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*"Implementing Sustainable Water Resources and Wastewater
Management in Pacific Island Countries"*

Rarotonga Island, Cook Islands, 25th – 30th July 2011

***CLIMATE VARIABILITY & CLIMATE CHANGE ISSUES AFFECTING THE ACHIEVEMENT OF
WATER & SANITATION OUTCOMES IN PACIFIC ISLAND COUNTRIES***

Summary: Pacific Island Countries are facing significant challenges in providing safe water and sanitation services, meeting poverty reduction targets such as the Millennium Development Goals, and safeguarding the basic human rights of their citizens. Climate variability, and the inherent vulnerability of Pacific Islands to climatic extremes, compound and exacerbate these challenges. The emerging impacts of climate change add a new dimension to the water and sanitation challenge: threatening resources, increasing uncertainties, and in many cases intensifying the extremes of existing climate variability. As these impacts will be experienced largely through changes in climate variability, the management of water resources for variability and extremes will be fundamental to successful adaptation. To be effective, adaptation responses to climate change must also acknowledge and address the underlying pressures and constraints that limit the Pacific's ability to meet today's serious water and sanitation challenges. By strengthening the capacity of countries and communities to better deal with current water and sanitation challenges, adaptation strategies can improve their ability to respond to current climate variability and adapt to future climate change.

*“Water is the primary medium through which climate change influences peoples’ livelihoods and wellbeing, and adaptation to climate change impacts must include better water management” – **UN Water***

*“Water needs to be placed at the heart of global policy responses to climate change” – **Water and Climate Coalition***

*“If you care about climate or if you care about poverty, you simply must make water a central part of your thinking. Water needs to move from the pump room to the cabinet room” – **The World Bank***

*“Many proposals and suggestions to improve our water situation have crossed my desk in recent times. Very few appear to have made the link between climate change and adaptation. This concerns me” – **President of the Republic of the Marshall Islands***

*“Only by improving the way we use and manage our water today can we as Pacific Island Communities be prepared to respond to the climate challenges of tomorrow” – **SPC-SOPAC***

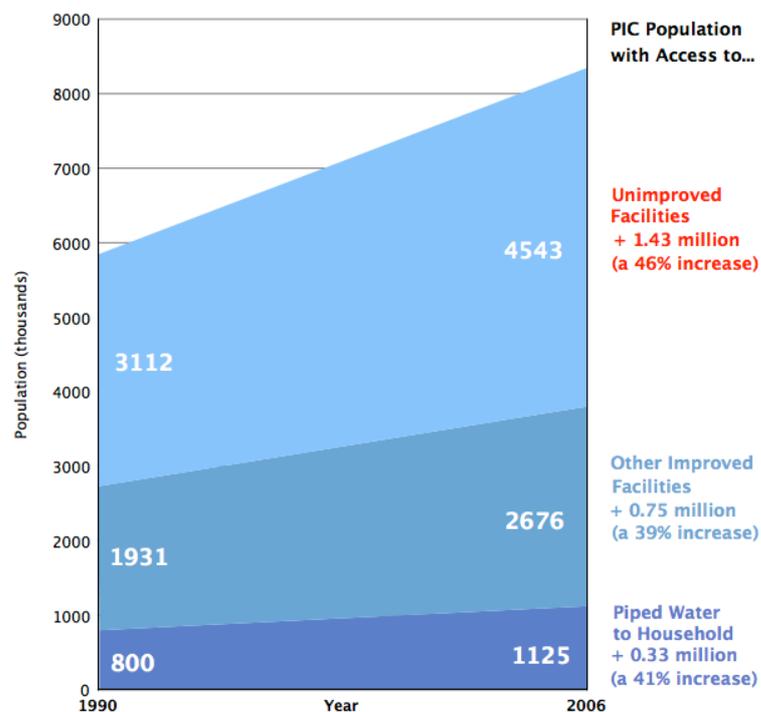
Climate Variability & Climate Change Issues Affecting the Achievement of Water and Sanitation Outcomes in Pacific Island Countries

1 UNDERLYING PRESSURES AND CHALLENGES

Despite significant positive work over the past decades, mounting social, economic and environmental pressures mean that most Pacific Island Countries (PICs) remain a considerable way from securing adequate fresh water and sanitation for their citizens. These countries struggle against the pressures of growing populations, limited and ephemeral water resources, vast distances, and incomplete and eroding infrastructure. Poor institutional capacity, thinly spread human resources, and inadequate and irregular funding sources all limit countries' ability to effectively respond.

Water supply statistics give some indication of the dynamic nature of these pressures. Despite a significant 41% increase in household access to piped drinking water between 1990 and 2006, the same period also saw a 46% increase in the number of Pacific Islanders with no access to any kind of improved drinking water facility. Clearly, existing efforts to achieve water security are not meeting the current challenges of a dynamic society and expanding population.

Figure 1: Trends in service levels for drinking water in PICs, 1990 to 2006 (data from WHO & SOPAC, 2008)



The human and economic impacts of inadequate management of water resources, water supply and sanitation are profound. Across the Pacific, the rate of diarrhoeal disease is higher than the world average, and four times greater than that experienced in Australia and New Zealand. Despite Government and community efforts in every Pacific Island Country, the region as a whole is unlikely to meet the Millennium Development Goal (MDG) target of halving the number of people without sustainable access to safe drinking water and basic sanitation by 2015.

Facing these base challenges, Pacific Island Governments are in danger of failing to uphold what the United Nations recently declared as a fundamental human right – the right of all people to safe and clean drinking water and sanitation.

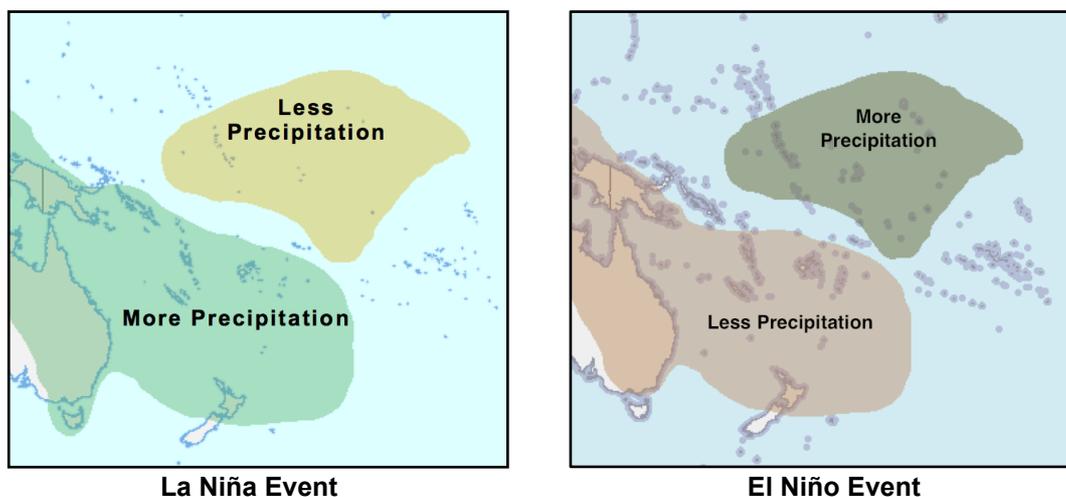
2. CLIMATE VARIABILITY

Population growth and social and economic pressures are of course not the only challenges to the provision of safe drinking water and sanitation in the Pacific region. For thousands of years, Pacific Island communities have been living in and adapting to dynamic and often difficult climatic environments. Island environments are inherently vulnerable to the extremes of climate variability, and this vulnerability compelled Pacific Island communities over time to build a level of resilience to extreme weather events. However today, population growth and social changes have created a situation where many communities are far less prepared for the floods, extended droughts and storms that remain an ongoing feature of the region. In this regard, the uncertainty and extremes of climate variability compound and exacerbate the social and economic challenges faced by Pacific Island communities.

Three large-scale features have a particular influence on the climate variability of Pacific Islands Countries: the *South Pacific Convergence Zone*, the *Inter-tropical Convergence Zone* and the *West Pacific Monsoon*. These features are caused by winds converging over warm water, and drive the seasonal variations in rainfall experienced by Pacific Island Countries, including wet and dry seasons. Together, they influence rainfall, winds, tropical cyclones, ocean currents and other aspects of the weather and climate.

While these features drive the wet and dry seasons experienced annually in most Pacific Island Countries, the single greatest factor affecting climate variability from year to year is the El Niño/La Niña Southern Oscillation, or ENSO. This cycle of warming and cooling of sea surface temperatures has a profound effect on the hydrological cycle of Pacific Island Countries, driving periods of drought and elevated rainfall across the Pacific region and beyond.

Figure 2: Projected Impacts of La Niña and El Niño Events on Precipitation in the Pacific during the months from June to August (adapted from UN OCHA, 2010)



The communities perhaps most affected by ENSO events are those living on small islands in the Northern and Central Pacific. Prolonged drought in countries such as the Marshall Islands, Nauru, Kiribati and Tuvalu, where fresh water resources are thin at best, cause considerable impacts on communities including significant human health ramifications through the spread of water borne disease. However, the effects of the ENSO cycle are not restricted to drought. It is also a driver of periods of elevated rainfall and rainfall intensity, and has a role in both suppressing and stimulating the propagation and severity of tropical cyclones - all of which have significant impacts on the people and economies of the Pacific.

Our understanding of ENSO and its impact on Pacific Island Countries has improved considerably over the past years, however this improvement has not translated to a corresponding increase in community resilience. Despite some progress on this issue, the preparation for and management of floods and prolonged drought remains relatively poor. As a result, Pacific Island communities are

exposed to levels of risk leading to human and economic impacts that would be considered unacceptable in many other countries.

As Pacific Island communities continue to evolve – through social, economic and environmental changes - their vulnerability to the impacts of climate variability also changes. Facing these changes, the challenge will be to draw on the lessons of the past and present in order to forge a new and practical resilience to climate impacts. As the impacts of climate variability are fundamentally linked to water, effective water resources management needs to be at the centre of this response.

Figure 3 ENSO events are a major driver of climate variability, driving periods of prolonged drought and elevated rainfall (illustrated here are drought in the Marshall Islands and floods in Fiji).



3. CLIMATE CHANGE

The emerging impacts of climate change add a new dimension to the water and sanitation challenge: threatening resources, increasing uncertainties, and in many cases intensifying the extremes of existing climate variability. Under International Panel on Climate Change (IPCC) emissions scenarios, higher temperatures are projected to affect all aspects of the hydrological cycle across the globe. In the Pacific, impacts are predicted to vary significantly across the region. Some sub-regions are projected to become wetter and some drier, while all are expected to experience an increase in rainfall intensity and seasonal variability.

Existing records show that an increase in average temperatures has already occurred throughout the region during the second half of the 20th century, accompanied by a trend towards more frequent hot days and nights and fewer cool days and nights. Changes in rainfall over recent decades are more varied, in which some areas of the Pacific have experienced increased rainfall and in other areas rainfall has decreased. However, these recent regional trends are small compared to the year-to-year variability associated with ENSO events.

Recent changes in sea levels have also varied across the region, being strongly influenced by ENSO patterns. Globally, satellite data indicate average sea level rose at a rate of about 3.2 mm/year since 1993. The IPCC projects a rise of between 18 to 80 cm by 2100, and potentially more under some scenarios, with the most significant impacts likely to occur in the latter half of the century.

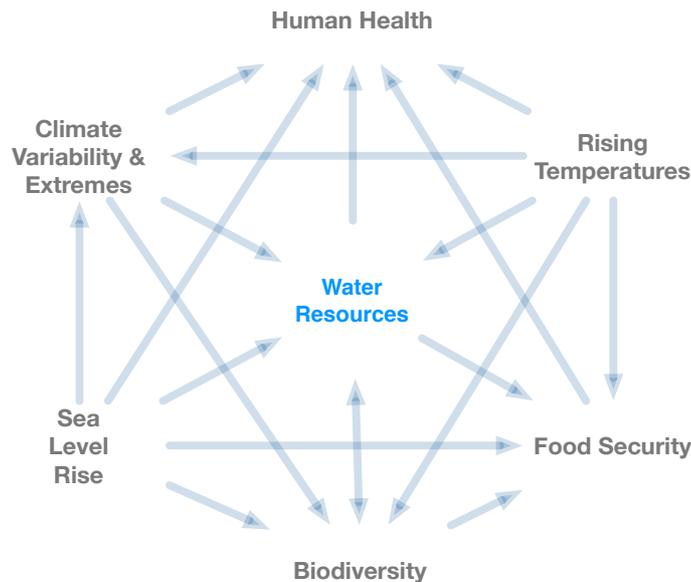
There is still much more work to do in translating global climate change projections to local impacts, and improving the collection and use of observational records is a crucial step to understanding the nature and impacts of climate change on individual Pacific Island Countries. However, it is broadly accepted that the key climate challenges facing Pacific Island communities will likely be driven by the following phenomena:

1. **climate variability** (through both variations in the ENSO pattern and in seasonality of annual rainfall);
2. **climate extremes** (particularly through storms and ENSO-driven drought);

3. **temperature rise** (impacting upon biodiversity, water resources and crop yields); and
4. **sea level rise** (contributing to the salinisation of water resources and an amplification of the impacts of storm surges).

These changes are likely to have a profound impact on biodiversity, food security and human health, and water is the primary medium through which these impacts are predicted to take hold. For this reason, the effective management of fresh water resources and sanitation is fundamental to the capacity of Pacific Island communities to adapt to the impacts of climate change.

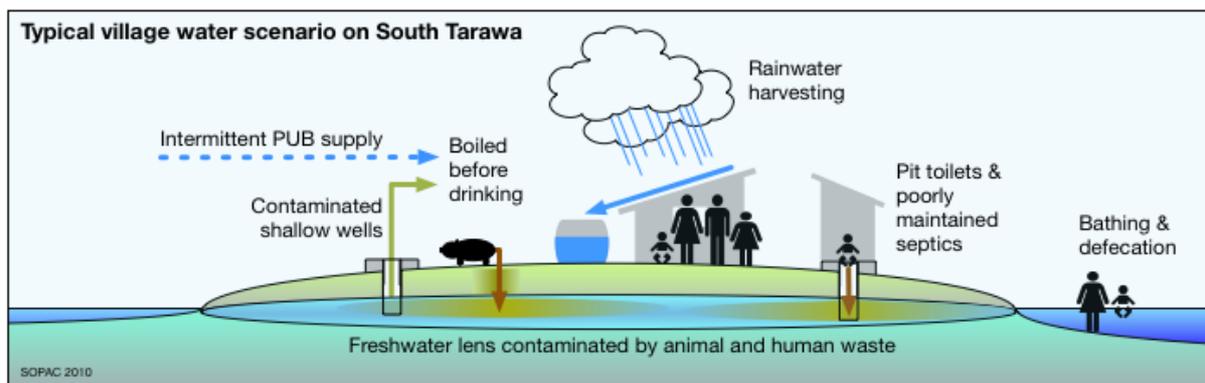
Figure 4 Some Key Drivers and Impacts of Climate Change in Pacific Island Countries and their Relationship to Water Resources



4. MOUNTING PRESSURES

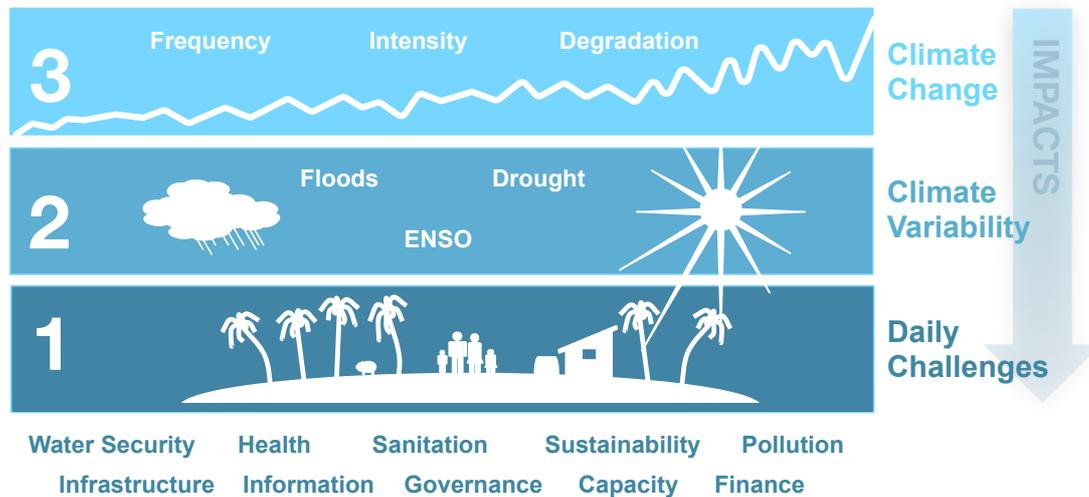
The agency UN-Water advises that water resources and how they are managed impact almost all aspects of society and the economy, and that - even under existing climate variability - water stress is high in most countries. This is certainly true for many Pacific Island Countries, and particularly so for atoll states. Without improved water resources management, progress towards poverty reduction targets, the Millennium Development Goals, and sustainable development in all its economic, social and environmental dimensions, will be jeopardised. The emerging impacts of climate change add even more urgency for action.

Figure 5 The management of water resources, water supply and sanitation in PICs impacts almost all aspects of society, and is in turn impacted upon by climate variability and change.



In this regard, the effects of climate variability and climate change on the fight to secure safe drinking water and sanitation can be viewed as mounting pressures on what is already a difficult and dynamic situation for Pacific Island Countries.

Figure 5 Mounting Pressures of Climate Variability & Climate Change on Existing Water Challenges



5. THE NEED FOR AN INFORMED, RISK-BASED RESPONSE

Managing the water-related impacts of climate variability and climate change requires a risk-based approach, and adaptation to these impacts requires integration of effective risk reduction strategies across all sectors. But how can water managers effectively respond to future climate scenarios that are yet to be fully understood? In the *Pacific Regional Action Plan on Sustainable Water Management* (the *Pacific RAP*), Pacific Island Countries identified the following key messages for addressing vulnerability to climate variability and climate change:

- (a) Strengthen the capacity of small island countries to conduct **water resources assessment and monitoring** as a key component of sustainable water resources management;
- (b) Develop capacity to enhance the **application of climate information** to cope with climate variability and change; and
- (c) Change the paradigm for dealing with island vulnerability from disaster response to **hazard assessment and risk management**, particularly through Integrated Water Resource Management (IWRM).

These three actions remain critical for dealing with the water-related impacts of climate variability and climate change in the Pacific, and are expanded upon below.

(a) **Strengthen capacity to monitor and assess water resources**

Improving Pacific Island Countries' collection and use of observational records is a crucial step to understanding the limits and pressures on water resources, as well as the nature and impacts of climate variability and climate change. Changes in rainfall patterns, temperatures, and the frequency and severity of floods and droughts can all impact on the integrity of Pacific Island water supplies, and affect how water supply systems and water and sanitation infrastructure need to be designed and managed into the future.

Effective adaptation to climate change requires accurate and reliable data sets to allow the analysis of trends, enable the calibration of models, and to inform long-term strategies and policy responses. However, within many Pacific Island governments there are few resources and limited capacity to

assemble and interpret even the most basic information on rainfall, groundwater and river flows essential to the daily management of water resources.

The scarcity and underutilisation of reliable water and climate data within the Pacific has been a recognised problem for some time. From 2006 SOPAC Division has, through the World Meteorological Organisation's Hydrological Cycle Observing System (HYCOS), supported Pacific island Countries in the establishment and operation of a limited number of river flow, groundwater and rainfall gauging stations and in improving the quality, security and accessibility of data. There is now an urgent need to capitalise on this work by effectively linking the collection of key water and climate data to the most pressing management issues, and establishing practical management tools and climate responses that utilise these data to the fullest extent.

(b) Enhance application of climate information specific to Pacific Island Countries

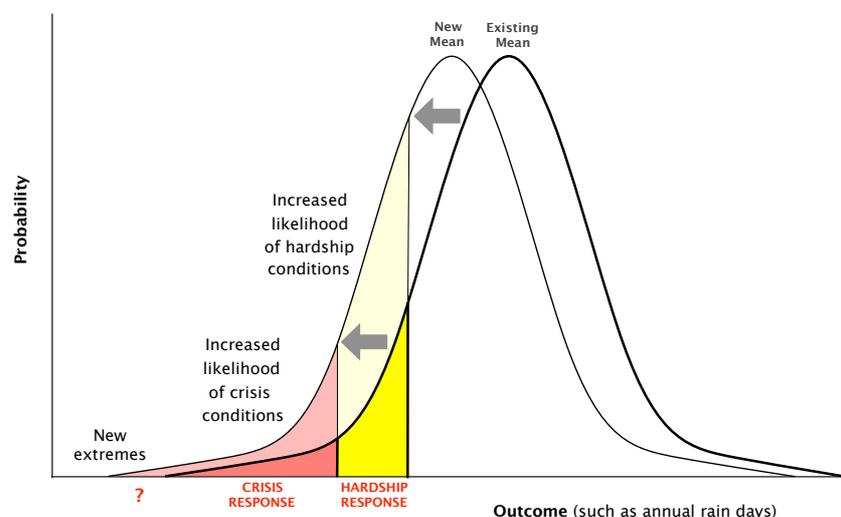
Countries urgently need improved information about how their future climates may evolve, as this is critical to assess their vulnerability to climate change and make informed decisions about adaptation and development planning. While there is still much more work to do in translating global climate change projections to local impacts, initiatives such as the *Pacific Climate Change Science Programme* (PCCSP) are working to improve regional and country-specific projections of likely changes to average and extreme weather conditions, including tropical cyclones.

This information, generated primarily through the downscaling of a range of (very large scale) global climate models, is expected to become available by the end of 2011. It is expected to be a useful step in improving the design of adaptation responses, but will not alter the critical need for accurate local information on the changes experienced on the ground in Pacific Island Countries. In this regard, improved collection, analysis and communication of basic water resources data such as rainfall, groundwater levels and stream flow is still needed in order to allow countries to better understand local conditions and design more appropriate responses to climate variability. In this regard, water managers will need to build closer relationships with their national meteorological offices in order to make clear the climate information needs of the sector, in order to ensure that the right data are collected analysed and communicated to decision makers.

(c) Adopt a risk-based approach

The impacts of climate change are not only associated with changes in the size of extreme events, but – importantly – also the frequency. Many of the impacts of future climate change are already being experienced by Pacific Island Countries through existing climate phenomena, and shifts in climatic conditions will inevitably cause a change in the likelihood and duration of these phenomena.

Figure 6 Example of a shift in a normally distributed climate outcome (such as rainfall occurrence) increasing the likelihood of hardship & crisis conditions



In this regard, lessons on how to respond to future climate change can be found in the successes and failures of responses to existing climate phenomena that cause hardship and crises - such as floods, storms and drought. In fact, the resilience of Pacific Island Countries to the water-related impacts of climate change can largely be measured by their resilience to existing climate variability. Across the region, risk-based approaches are needed to strengthen this resilience in order to minimise impacts on health, infrastructure and economies. The good news is that many of these approaches need not be prohibitively complex and expensive.

A risk-based approach seeks to more fully utilise climate and water observations to plan for and minimise the impacts of periods of hardship and crisis. For example, regional drought prediction is improving where it is possible to determine the likelihood of rain for the coming three months with increasing accuracy. Much of this information is readily collectable, and - if analysed and communicated in an appropriate way - can be of enormous value in assisting water managers and the community to plan for periods of depressed rainfall. By understanding and responding to climate risk, water resource managers can make a real difference to the resilience of Pacific communities to current climate variability and future climate change.

6. THE ROLE OF IWRM

Globally and across the region, there is a growing recognition of the role of Integrated Water Resources Management (IWRM) in adapting to climate change impacts. The *Global Water Partnership* has stated that the best approach to manage the impact of climate change on water is that guided by the philosophy and methodology of IWRM, and that the best way for countries to build the capacity to adapt to climate change will be to use IWRM tools to strengthen their ability to cope with today's climate variability.

These tools are not limited to technical assessments and interventions. Under-resourced and ineffective governance structures are a major barrier to the achievement of water and sanitation outcomes in the Pacific, and strengthening water governance at a community, national and regional level should be a cornerstone of efforts to adapt to climate change. Climate change adaptation efforts should include programmes that help build the capacity of the institutions and community organisations that will be at the forefront of the adaptation battle against climate impacts. By applying practical IWRM tools, governments and communities can get on with the job of fixing today's serious water and sanitation problems before they are compounded beyond repair.

Figure 6 Workshop session of Palau's *National Water Summit* held on World Water Day 2011. IWRM approaches to water and sanitation decision-making can enhance the resilience of Pacific Island Countries to the impacts of climate variability and climate change.



However, IWRM tools will be less useful if IWRM itself is treated as a sectoral concept, confined to the realm of water practitioners. UN-Water has warned that the sense of urgency for climate change adaptation, and the recognition of the centrality of water therein, have not yet permeated the political

world and are not systematically reflected in national plans or international investment portfolios for adaptation. IWRM responses must therefore be integrated in a meaningful way with other climate change and disaster risk responses throughout governments and across sectors. In this way, the principles of IWRM can drive the change that they aspire to deliver.

7. OPPORTUNITIES FOR ENGAGEMENT

This integration of water and sanitation issues with climate change adaptation efforts will not occur without the effective engagement of both Pacific leaders and those involved in and affected by local water and sanitation issues.

Climate change adaptation is beginning to constitute a significant portion of development assistance in the Pacific region, and the scale and reach of these investments are expected to increase dramatically in the coming years. Numerous opportunities will arise for the management of water and sanitation issues to be considered and addressed in climate adaptation programmes, and several of these will be explored during this RSC. But who will these programmes engage with, what issues will be considered, and how will they be addressed?

As is the case for IWRM, continuing efforts are needed on the part of donors, regional organisations and national governments to ensure that these programmes meaningfully engage with all relevant sectors and interests, including those best placed to speak for countries' critical water and sanitation issues.

Similarly, affected communities, champions of safe water and sanitation, and water managers need to ensure that their voices are heard in the discussion, in order that adaptation strategies fully consider and address water issues in a practical and sustainable way. As managers, practitioners and stakeholders in national water and sanitation issues, RSC members may wish to ask themselves:

- ***“How can I be effectively involved in the design and implementation of climate change adaptation responses?” and***
- ***“Once I am part of this process, what will my key messages be?”***

Much of the work of SPC and its SOPAC Division is directly concerned with strengthening the capacity of Pacific Island Countries to assess and respond to the risks of today's climate variability and future climate change, and the organisation is currently in the process of identifying ways to better engage with other national and regional adaptation efforts.

As a first step towards the updating of the *Pacific RAP*, SOPAC will be supporting countries in the development of *National Outlooks for Water, Sanitation and Climate*. The preparation of these forward-looking Outlooks will be designed to assist decision-making, help generate the national and regional responses necessary to drive future investment, and build the capacity of Pacific governments and communities to more effectively engage in the management of water, sanitation and relevant climate issues.

The expanded SPC/GIZ *Coping with Climate Change in the Pacific Island Region* (CCCPiR) programme aims to strengthen the capacities of member countries and regional organisations to cope with the impacts of climate change. A process of national consultations has recently concluded, and several countries have identified water as a key national focus for the programme. SPC will be seeking further input from water managers in these countries as national adaptation activities are developed.

SPC is also involved in collaborative work with member countries and the South Pacific Regional Environment Programme (SPREP) including the development of national policies with SPREP's PACC programme, and in the mainstreaming of climate and disaster risk responses through the development of Joint National Action Plans (JNAPs) on Climate Change Adaptation and Disaster Risk Management. These Plans combine national responses to disaster risk and climate change, and have so far been initiated in five countries including Tonga, the Marshall Islands, Cook Islands, Niue and Tuvalu.

8. CONCLUSION

Pacific Island Countries are already facing significant challenges in providing safe water and sanitation services, meeting poverty reduction targets such as the Millennium Development Goals, and safeguarding the basic human rights of their citizens. Climate variability, and the inherent vulnerability of Pacific Islands to climatic extremes, exacerbate and add to the urgency of these challenges. The impacts of climate change are likely to be experienced through changes in variability, meaning that managing water resources for variability and extremes is fundamental to the issue of adapting to climate change in the longer term.

To have any chance of success, adaptation responses to climate change must acknowledge and address the underlying pressures and constraints that limit the Pacific's ability to meet today's serious water and sanitation challenges. By strengthening the capacity of countries and communities to better deal with today's challenges, adaptation strategies can improve their ability to respond to current climate variability and adapt to future climate change.

Pacific Island Countries have, through the *Pacific RAP*, acknowledged the importance of water resources assessment and monitoring, effective application of climate information, and the application of risk-based IWRM approaches in addressing climate vulnerability. While information from global atmospheric models is likely to improve over the coming years, there remains a critical need for countries to monitor and assess changes as they occur on the ground so to ensure they have access to the best information to drive management responses.

As adaptation responses expand in the Pacific region, dedicated efforts need to be made to ensure that water and sanitation voices are reflected in the design and implementation of programmes, and water managers, advocates and stakeholders must now seize the opportunity to effectively engage in these processes.

The Committee will be invited to consider opportunities for the water and sanitation sector to more effectively engage with regional climate change adaptation initiatives.

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