

**SECRETARIAT OF THE PACIFIC COMMUNITY**

**THIRTY-EIGHTH MEETING OF THE  
COMMITTEE OF REPRESENTATIVES OF GOVERNMENTS AND ADMINISTRATIONS**  
(Noumea, 13–16 October 2008)

**AGENDA ITEM 3.2 - CLIMATE CHANGE: CONTRIBUTIONS FROM SPC TO REGIONAL  
AND NATIONAL ADAPTATION INITIATIVES**

(Paper prepared by the Secretariat)

**EXECUTIVE SUMMARY**

1. Changes to the sea level, air and sea temperatures, ocean acidity and rainfall patterns, and stronger cyclones could have serious impacts on the capacity of the Pacific's agricultural, forestry and fisheries sectors to provide food security, livelihoods and economic growth.
2. In the agricultural sector, the combined effects of a changing climate and sea-level rises are projected to reduce yields, affect the types of crops that can be grown, and increase the risk of pests and diseases. The effects on forests are still uncertain. Increased atmospheric CO<sub>2</sub> may enhance growth and yield, but higher temperatures may disrupt the ecosystem benefits provided by forests.
3. Regional and national plans to optimise benefits from fisheries could be derailed by climate change. Specific threats to fisheries include changes to the distribution and abundance of tuna; degradation of coral reefs, leading to a decline in coastal stocks; damage to essential fishing infrastructure; higher costs for ensuring sea safety for fishing operations; and difficulties in developing freshwater aquaculture.
4. Governments and NGOs must ensure that subsistence and primary producers are aware of the need to adopt systems that are more resilient to the likely effects of climate change. In particular, poor rural communities need help to diversify how they produce food and earn income.
5. In the agricultural and forestry sectors, SPC's Land Resources division is assisting members through developing 'climate ready' crops and varieties for farmers including seeds that are salt-water and flood tolerant; promoting sustainable management practices and participatory approaches to help farmers identify and adopt suitable methods to combat climate change; establishing the Centre for Excellence for Atoll Agriculture; and raising awareness of the advantages and disadvantages of assistance from the Clean Development Mechanism to forgo deforestation and develop biofuels. A new Pacific-German regional climate change project aims to build and strengthen national and regional capacities to adapt to, and mitigate, climate change by integrating the necessary considerations into agriculture, forestry and land use planning.
6. To assist the fisheries sector to adapt, SPC has launched a project with support from AusAID to assess the implications of climate change for regional and national plans to optimise the use of fish for food security, livelihoods and economic growth. This project will also identify the policies and management measures needed to maintain the benefits of fisheries in the face of climate change; regional capacity to forecast and mitigate the effects of climate change on fisheries and aquaculture; and priorities for development assistance to build the necessary capacity and implement adaptation programmes.

7. In the health sector, the incidence of infectious and vector-borne diseases will increase, with the potential for much higher mortality. SPC's Public Health Programme is working with members to strengthen their capacity to respond to the health impacts of climate change.
8. Gender mainstreaming will be a key feature in the development of all SPC strategies to adapt to climate change. This will help ensure that rural communities and the urban poor who are likely to be most severely affected, and women whose socio-economic position often makes them more vulnerable to environmental risks and disasters, have the opportunity to participate in developing and implementing adaptation strategies that are equitable, effective and sustainable.
9. Critical infrastructure, such as housing, schools, hospitals, airports, food stores, etc., is threatened by the extreme weather conditions that could result from climate change. SPC's Demography Programme is working with members on developing policies to guide human settlement planning to try and mitigate the effects of climate change.
10. SPC is working with members on the roll-out of the Pacific rural internet connectivity system (RICS), a low-cost satellite-based system that enables rural and remote communities to connect to the global communication backbone to support early warning systems.

## **RECOMMENDATIONS**

11. CRGA 38 is requested to:
    - i. recognise the long-term threat posed by climate change to the capacity of the agricultural, forestry and fisheries sectors to provide food security, livelihoods and economic growth;
    - ii. endorse the strengthened focus on climate change activities within the Land Resources and Marine Resources Divisions and the Public Health, Statistics and Demography and Human Development Programmes, particularly those aimed at helping rural communities adapt by diversifying methods for producing food and generating income;
    - iii. note the strong cooperation between SPC, SPREP and other CROP agencies to assist PICTs to achieve the goals of the Pacific Islands Framework for Action on Climate Change; and
    - iv. support the efforts of SPC and its partners to obtain the resources needed to further develop adaptive strategies and implement effective demonstration projects.
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## CLIMATE CHANGE: CONTRIBUTIONS FROM SPC TO REGIONAL AND NATIONAL ADAPTATION INITIATIVES

### Purpose

1. The purpose of this paper is to:
  - a. summarise the projected changes to atmospheric climate and oceanic conditions in the Pacific under climate change;
  - b. outline the expected impacts of climate change on the capacity of the agricultural, forestry and fisheries sectors to provide food security, livelihoods and economic growth;
  - c. highlight the possible impact of climate change on gender, human health and human settlements;
  - d. present the adaptive strategies that SPC and its partners are developing to assist PICTs to maintain the benefits from their productive sectors in the face of climate change.

### Background

2. Evidence that the earth's climate is warming due to human activity is now unequivocal. As a result of the rapid increase in the concentration of greenhouse gases, scientists project that the Pacific will experience the following climatic changes [1-3]:
  - a. Sea-level rise of 0.19– 0.58 m by 2100, resulting in accelerated coastal erosion and saline intrusion into freshwater sources.
  - b. Surface air temperature increases of 1.0–4.17<sup>0</sup>C in the northern Pacific and 0.99– 3.11<sup>0</sup>C in the southern Pacific by 2070, leading to increases in sea surface temperature of 1.0–3.0<sup>0</sup>C;
  - c. Acidification of the ocean through increased absorption of CO<sub>2</sub>, causing pH to drop by an estimated 0.3–0.4 units by 2100;
  - d. Rainfall increases or decreases – from -2.7% to +25.8% in the northern Pacific, and -14% to +14.6% in the southern Pacific, causing worse floods or droughts;
  - e. El Niño conditions possibly occurring more frequently, leading to higher rainfall in the central Pacific and northern Polynesia;
  - f. Tropical cyclones becoming more intense, with increased peak wind speeds and higher mean and peak rainfall.
3. The 39<sup>th</sup> Forum Pacific Islands Forum ... 'reaffirmed the continuing urgency of addressing the challenges posed by and the impacts of climate change as a regional priority ... and ... called on appropriate regional bodies including SPREP, SOPAC, SPC and USP to support national efforts and take a leadership role in implementing relevant regional actions to address climate change with a particular focus on<sup>1</sup>:

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<sup>1</sup> Forum Communiqué – Thirty-Ninth Pacific Islands Forum, Alofi, Niue, 19-20 August 2008.

- a. pursuing and implementing mitigation and adaptation measures;
- b. mainstreaming human security issues;
- c. improving preparedness for the impacts of increasing natural disasters through the implementation of national action plans;
- d. addressing the vulnerability of Pacific Islands to climate change and subsequent impacts on people, land, water, food security, infrastructure, and natural resources;
- e. continuing to work collaboratively to rationalise the roles of the various regional organisations and to harmonise donor engagement; and
- f. improving the capacity of countries in the region to engage in the ongoing United Nations Framework Convention on Climate Change negotiations for a post 2012 global climate change agreement which is scheduled to conclude in 2009'.

### **Expected impacts of climate change on food security, livelihoods and economic growth**

#### ***Agriculture and forestry***

4. Changes in air temperature and rainfall patterns are projected to affect agricultural yields and the type of crops that can be grown. Increasingly extreme rainfall patterns would result in loss of crop production due to heat stress, drought conditions or water-logging, more frequent flooding of river catchments and greater soil erosion. Sea-level rise will also increase coastal erosion, and intrusion of saltwater will contaminate groundwater, leading to the loss of productive land. Managing water resources may become more costly as a result of changes in rainfall patterns and saltwater intrusion.
5. Climate-induced changes in temperature, wind direction and rainfall patterns could increase the risk that new pests and disease vectors are introduced and established, further threatening production and food security. The concern is that such changes may favour plant diseases capable of wiping out crops, as occurred with taro leaf blight in Samoa in the 1990s. These risks will be compounded further if the ecosystem processes that maintain the natural enemies of plant and animal pests, such as pollination and soil enrichment, are also disrupted by climate change.
6. The consequences of reduced agricultural production due to climate change will be increased dependence on imported food, poorer diets and higher rates of lifestyle diseases. Countries and territories comprising only atolls are naturally more vulnerable given their limited agricultural land. However, impacts on crops are also projected for many high islands due to the large proportion of people living near rivers or on the coast.
7. The effects of climate change on forests are uncertain. Increased atmospheric CO<sub>2</sub> may enhance growth and yield [4] On the other hand, temperature increases may affect the function and species composition of forests, affecting their ability to provide ecosystem services important to food security and livelihoods, such as water cycle regulation, maintenance of soil fertility and conservation of biodiversity. Mangroves, which provide fish, timber, fuel and medicine, and act as a barrier to storm surges and tsunamis, are not expected to survive where they are constrained from spreading inland as the sea level rises. Other impacts may occur if increased coastal erosion and saline intrusion force coastal communities to relocate, resulting in clearance of forests.

### ***Fisheries***

8. Regional and national plans to optimise benefits from fisheries, as articulated in the Vava'u Declaration, could be derailed by climate change [5]. These plans, and the actions for implementing them, must be adapted to changing environmental conditions to ensure they succeed in the long term.
9. Key threats to fisheries and aquaculture from climate change include:
  - a. ***Changes to the distribution and abundance of tuna.*** Alterations in ocean temperatures and currents, and the food chains that support tuna, are projected to affect the location and abundance of these valuable resources. Early models indicate that the concentrations of skipjack and bigeye tuna are likely to be located further to the east than in the past. This has implications for the long-term development and profitability of national industrial fishing fleets and canneries in the western Pacific.
  - b. ***Decline in coral reefs and coastal fisheries.*** Rising sea surface temperatures and more acidic oceans are projected to have impacts on the growth of hard corals and the maintenance of the important fish habitats they create. Degraded coral reefs are likely to support different types of fish and perhaps lower yields. Reduced catches of reef fish will widen the expected gap between the fish available and the fish needed for future food security [6].
  - c. ***Damage to infrastructure.*** Storms of greater intensity will increase the risk of damage to wharfs and essential infrastructure. There will also be higher financial risks associated with coastal aquaculture due to more frequent damage to equipment.
  - d. ***Greater costs for fishing at sea.*** Fleets will eventually need to be upgraded to increase the safety of fishing operations during severe storms. When these costs are combined with loss of days at sea due to bad weather, and higher fuel costs, the profitability of national enterprises could be jeopardised.
  - e. ***Difficulties in developing freshwater aquaculture.*** Changing patterns of rainfall and more intense storms are likely to flood aquaculture ponds more regularly in some places, and make small-pond farming impractical in others due to more frequent droughts.

### **Adaptation strategies**

10. Although rural communities in the Pacific have a history of overcoming the effects of natural disasters and the resulting food shortages and disruption of livelihoods, new levels of awareness and adaptation are needed to address the projected threats from climate change. Governments and NGOs must alert rural communities to the likelihood of unexpected environmental conditions and help them build on their existing level of resilience to make the adaptations needed to handle the uncertainty of climate change. In particular, rural communities need to diversify further the ways they produce food and earn income. The Land Resources Division (LRD) and Marine Resources Division (MRD) are developing practical methods to help them, as summarised below.

### *Agriculture and forestry*

- a. ***Making the most of biodiversity.*** The Centre for Pacific Crops and Trees (CePaCT) is developing and maintaining a greater diversity of crops to provide PICTs with options to combat the effects of climate change by: 1) collecting ‘climate ready’ crops and varieties from the region that have resilience to marginal conditions; 2) collaborating with international agriculture research centres (IARCs) to access new breeding lines from outside the region (e.g., salt- and drought-tolerant sweet potato lines from the International Potato Centre (CIP) are being multiplied in tissue culture and supplied to farmers); and 3) working with the SPC Plant Health team to develop crop varieties resistant to new pests and diseases.

Other initiatives include efforts by the Pacific plant genetic resources network (PAPGREN) to build national capacity in identifying, conserving and improving the diversity of crops, and the search for livestock strains and suitable pastures that could cope with the harsh environmental conditions anticipated under climate change.

- b. ***Technologies adapted to better manage climate change.*** The Development of Sustainable Agriculture in the Pacific (DSAP) project, funded by the EU, uses a participatory approach with farmers and rural communities to identify, adapt and adopt technologies to solve agricultural problems, including climate change. For example, bucket irrigation systems have been promoted to manage water resources more effectively. Other initiatives to assist the agriculture and forestry sectors adapt, but also help mitigate the production of greenhouse gases, include: i) promoting the use of leguminous cover crops and multipurpose tree species to enhance soil organic carbon and regenerate soil fertility; ii) combining charcoal with compost to build soil carbon and increase productivity, particularly on atolls; and iii) processing waste from piggeries through hot aerobic composting to reduce methane emissions.
- c. ***Resource management systems to support adaptation.*** To help communities identify the management systems necessary for sustaining their resources in the face of changing environmental, economic and social conditions, LRD is promoting sustainable land management (SLM) and sustainable forest management (SFM). To do this, LRD is developing national capacity at every level, from enabling policy and institutional frameworks to extension support. Community-based SFM models have been applied in Fiji, Vanuatu and Samoa, resulting in new community forest and mangrove management plans and land use plans. Integrated land use plans strengthen community resilience to changing conditions by involving them in identifying the best land use options, agricultural practices and technologies, and the best management regimes for their land. Application of SFM principles has also led the revised Fiji National Forest Policy and National Code of Logging Practice, and the Niue National Forest Management Plan.

LRD also supports the development of participatory land use planning processes, national land use policies and land zoning plans to assist members in adapting to the effects of climate change on rural and urban land use practices. Assistance has been provided to the Cook Islands in developing a draft land use policy and draft land zoning map.

- d. ***Supporting atolls in confronting their unique challenges.*** In recognition of the harsh conditions facing atolls, and with support from the International Fund for Agricultural Development (IFAD), LRD established a Centre of Excellence for Atoll Agriculture in Kiribati in July 2008. The centre provides a focal point for the Pacific scientific community to produce technologies that will help farmers on atolls improve their productivity and income, increase their market opportunities and adapt to climate change.
- e. ***Responding to opportunities.*** LRD facilitated a regional workshop in January 2008 to increase awareness among forestry officials about the potential opportunities, hurdles and risks associated with implementation of forestry carbon storage projects under the Clean Development Mechanism (CDM). This mechanism enables developed countries with emission reduction targets under the Kyoto Protocol to buy credits from developing countries for projects that generate emissions reductions or carbon storage. Because 20% of annual greenhouse gas emissions stem from land use change, deforestation and forest degradation, proposals are being discussed to provide finance for avoiding deforestation projects (Reduced Emissions from Deforestation and Degradation, or REDD). This would mean that communities would be paid to protect their forests. Papua New Guinea (PNG) has the third-largest tropical rainforest in the world, and the PNG Government has provided important leadership on this issue, both at the global level and in discussions with traditional donors.
- f. ***Biofuel*** projects are also eligible for CDM funding and represent opportunities for PICTs to reduce carbon emissions and dependence on imported fossil fuels. SPC will host a conference with SOPAC later in 2008 to discuss biofuel production in the region, assess and avoid potential impacts on food security, and identify community-level applications that can improve energy and income security.

### ***Fisheries***

11. To provide PICTs with specific information on the vulnerability of the Pacific fisheries sector to climate change, SPC's Strategic Engagement, Policy and Planning Facility and MRD have launched a project to assess the impact of climate change on fisheries and aquaculture with support from AusAID. This initiative brings together the best scientists from the region to determine: (i) the observed and projected changes to Pacific climate and oceanography; (ii) the effects of these changes on the ecosystems that support fisheries; and (iii) the projected changes in fish stocks themselves. This information will provide a sound basis for assessing the vulnerability of oceanic, coastal and freshwater fisheries, and aquaculture, to climate change. The project is guided by a Technical Working Group with relevant experts and representatives from CROP agencies and national fisheries departments
12. As a result of this project, SPC will be able to provide more specific advice to the region on: i) implications of climate change for plans to optimise the use of fish for food security, livelihoods and economic growth; ii) adaptation and management measures needed to maintain the benefits of fisheries in the face of climate change; iii) regional capacity to forecast and mitigate the effects of climate change on fisheries and aquaculture; and iv) priorities for cost-effective development assistance to address the effects of climate change on the fisheries sector

13. Policies that should help PICTs adapt to the anticipated impact of climate change on fisheries include:
  - a. diversifying how fish are produced, processed and distributed to enable communities to switch more easily to those methods and areas least affected, or favoured, by the changing climate. In rural areas, practical ways of diversifying fish production are: 1) the installation and maintenance of low-cost inshore fish aggregation devices (FADs) to give subsistence fishers access to tuna, and 2) scaling-up small pond aquaculture. In addition, retaining and distributing tuna normally discarded by industrial fleets will help meet the demand for fish from rapidly growing urban populations.
  - b. strengthening initiatives to reduce existing stresses on coastal fisheries (such as overfishing and degradation of fish habitats due to careless land use) to maximise the natural potential of these resources to adapt to climate change.
  - c. establishing monitoring programmes to assess the impact of climate change and the success of adaptation programmes.

#### **Gender issues**

14. The socio-economic position of women often makes them disproportionately vulnerable to the after-effects of environmental risks and disasters. SPC will mainstream gender issues in the development of all strategies for climate change adaptation. All sections of society will be given the opportunity to participate in developing and implementing adaptation strategies that will be designed to be equitable, effective and sustainable. The traditional knowledge about how to cope with natural disasters that resides with rural communities and women will be considered as a valuable asset in adapting to climate change.

#### **Health implications**

15. Diseases that are sensitive to climate change are among the largest global killers. Interruptions to the food and water supply due to climate change could have profound health consequences – particularly for already vulnerable populations. The World Health Organization (WHO) estimates that globally, 3.3 million deaths each year are due to malaria, diarrhoeal diseases and malnutrition. Climate change could double these figures by 2030. This is in addition to the five million cases of illness and more than 150,000 deaths that already occur each year due to climate change<sup>2</sup>. Rising temperatures and increased humidity create perfect conditions for pathogens to grow and spread, resulting in increased incidence and prevalence of infectious diseases.
16. Food and waterborne diseases will become more common. Some studies predict that for every 1° rise in temperature, there will be an 8% increase in diarrhoeal diseases. Higher temperatures and changes to rainfall patterns will also see increased incidence of vector-borne diseases such as malaria, dengue fever, Ross River fever, and Japanese and Australian encephalitis. Skin diseases and acute respiratory illnesses could also worsen with climate change.
17. WHO has identified climate change as a key determinant of health that will require enormous efforts to both monitor and respond to the effects on human populations.

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<sup>2</sup> World Health Organization, Climate and Health, fact sheet- July 2005.



18. Early warning systems and reliable real-time communication networks are becoming increasingly important in the Pacific. The RICS internet communications system implemented by SPC provides new opportunities to bridge the communication gap for all rural and remote communities in the region. In addition to enabling communication and information dissemination, RICS will provide the backbone for early warning systems such as the Pacific Public Health Surveillance Network (PPHSN).

### **Human settlements**

19. With the exception of PNG, the majority of population settlements and critical infrastructure in most PICTs are located in coastal areas. Villages, towns, cities, and key infrastructure such as hospitals, schools, power plants and distribution systems, fuel depots, telecommunication systems, disaster coordination centres, hotels and other tourist infrastructure, airports and business communities are mostly located in coastal areas. It is estimated that flooding will potentially affect between 60,000 and 90,000 Pacific Island people by 2050. Extreme weather events could thus exact a very high human and economic toll in PICTs.

### **Partnerships and cooperation**

20. Pacific Islands Forum Leaders endorsed the Pacific Islands Framework for Action on Climate Change (PIFACC) 2006–2015 as a regional platform for intensifying adaptation efforts to cope with increasing vulnerability to future climate change. PIFACC explicitly recognises the need to identify vulnerable sectors and to design, target and implement adaptation measures in a better way. It also seeks to improve PICTs' understanding of climate change and enhance their capacity to cope with the threats. SPC has been working in partnership with SPREP and other CROP agencies in supporting PICTs to implement PIFACC, including by providing technical staff to assist PICT representatives at recent high-level meetings on climate change<sup>3</sup>. Such support will continue, particularly for the UNFCCC post-2012 global climate change agreement negotiations, scheduled to conclude in 2009.
21. A new Pacific-German project 'Adaptation to climate change in the Pacific Island region' will be implemented by LRD and GTZ from the beginning of 2009. The four-year project will receive funding of up to Euros 4.2 million from Germany.

### **Conclusion**

22. Climate change is no longer just a topic for discussion. For many Pacific island countries and territories, it poses serious questions about our ability to survive. The 4<sup>th</sup> Assessment Report by the Intergovernmental Panel on Climate Change states unequivocally that global warming is an existing and worsening threat.

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<sup>3</sup> Conference of the Parties (COP) to the United Nations Convention to Combat Desertification (UNCCD) – Madrid, September 2007; United Nations Forum on Forests (UNFF) – New York, April 2007; COP to UNFCCC as part of SPREP – Bali, December 2007; Asia-Pacific Forestry Commission (APFC) – Hanoi, April 2008; COP to the Convention on Biological Diversity (CBD) – Bonn, May 2008; and International Tropical Timber Organisation (ITTO) expert meeting on Addressing Climate Change through Sustainable Management of Tropical Forests – Yokohama, May 2008.

23. 'Climate change, and what we do about it, will define us, our era and ultimately the global legacy we leave for future generations.' – *UN Secretary General, Mr Ban Ki-Moon speaking to global leaders at the 2007 UN gathering entitled 'The future in our hands: Addressing the leadership challenge of climate change'*.
24. For PICTS, a 'business as usual approach' is simply not an option. The time for taking adaptation measures is now. We simply cannot afford to wait. The cost in human, economic, environmental, social-cultural and political terms is too great.
25. 'Confronting climate change will be this generation's Cold War. It is however a more difficult challenge to face because it can undermine the very notion of societal stability'<sup>4</sup>. As aptly stated by His Excellency, the former President of Nauru at last year's Forum leaders' meeting in Tonga ... 'Action on climate change represents one of the great moral imperatives of our era'<sup>5</sup>.

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12 September 2008

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<sup>4</sup> Kurt Campbell, in 'Haag, A.L, Is this what the world's coming to?'

<sup>5</sup> President of Nauru, Climate Change Statement, Post Forum Dialogue Plenary Session, 38<sup>th</sup> South Pacific Forum, October 2007.

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