the past, the natural ecosystems and Pacific people have been able to cope with changes in natural, social and economic conditions. However, the future impacts of climate change are expected to be so high that such local adaptations would be inadequate to meet the challenge.

In a keynote address presented by Professor Patrick Nunn on 'Adaptation to Climate Change and Variability in the South Pacific - Issues and Priorities for Action', he concluded that:

- discussions about climate change in the Pacific Islands should re-focus on the positives;
- to re-centre agendas for coping with climate change in the Pacific islands on the people who live there, and are directly sustained by their environments;
- to establish environment laws which are appropriate and enforceable;
- to research new ways of enforcement;

empower Pacific Island people appropriately.

Capacity building and transfer and assimilation of technologies that support adaptive responses to climate change are the key priority needs identified for the Pacific Island countries.

IGES, URC and SPREP believe that the time is opportune for a careful assessment of the current state of knowledge of impacts and adaptation approaches, and of prospects for utilising the Clean Development Mechanism (CDM) as a tool for sustainable development in these countries. These organisations contend that significant progress is unlikely in the absence of greater conceptual progress, methodological development, and prioritisation of research and implementation efforts. Such progress, they say, must build on enormous indigenous and local knowledge on adaptation available in those countries.

Dr Ancha Srinivasan, Climate Policy Project, IGES, explained at the workshop that scientific research played a critical role in placing climate change on the international policy arena. He said that there was an enhanced focus

on mitigation through the 1990s leading to UNFCCC and the Kyoto Protocol and a recognition of the need to design win-win strategies. He said there was an additional focus on adaptation and consideration of climate issues as an integral part of policies for sustainable development.

Speaking on adaptation, Dr Srinivasan said it was a global challenge that raised complex problems involving science and economics, decision-making under uncertainty, and balancing of the interests of the current and future generations.

"Poor countries and communities that contribute relatively little to climate change face a disproportionately high burden in terms of adaptation. Policy discussions on adaptation are rather limited at all levels of governance and designing and implementing cost-effective adaptation policies in the face of competing environmental and developmental priorities is not always easy," Dr Srinivasan said.

The objectives of the Apia workshop include: to identify adaptation policies and measures and assess their

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Conferences

3-4 December 2004: 2004 Berlin Conference on the Human Dimensions of Global Environmental Changes, to be held in Berlin. The Environmental Policy and Global Change section of the German Political Science Association (DVPW) and its partners invite papers for the above conference on the theme: "Greening of Policies - Interlinkages and Policy Integration." The conference has been endorsed by the IHDP and is organised by the Environmental Policy Research Centre of the Freie Universität Berlin. For more information visit the 2004 Berlin Conference-homepage: www.fu-berlin.de/ffu/akumwelt/bc2004/index.htm

21-23 June 2005: GECHS-sponsored workshop on Human Security and Climate Change will be held in Oslo, Norway, from 21-23 June 2005. Call for Papers has been announced. For further information, visit website: www.cicero.uio.no/humsec

9-12 November 2005: The First DIVERSITAS Open Science Conference (OSC1) will be held in Oaxaca, Mexico, on the theme 'Integrating Biodiversity Science for Human Well-Being'. Registration is open until January 2005. Abstracts are due on 31 March 2005. For more information, contact the DIVERSITAS secretariat on email: info@diversitas-osc1.org or visit the website: <http://www.diversitas-osc1.org>

27 August - 2 September 2005: 4th International NCCR Climate Summer School will be held in Grindelwald, Switzerland on the theme 'From the Holocene to the Anthropocene: Climate of the Last 1000 Years'. Young scientists (PhD students and Post-Docs) are invited to apply. Participation is limited to a maximum of 70. A small number of grants is available for students from developing countries. Deadline for applications is 15 December 2004. Details and application form can be found online at: <http://www.nccr-climate.unibe.ch>

9-13 October, 2004: 6th Open Meeting of the Human Dimensions of Global Environmental Change Research Community will be held at the University of Bonn, Germany, on the theme 'Global Environmental Change, Globalisation and International Security: New Challenges for the 21st Century'. Session submissions are open from September 15th - November 15th, 2004; paper abstract submissions are open from February 1st, 2005 - March 15th, 2005; and poster submissions are open from February 1st, 2005 - March 15th, 2005. Pre-Open Meeting capacity-building training seminars will be held from November 15th, 2005 - February 15th, 2005. More details are available at the website: <http://openmeeting.home.linux.org> or at the 2005 Open Meeting link on website: <http://www.ihdp.org>

Tourism industry is vulnerable to climate change

The Fiji government should pursue climate change measures that offer win-win situations for adaptation, mitigation and wider environmental management, to tourism developers.

This was recommended by Dr Susanne Becken in her report titled 'Climate Change and Tourism in Fiji - Vulnerability, Adaptation and Mitigation', published by the Department of Tourism and Hospitality of the University of the South Pacific (USP). The report was published by the Department, under the project 'Climate Change and Tourism in Fiji' funded by the European Union under the 8th EDF.

Dr Becken says that current policy and research in Fiji focus on adaptation rather than mitigation, and measures were predominantly reactive rather than proactive. "Some policy frameworks exist that regulate tourism development but few of them are enforced, are mandatory legal requirements, work in practice or are monitored," she said.

"These gaps might be overcome once the Sustainable Development Bill is enacted. The government through its Department of Environment is currently developing a Climate Change Policy, which will address key issues such as lack of information, lack of capital and skilled staff, and a lack of a general risk management plan that incorporates climate change into a wider framework.

"It is recommended that the Department of Environment in their climate change policy or the Ministry of Tourism in their envisaged Risk Management Plan pursue climate change measures that offer win-win situation, namely for adaptation, mitigation and wider environmental management," she said.

Dr Becken's research focused on the interactions between climate change and tourism whereby both tourism's vulnerability to climate change impacts and tourism's contribution to climate change were considered. It also explored tourist's perceptions of climate change and their willingness to contribute financially to adaptation or mitigation measures. She also interviewed government



This beach near the resort at Natadola, Fiji, is already feeling the effects of coastal erosion due to strong waves. It is currently a research site for the START-sponsored AIACC project.

stakeholders and tourism developers. Below are some extracts from her report.

The Fiji Islands are highly vulnerable to climate change and tourism in particular is at risk related hazards such as cyclones, storm surge and flooding, sea level rise, erosion, transport and communication interruption, and reduced water availability.

Sea level rise appears to be less severe in higher islands such as Viti Levu, Fiji, compared with atoll islands, however, most of Fiji's population and infrastructure are located on coastal and low-lying areas and therefore are potentially affected by inundation and other damages to the coastal systems.

Most of the tourism infrastructure is located in coastal areas below five metre elevation and could suffer serious impacts from sea level rise, storm surges and cyclones.

This poses a risk for existing capital and could impede further investment, in particular when insurance is excluding cover for damages from climate change. Other problems associated with rising sea levels include inundation, flooding, intrusion of salt water into groundwater and rivers, and drainage problems for septic tanks and pumping systems. Tourist resorts can adapt to those by drainage management, water conservation and advanced sewage systems to prevent pollution of lagoons and reefs. Fiji is currently focussing more on adaptation rather than mitigation because the potential impacts from climate change are perceived to be much more

severe than Fiji's contribution to climate change. While stakeholders seem generally aware of Fiji's vulnerability to climate change, few detailed data is available on impacts, such as storm surges, and there are no 'hazard maps' that provide information on the likelihood associated with different hazards for geographical areas.

Tourism stakeholders and operators recognise that environmental factors, such as healthy reefs and clear water, are essential for tourism in Fiji. When asked which

impacts from climate change may have the worst impact on the respondent's accommodation business, operators expressed awareness of impacts related to cyclones, loss of coral reefs, and heavy rain events or flooding. A few operators were sceptical about the impacts of climate change.

Some managers indicated that cyclone damage risks constitute a natural part of running a tourism business in Fiji.

Tourism businesses are therefore, already impacted upon by climate-related events, most commonly in the form of physical damage from a cyclone, storm surge, erosion and coral bleaching.

Overall, water pollution is a major concern and increasing water temperatures as a result of climate change put more pressure on already stressed coral, ultimately increasing the risk of coral bleaching. Coral reefs are major tourist attractions.

Relatively little is done in terms of water conservation and independency of energy, guest education and comprehensive risk management plans (including evacuation plans).

Despite the high risk associated with tourist facilities built on the waterfront, most new developments still focus on coastal areas, and it is still common practice to cut down mangrove forests, which would serve as a natural protection against climate-related impacts.

Dr Becken is a researcher with the Lincoln University, New Zealand. She recently presented a public lecture on her findings, at USP's Laucala Campus, Suva, Fiji.

Training Institute strengthens regional network on climate change

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not only the special situation with Fiji, it is a common concern of all Pacific Island countries.

"The essential starting point for risk management is the present. It is of great importance to have a clear understanding of the present vulnerability to climate and extreme events to plan future response measures.

"Although people living near the towns and cities have access to climate information, it is those in the islands and in the interior of the main islands that are mostly affected. Lack of information and awareness will put them at greater risks of climate related hazards.

"Capacity building through formal training, like this training, and informal collaborative networks are equally

important to address these challenges.

"In this regard, the efforts of USP and its partners who have organised this workshop deserve special praise. Together with USP's Postgraduate Training on Climate Vulnerability and Adaptation Assessment, this training, I am sure, will add a new dimension to building regional capacity," Hon Banuve said.