**SECRETARIAT OF THE PACIFIC COMMUNITY**

**SEVENTH CONFERENCE OF THE PACIFIC COMMUNITY**
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# AGENDA ITEM 4 A – CLIMATE CHANGE AND FOOD SECURITY – MANAGING THE RISKS FOR SUSTAINABLE DEVELOPMENT

(Presented by the Secretariat)

## SUMMARY

1. Climate change projections indicate there will be many challenges to achieving the sustainable development objectives of Pacific Island countries and territories (PICTs). Managing risks to food security (including water) and reducing exposure to extreme weather events are arguably the most pressing climate change issues confronting PICTs. Effective risk reduction strategies, both proactive and reactive, need to be put in place to minimise the impacts of climate change. This paper focuses specifically on the issue of climate change and food security.

2. Key challenges for PICTs include improving the understanding and quantification of climate-related risks to food security, identifying viable adaptation options and marshalling resources to implement timely and effective responses. Given the human and financial resource constraints faced by many PICTs, climate change adaptation responses must take into account the relative timeframes and risk profiles of the projected impacts. Responses must also ensure that available resources are allocated to the highest priority and most cost-effective actions.

3. The social, cultural and economic significance of agriculture and fisheries to the people of the Pacific, and the high susceptibility of these sectors to projected climate change impacts mean that addressing effects on food production and securing safe drinking water must be a central focus of adaptation initiatives. Building a better understanding of the risks presented by climate change and the types of actions that can help minimise these risks is essential to sound, evidence-based, decision making. Many of the projected impacts of climate change can be effectively managed through adopting a well-informed and targeted risk management approach to address existing threats to food production and water security. Decision makers must ensure that timely and cost-effective responses are put in place to minimise the emerging additional risks of climate change to food security. Importantly, their decisions will depend on having relevant data together with information and knowledge products to determine levels of acceptable risk.

**RECOMMENDATION**

4. Conference delegates are invited to:

   i. review and discuss the paper, in particular noting the range of projected impacts that climate change poses to food security, including water, in the Pacific region;

   ii. note the importance of adopting a well-informed, inclusive and integrated risk reduction and management approach to ensure the adverse impacts of climate change on food and water security are minimised now, and in coming decades; and

   iii. further note the importance of a paradigm shift in our thinking and planning for climate change in that it is not necessarily a matter of doing different business but rather doing business differently to determine the level of acceptable risk at all points and prepare to respond effectively through appropriate mitigation and adaptation initiatives.

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# CLIMATE CHANGE AND FOOD SECURITY[1]– MANAGING THE RISKS FOR SUSTAINABLE DEVELOPMENT

## PURPOSE

1. This paper presents an overview of the projected threats posed by climate change to food and water security, and even continued sustainable development, of Pacific Island countries and territories (PICTs). It aims to enhance awareness of the potential adverse impacts of climate change on the lives of Pacific Island people and encourage delegates to take an integrated and proactive role in risk management to address these impacts.

## BACKGROUND

2. The Pacific Islands region already faces a wide range of pressures and constraints to achieving long-term sustainable development objectives. These include high population densities and growth rates in many countries (the regional population is expected to increase from ~10 million in 2011 to ~18 million by 2050); rapid and often unplanned urbanisation; increasing poverty; high exposure to natural hazards; limited natural, human and financial resources; and the small size and high external dependency of many island economies. Furthermore, land and marine resources are under considerable stress from existing unsustainable patterns of use, increased pollution and poor waste disposal, which undermine the resilience of food production systems to external shocks.

3. Climate change presents an additional set of risks to sustainable development. A vital element of the region's approach to managing these risks will be to address the existing sustainable development constraints described above – improving the resilience of natural ecosystems will reduce vulnerability to climate change.

4. There have already been observed changes in the region's climate. Average land surface temperatures have increased by $0.6^0$C over the past century, most of which has occurred in the past few decades. Sea surface temperatures have warmed by a similar amount and the ocean has become more acidic. Rainfall patterns have changed in recent decades, with the southwestern Pacific becoming drier and the central equatorial Pacific wetter, and the intensity of rainfall events has risen. There is also evidence that the intensity of extreme weather events, especially floods and droughts, has increased since the 1970s. It is difficult to attribute these changes solely to human-induced climate change given the influence of natural climate variability cycles (such as ENSO), but the observed changes are consistent with those projected by climate models.

5. While PICTs need to accommodate the climatic changes that have already occurred, it is the projected magnitude of climate change over the course of this century that poses the greatest challenge for the region. The Fourth Assessment Report of the Inter-governmental Panel on Climate Change (IPCC), released in 2007, projects that average global surface temperatures could rise by between 1.8 and $4^0$C by 2100[2]. The final outcome depends to a large extent on how successful the international community is in limiting increases in atmospheric greenhouse gas concentrations. The IPCC also projects that the frequency and intensity of floods and droughts are likely to increase, cyclones will most likely become

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[1] Food security also includes water security.

[2] The IPCC states that the most probable temperature rise would be between 1.8˚C and 4˚C, but that given the range of uncertainties that exist, temperatures could rise by as little as 1.1˚C, or as much as 6.4˚C.

more intense (though not necessarily more frequent), and the ocean will become warmer and much more acidic (ocean pH could decrease by 0.3−0.4 units by 2100).

6. The projected changes to surface climate and the ocean are expected to have profound effects on natural ecosystems and the hydrological cycle, with subsequent impacts on the productivity of agriculture and fisheries, and hence food security. While the IPCC's current projection is that the mean sea level will rise by up to 58 cm by 2100, recent projections suggest that sea-level rise could be higher and could possibly exceed 100 cm by 2100. A 100 cm rise in mean sea level would have significant repercussions for some PICTs, especially for low-lying atolls and coastal areas. However, sea-level rise is not expected to have a significant impact on food security for the region as a whole.

7. If the well-being of Pacific people is to be improved and sustained over the coming decades, a wide range of measures to manage existing and future climate-related risks need to be put in place. Climate change is expected to impact all sectors and have far-reaching environmental, economic, cultural and political implications for the region. The magnitude and timing of projected impacts is likely to vary significantly among PICTs and will require different responses at the national and regional level. Some impacts will pose serious risks in the short-to-medium term, especially to maintaining food and water security, and require immediate response measures. Other impacts, such as from sea-level rise and ocean acidification, will emerge over the longer term.

8. Key challenges for PICTs include improving the understanding and quantification of climate related risks, identifying viable adaptation options, and marshalling the resources to implement responses in a timely, efficient and effective manner. Given the human and financial resource constraints faced by PICTs, it is essential that climate change adaptation responses take into account the relative time frames and risk profiles of the projected impacts. Available resources will also need to be allocated to the highest priority and most cost-effective actions. Without doubt, managing risks to food and water security and reducing exposure to extreme weather events are the most pressing issues confronting PICTs.

9. The agriculture and fisheries sectors are very important for most PICT economies. They underpin the livelihoods of a significant proportion of the region's population and play an essential role in sustaining food supplies. They also account for the largest share of export earnings for most countries. These sectors now face a set of complex and interrelated risks associated with existing climate variability and projected changes and must therefore be the priority focus of climate change adaptation initiatives.

## CURRENT STATUS OF FOOD (INCLUDING WATER) SECURITY IN THE PACIFIC

10. Food security is said to exist 'when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life'.[3] Food security can be assessed against five main pillars: *adequacy* of food supplies (enough to meet daily nutritional needs); *availability* of food supplies (ability of households and individuals to acquire food); *stability* of the food supply (resilience of food supplies to external shocks, such as natural disasters); *utilisation* of food (people are healthy enough to secure, process and consume food in hygienic conditions); *safe and nutritious* food (contributes to a healthy diet).

[3] Declaration of the 2009 World Summit on Food Security.

11. A recent SPC report[4] on the current food security situation in the Pacific drew the following conclusions.

- Per capita food production has been falling in nearly all Pacific countries over the past two decades, and crop yields have often remained stagnant or fallen.
- Fisheries production across the region has been increasing, but nearly all of this increase is from offshore tuna fisheries. Production for local consumption from coastal fisheries has not improved and the potential for increase is limited.
- Pacific diets are changing rapidly with traditional foods being replaced by imported foods (most notably white rice, flour and processed or tinned foods), especially in urban areas. Dependence on imported foods has increased for nearly all countries.
- Increases in international food prices, combined with stagnant or falling per capita incomes, have placed considerable strain on household budgets and PICT trade balances.
- The trend to increased dependency on highly processed foods has led to a significant rise in the incidence of non-communicable disease (e.g. diabetes and cardiovascular disease) and placed a high burden on health budgets.
- The region's populations generally receive adequate nutrition but pockets of under-nutrition remain, especially in Papua New Guinea. Deficiencies in iron, iodine and vitamin A are also widespread.
- Traditional sustainable resource management practices have declined in importance, resulting in excessive exploitation of some wild food stocks, increased environmental degradation and soil loss, and reduced agro-biodiversity. These trends undermine ecosystem productivity and increases the vulnerability of food supply systems to external shocks, such as climate change.
- Food vulnerability index levels are high to very high for the smaller PICTs (especially atoll countries) but generally low to moderate for the larger island countries.

12. Like food security, water security is essential for the sustenance of life. Sources of fresh water are affected by climatic events. Management of water supply systems through conservation and management of watersheds and groundwater resources, and collection and storage of rainwater are affected by legislation, policies and management systems put in place by each PICT to ensure continuous supplies of water for their populations and for national development initiatives.

13. The recent declaration of an emergency in Tuvalu due to drought conditions together with similar emerging conditions in other parts of the region, notably Tokelau and Cook Islands, emphasise the urgent need to improve secure access to safe drinking water supplies.

14. In July 2010 the United Nations declared access to safe and secure water and sanitation a basic human right. The period 2006−2009 has seen increased support for, and intervention in the region's water and sanitation sector. This unprecedented growth has been guided largely by a number of strategic policy instruments developed by the region over the last eight years through a broad series of coordinated and comprehensive consultations. They include the Pacific Wastewater Policy and Wastewater Framework for Action (2001); the Pacific Regional Action Plan on Sustainable Water Management (2002) and the Pacific Framework for Action on Drinking Water Quality and Health (2005). In 2006, water, sanitation and hygiene challenges facing the region were incorporated in the Pacific Plan.

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[4] *Food security in the Pacific and East Timor and its vulnerability to climate change*. Report prepared by SPC for the Australian Department of Climate Change and Energy Efficiency, September, 2011.

15. A 'Pacific Water Partnership on Sustainable Water Management' has been established, which will provide a more coordinated and strategic approach to water and sanitation activities in the region. The partnership enables PICTs and development partners to identify successful previous activities and therefore improve the sustainability of subsequent interventions; reduce and prevent duplication of activities; link country requirements to development programmes (and vice versa); and augment existing and proposed activities nationally and regionally. The partnership is coordinated through the water and sanitation programme of the SOPAC division of SPC. A new interactive information portal has been established which will assist PICTs, the Pacific Water Partnership and SOPAC to share information and news on sustainable water management (www.pacificwater.org).

16. Overall, it is clear that the region already faces significant food and water security issues, irrespective of the impacts of climate change. Addressing these existing constraints and trends will be essential to reducing the vulnerability of PICTs to climate change.

## CLIMATE CHANGE AND FOOD SECURITY

17. Climate change can adversely impact on food security throughout the entire food supply chain. Managing the inherent risks must be tackled effectively on many fronts. In particular, it is important to adopt a comprehensive approach to identifying critical threats and risks that extend well beyond direct on-farm and marine ecosystem impacts. This approach includes understanding and responding to climate-related risks to critical infrastructure (roads, ports, energy supply systems, shipping, storage/processing facilities, and communication), human settlements (such as urbanisation and land use patterns and zoning), health, and income-earning activities that enable people to produce and purchase food.

### *Primary food production impacts*

18. At the *primary food production level*, changes to the amount and distribution of rainfall, increases in the frequency and intensity of extreme weather events (floods, droughts, heat waves, storm surge and winds), increases in average and maximum temperatures, and changes in ocean temperatures and chemistry (acidification), are likely to have profound effects on the productivity of ecosystems. Such impacts are expected to adversely affect agricultural, marine and freshwater food production potential.

19. Warmer temperatures can result in increased plant growth and enhance freshwater fisheries productivity in areas where they are presently constrained by low temperatures. However, for most PICTs, temperature-related (cold limited) production constraints are generally not common, except at higher elevations on the larger islands. On the other hand, many important crops are sensitive to either higher average temperatures (for example, cocoa and coffee) or to periods of above average maximum temperatures (extreme temperature events). This is especially the case at critical flowering and fruiting times, when substantial declines in yield and product quality can occur. Elevated temperatures can also adversely impact the health and productivity of poultry and other livestock. Increased carbon dioxide concentrations can be beneficial for plant growth (biomass production), but can also have adverse effects on the nutritional value of some foods and pastures. Of particular concern is the fact that some plants generate toxins as carbon dioxide concentrations rise (for example, cyanide levels in cassava tend to rise in line with carbon dioxide concentrations and with drought conditions).

20. Reduced rainfall and the increased frequency and intensity of drought events, as is projected for the southwest Pacific, will adversely affect crop yields and livestock productivity (through reduced pasture quality and availability). Increased rainfall intensity and flood events can cause significant loss or spoilage of crops and higher rates of soil nutrient loss and soil erosion. Changes in rainfall patterns and

inundation of low-lying areas can also result in increased salinity and reduced recharge rates for coastal aquifers and atoll water lenses, reducing crop productivity in affected areas. In addition, higher average and extreme wind speeds (such as those generated by more intense cyclones) have damaging effects on crops and livestock.

21. The flow-on effects of changes in climatic conditions also affect production of food by many indirect pathways. Such effects include altered pest and disease regimes; changes in the composition of agro-biodiversity (such as the prevalence of essential pollinators); altered optimal planting times for crops; lifecycle mismatches between species important to cropping systems (for example, insect predator species interrelationships); conditions more conducive to the spread of weeds, fungal diseases, rodents and invasive species; and increases in the incidence of ciguatera fish poisoning in coastal waters. Indeed, changes in the fruiting and optimal planting times of several important Pacific crops have already been observed.

22. While the global scientific knowledge base of the likely impacts of climate change on agriculture has grown substantially in recent years, the understanding of these impacts on Pacific Island agricultural systems is much more limited. Considerable uncertainty remains about the impacts on terrestrial food production, how different crops and livestock species/varieties are likely to respond to the projected changes in local climatic conditions, and how disease and pest regimes will change. More detailed research and analysis of the magnitude and timing of impacts are required to enable PICTs to identify the most appropriate response options (such as changing crop varieties and altering resource and on-farm management regimes). These gaps in knowledge need to be urgently addressed so that PICTs are better placed to identify and quantify the climate risks to agriculture, and the adaptation response options available to reduce these risks.

23. Important work has already commenced on several fronts, For example, the 'Climate Ready Collection of Pacific Crops' at SPC's Centre for Pacific Crops and Trees (CePaCT) provides a range of traditional Pacific crop varieties with climate resilient traits. Progress has also been made with collection of baseline agro-biodiversity data and demonstration of a range of beneficial crop and pest management interventions at the farm level. For example, the importance of crop improvement through breeding has been well demonstrated by Samoa's Taro Improvement Programme, where excellent new taro varieties resistant to taro leaf blight have been generated. Nevertheless, the scale and breadth of knowledge building, on-farm demonstration, and widespread dissemination and uptake of successful approaches across the region are still well below that required to adequately cope with the emerging risks posed by climate change.

24. Our understanding of potential changes in the fisheries and aquaculture sector is much better as a result of the recent assessments made by SPC of the vulnerability of oceanic, coastal and freshwater fisheries, and aquaculture production.[5] These assessments indicate that coastal fisheries catches could fall by 20% by 2050 and as much as 50% by 2100. Changes of this magnitude, when combined with growing populations, will have significant repercussions for those people who depend heavily on coastal subsistence fisheries for dietary protein (coastal fisheries are the single largest source of protein for more than half of PICTs).[6] Increased sea surface temperatures and accelerated ocean acidification are also expected to adversely affect coral reef ecosystems, with consequent effects on tourism and foreign exchange earnings.

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[5] Bell JD, Johnson JE and Hobday AJ (editors). (2011) *Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change.* Secretariat of the Pacific Community, Noumea, New Caledonia.
[6] Op cit.

25. But not all the projected effects of climate change are negative. Sustainable catches of tuna could increase by up to ~20% across the region by 2035, but then decline by 5−10% by 2100. These gains will not be evenly distributed because there is projected to be a general eastward movement of tuna stocks, resulting in increased catches in central and eastern Pacific fisheries and decreased catches in the western Pacific. Warmer and wetter conditions are also likely to benefit freshwater fisheries production, mainly in Papua New Guinea but also elsewhere in Melanesia.

26. It is evident that there are likely to be both gains and losses in the fisheries sector and it will be important that PICTs capitalise on the opportunities expected to arise from climate change. A particularly important adaptation is to increase domestic consumption of tuna. This simple and practical adaptation promises to provide fish for rapidly growing populations and to fill future gaps between the fish available from degrading coral reefs and the fish needed for food security.

***Postharvest production impacts***

27. Climate change is likely to have important implications for the *postharvest production stages* of the food supply chain, which are essential to ensuring food security. For many crops, prolonged time in the field as a result of weather conditions will result in an increase in storage pests and diseases, affecting yield and quality. Damage to value-added agricultural and fish processing operations and food storage facilities, through impacts such as increased intensity of extreme weather events (storms, floods and high winds) and droughts (lack of water and reduced hydro energy supplies) could adversely affect the industrial side of food production. This would not only result in production losses but also impact on employment and foreign exchange earnings (with subsequent flow-on effects on the ability to purchase food). Increased risks of extreme floods and more intense cyclones will have important implications for critical transport infrastructure, which is essential to the food supply chain and crucial in ensuring access for emergency food relief operations. In the longer term, sea-level rise and coastal erosion could impact on port infrastructure and shipping services. Managing the climate risks to infrastructure must be an important part of climate change and food security response strategies across the region.

28. Higher temperature and humidity levels are expected to increase food spoilage by reducing the shelf-life of many fresh and staple foods, and lead to more frequent cases of food poisoning due to the elevated risk of bacterial contamination. The resulting food waste and health implications (through increased health expenditure and lost worker productivity) will also adversely affect food security and lead to economic losses. Increased use of refrigeration, and other improved food storage technologies, could be employed to manage these risks but they entail high capital investment and energy costs. Other indirect health effects, for example the impacts of climate change on the geographic distribution of malaria and dengue fever, and potential increases in the incidence of water-borne diseases and other pathogens affected by changing climatic conditions, could also impact on food security. These impacts are expected to occur through losses in productive person days in the primary production sectors and reduced household labour available for food preparation.

29. The examples of potential impacts mentioned above indicate the broader implications of climate change for food security. To effectively manage the full suite of climate risks to food security will require a multi-faceted, cross sectoral approach that extends well beyond the farm.

**IDENTIFYING AND MANAGING CLIMATE CHANGE RISKS TO FOOD SECURITY**

30. Although some climate change impacts have already emerged, many of the projected impacts are yet to occur, and some may not actually eventuate. Much depends on the success of global efforts to limit the increase in atmospheric greenhouse gas concentrations, how ecosystems respond to the climate change

that does occur, and the success of response options put in place by PICTs to manage and reduce climate change related risk. Some of the potential risks are actually within our power to manage and influence. In particular, much can be done now to reduce and manage the potential impacts of climate change on food security in the Pacific Islands region.

31. Central to effective management of these impacts is the development and implementation of a well-informed risk management approach. Reducing scientific uncertainty on how the climate will change, filling knowledge gaps on impacts, and identifying, implementing and evaluating potential response measures, will be critical to this process. In assessing risk, decision makers need to carefully consider the timing and potential magnitude of climate change impacts when developing response options. Some impacts will require an immediate response action, while others may take many decades to emerge. This will need to be reflected in the priority attached to implementing different risk management options. Each PICT will face a different set of issues, requiring a different set of responses. For example, the risks of salinisation and land loss through sea-level rise are greater for low-lying areas such as atoll islands than for larger high islands.

32. The region must continue to invest in building its understanding and information base on climate change impacts on food security, to monitor and observe changes on agriculture, fisheries and forestry, and assess the relative costs and merits of different response options. In particular, there is a need to identify and define the climate change related risks to food security 'downstream' from farming and fishing activities more precisely, including risks to critical infrastructure, storage and processing facilities, and services such as energy and water.

**THE REGION'S RESPONSE**

33. Effective management of climate change related risk will involve a long-term, on-going, commitment by PICTs and partners. Approaches need to remain dynamic and flexible to take into account new information that comes to hand on the impacts, and their relative timing and importance. These approaches must also be informed by experience gained in implementing different response options. Well-informed, evidence-based decision making that takes into account the full costs and benefits of particular response options will enable PICTs to make the best use of limited resources to meet the sustainable development challenges they face. Essentially, available resources must be used wisely and target areas that will yield maximum dividends. While a particular response option might clearly work well from a technical point of view, it might not be the wisest investment in terms of social or economic dividends. There will always be trade-offs. For example, faced with the choice of building a sea wall to protect 10 hectares of farmland, or using the same resources to build two new schools and a health clinic, which should one choose and why?

34. Decision makers will face many such choices in the years ahead and it is important that their decisions are based on a sound understanding of the risks and relative costs and benefits. In the presence of uncertainty, the most sensible risk management approach is to give priority to measures that will yield positive benefits irrespective of climate change – often referred to as a 'no regrets' approach. The same measures could, for example, address existing sustainable development risks and constraints and also increase the resilience of the food supply chain to climate change. There is much to be done in the region in this regard because many existing human activities and natural resource management approaches are unsustainable and actually increase our vulnerability to climate change risks.

35. Specific actions that can be implemented along the entire food chain to help strengthen national and regional food security and enable countries to develop more productive, climate resilient and sustainable agricultural and fisheries systems are listed below.

*Primary food production systems*

- Revegetate catchments to protect/enhance coastal fish habitats (e.g. coral reefs, mangroves and seagrasses), reduce or cease deforestation, implement measures to reduce soil loss and increase organic carbon in soils, and promote farm systems that contribute to increased agro-biodiversity (e.g. integrated agro-forestry systems).
- Increase the availability, exchange and utilisation of climate resilient Pacific crop genetic material, and develop capacity at the national and community level in crop improvement.
- Establish sustainable planting material supply chains for both seed and vegetatively propagated crops at the regional, national and community level to ensure that availability and access is not constrained by climatic conditions.
- Adopt improved livestock management and husbandry practices and develop an improved understanding of the potential impacts of climate change on livestock species resilience and pasture management techniques.
- Identify, introduce and develop capacity in appropriate crop management techniques to reduce food production losses and enhance/preserve beneficial insect predator species.
- Adopt sustainable resource use management regimes, including traditional approaches, as a means of enhancing ecosystem resilience to external shocks.
- Increase farmers' access to cost-effective sustainable irrigation and water efficiency technologies that reduce the risks associated with climate change induced variations in water availability.
- Scale-up new fishing technologies (e.g. near shore fish aggregation devices) to facilitate increased access to tuna resources by coastal fishing communities to supplement food supplies and make up for declines in coastal fisheries catches in the longer term.
- Invest in improving our understanding of potential changes in the distribution of tuna resources and identify possible future changes to recommended regional harvests to ensure maximum sustainable yields.
- Evaluate the potential of aquaculture and enhanced freshwater fisheries as a supplementary food supply source and climate risk minimisation strategy, particularly in inland areas.
- Implement measures to reduce pollution, run-off and wastes in urban areas, which are detrimental to ecosystem productivity.
- Expand the introduction of improved coral reef conservation management regimes to enhance the resilience of these important coastal fish habitats to climate shocks.
- Evaluate and promote the contribution of urban and peri-urban food production systems to enhancing food security and nutrition.

*Postharvest stages*

- Increase our understanding of the climate change related vulnerabilities of food processing and storage facilities, and support the implementation of appropriate response strategies (for example, improved dry stores and refrigeration, security of access to water and energy).
- Assess the climate risks to essential food chain transport links and adopt appropriate measures to build climate resilience.
- Identify and address political, cultural and social constraints to enhancing food security, including those related to land tenure, education and governance that influence people's livelihoods and adaptive capacity.
- Identify and implement measures to assist countries to reduce rates of population growth and ease population induced pressures that impact on food security.

- Improve monitoring and assessment of consumption and nutrition trends to enable the development of targeted programmes to promote nutritious and balanced diets combined with better hygiene and food utilisation/storage practices.
- Improve land use management and zoning to build resilience to extreme weather events, especially flooding and storm surges in exposed areas.
- Strengthen emergency food relief and support systems at the national and regional level to reduce the risks and hardship associated with extreme weather events, including the capability for distributing crop materials and seeds to aid rapid post-disaster recovery.
- Develop an improved understanding of the impacts of climate change on important export cash crops (sugar, copra, coffee, cocoa and others), including attention to value-adding in food production systems and the resilience of vital infrastructure such as ports, roads and storage facilities.
- Identify and implement fiscal policies and incentives that promote sustainable climate resilient food production and processing approaches.
- Assist coastal communities to develop effective preservation methods (for example, smoking and drying) to extend the shelf life of tuna when good catches are made around inshore fish aggregating devices.
- Provide incentives for enterprises to invest in storage and distribution systems to ensure that small-sized tuna landed in major ports by industrial fleets can be used to provide low-cost fish for urban populations.

36. Many of the measures listed above would help build resilience to current and future climate related risk, contribute to national and regional food security, and improve our understanding of the timing, magnitude and potential costs of future climate change impacts. Building knowledge and capacity at the national and regional level to manage climate change risks to food security is critical and will require ongoing commitment from all key stakeholders and their development partners.

37. The region is already implementing a range of actions to address climate related risks to food security. The 2010 Framework for Action on Food Security in the Pacific offers a broad framework for improved coordination and harmonisation of food security measures. The Food Secure Pacific Working Group has been established to coordinate and develop the framework for action. The aim of the group's climate change and food security activities is to 'promote and strengthen inter-sectoral collaboration and link community resilience and coping mechanisms to protect against adverse effects of climate change natural disasters'. Pacific leaders have also endorsed the Pacific Islands Framework for Action on Climate Change (PIFACC) 2006–2015 and the Pacific Disaster Risk Reduction and Disaster Reduction Framework 2005–2015 (commonly referred to as the Regional Framework for Action or RFA) which, like the PIFACC, provides guidance to PICTs on measures to reduce the risks posed by both climate-related and other natural hazards.

38. It is important that food security related measures become an integral component of national climate change response strategies and plans. Although food security is highlighted in many national climate change adaptation plans and strategies, on-the-ground implementation and capacity building have yet to feature significantly in climate change responses across the region. Much more needs to be done to integrate and mainstream climate change considerations into agricultural and fisheries ministries' strategies and sector development plans. Considerable additional resources are now becoming available to PICTs through a range of national and regional initiatives being supported by regional organisations and development partners. These include the SPREP/UNDP PACC project; SPC/GIZ programme; SPC/European Union GCCA-SIS climate change programme for small island states; Australian International Climate Change Adaptation Initiative; SPC/USAID climate change project; USP/Pacific Europe Network for Science and Technology; and several other multilateral (Asian Development Bank,

World Bank) support activities. FAO has also planned a large six-year Food Security and Sustainable Livelihoods Programme in Pacific Island countries. All these programmes have components that target climate change and food security. It is important that member PICTs access and utilise the resources and technical expertise from these programmes to build resilience across the food supply chain. It is also crucial to improve coordination at both the regional and national level to ensure maximum benefits to members.

**CONCLUSION**

39. So what are the lessons to be learnt in relation to the threats of climate change to food and water security?

    i. Firstly, and simply we cannot be complacent.

    ii. Secondly, PICTs are and will continue to be vulnerable across the full development spectrum and climate change will only add to this situation. Understanding today's realities will help PICTs position strategically to face tomorrow's challenges.

    iii. Thirdly, to be prepared, PICTs must first understand the risks and then address the vulnerabilities they are exposed to.

    iv. Fourthly, to address these risks and assist communities to determine levels of acceptable risk, PICTs need timely and accurate data and information supported by information databases across all sectors, not only in the context of food and water security.

    v. Finally, people must work together – and herein lies one of the key values of the 'new SPC'. SPC's coverage of many of the sectors likely to be impacted by climate change events mean that it can work to support members in making a coordinated response to climate change related challenges at national level.

40. The projected effects of climate change pose many challenges to maintaining food security and sustainable livelihoods in Pacific Island countries and territories over coming decades. Given the importance of agriculture and fisheries to the region, and the high susceptibility of these activities to the impacts of climate variability and climate change, reducing the risks to food security must become a central focus of national and regional strategies. To effectively manage these risks will require a balanced multi-sector approach that extends well beyond optimising harvests. Considerable additional effort is needed to reduce climate change uncertainty, fill knowledge gaps and evaluate potential adaptation initiatives. Risk management interventions must be guided by well-informed, evidence-based decision making. Initially, preference should be given to targeting and implementing 'no-regret' measures that address existing sustainable development constraints and vulnerabilities while building longer-term resilience to the impacts of climate change.

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25 October 2011