

# PRACTICAL RESPONSES TO CLIMATE CHANGE: DEVELOPING NATIONAL WATER POLICY AND IMPLEMENTATION PLANS FOR PACIFIC SMALL ISLAND COUNTRIES

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*The potential threats of climate change to Pacific Island Countries (PICs), and especially low-lying islands are well known. First impressions are that adaptation to change is an overwhelming task for PICs with limited capacities and resources. Some, however, have argued that any activity towards ecologically sustainable human development constitutes adaptation and that the only rational adaptation strategy is to develop the general capacity of a society to cope with change by building up its institutional structures and human resources while maintaining and enhancing the integrity of ecosystems. Others have suggested past experiences in coping with climate variability provide good lessons for developing adaptation policy and plans which, when coupled to the natural resilience of island populations, mean that prospects for adaptation are less bleak. Some have concluded that the international focus on adaptation to global climate change has distracted PICs from addressing the actual, local sustainability problems facing island communities, particularly in managing vital freshwater resources and ensuring their longer-term security, which is the focus of this paper. Here we describe a five phase adaptive planning process carried out to assist in the development of national water policy and implementation plans in two dissimilar PICs, which address both immediate and perceived future challenges. These PICs have water resource problems amongst the most challenging in the world. Population centres in small islands, particularly low atolls and carbonate islands, have rapidly growing populations and largely unplanned urbanisation with significant impacts on water quality. In these high-density areas, the traditional coping mechanisms and customary values appear mismatched to urban situations. These factors constitute greater risk to water security to the year 2030 than climate factors. There is often limited government direction, unclear management and regulatory roles, very few national water laws and limited information on the quantity and quality of water resources and their relation to climate. Because of these, clear public policies, specifying priority goals and policy implementation plans are necessary. Implementation is therefore a long-term process which requires suitable long-term support from regional organisations, aid and donor agencies giving due regard to the pressing needs and priorities for water security identified by the PICs themselves.*

## 1. INTRODUCTION

The threats posed by climate change to Pacific Island Countries (PICs) have been described in detail (Mimura et al., 2007). Despite the magnitude of the risks posed by these threats, especially to low-lying atolls and carbonate islands, some are optimistic that PICs can adapt to climate change, provided firstly, the rate of climate change is slowed and eventually stopped and secondly, PICs can achieve a high level of domestic sustainability to promote social and ecological resilience (Barnett, 2005). In this sense, adaptation to climate change can be viewed as but one aspect of addressing the broader challenges of sustainability, which are exacerbated in small island states because of their fragility and vulnerability to demographic, economic, and environmental pressures (UNDESA, 1994).

In the face of the uncertainties surrounding the magnitude and timing of climate change (Barnett, 2001), its impacts and lack of detail of ecosystem functions in PICs, Barnett (2005) concluded that the only rational adaptation strategy is: "to develop the general capacity of a society to cope with change

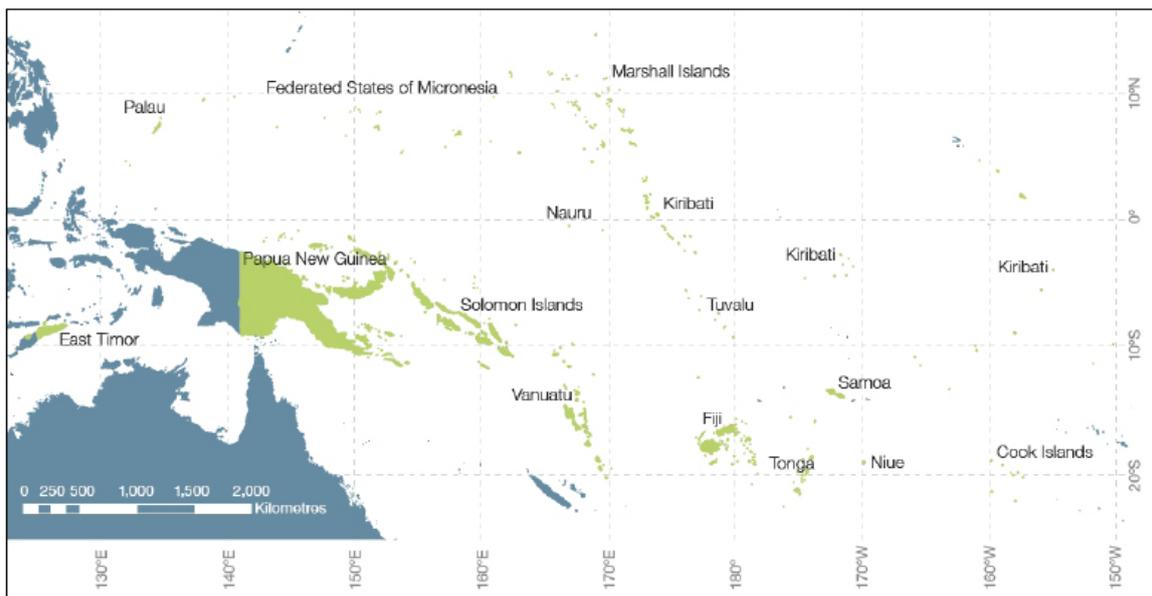
by building up its institutional structures and human resources while maintaining and enhancing the integrity of ecosystems". In his view, any activity towards ecologically sustainable human development constitutes adaptation. He concluded that, despite limited financial, technological and infrastructure resources in PICs, their communities' well-developed local institutions, resilient social systems, sensitivity to environmental change and high degree of equity, together with their kinship-based, transnational networks are the basis for considerable capacity to adapt to climate change.

Dovers (2009) pointed out that the emphasis in climate change has spread from the scientific to the policy realm where the focus has shifted from mitigation towards adaptation. He argued quite generally that challenges faced in adapting to climate change are not new. Humans have attempted to cope with climate variability for a long time and he cites examples in developed countries covering: water management; local and regional economic vulnerability; biodiversity; health and well-being in remote communities; energy reform; and emergency and disaster management.

Some have concluded that the international preoccupation with adaptation to global climate change in PICs has distracted them from addressing the actual, local sustainability problems facing island communities (Connell, 2003), particularly in managing vital freshwater resources and ensuring their longer-term security (White and Falkland, 2010), which is the focus of this paper. Here we describe efforts to assist the development of national water policy and implementation plans as steps towards addressing local sustainability issues in two PICs.

## 2. FRESHWATER SECURITY IN PICs

There are about 1,000 populated small islands in the Pacific Ocean, most of which are located in the tropical and sub-tropical zones of the central and southern Pacific (see Figure 1).



*Figure 1: Some of the PICs in the Central and Southern Pacific (PCCSP, 2010)*

There is considerable diversity of sources of freshwater used throughout the islands of the region. These range from naturally occurring groundwater and surface water, rainwater harvested from roofs and other surfaces and seawater desalination (Falkland, 2002). Surface water is only available in some islands but fresh to brackish groundwater is available, even though in very limited quantities, in all islands. Desalination is only used as a primary source of water in one country, Nauru, and in also in Banaba in the western, Gilbert Group of Kiribati, when equipment is operating (Figure 1). Some countries, such as Tuvalu, use desalination as an emergency source in droughts for urban centres. Water is also imported to some small islands via pipeline or barge or boat in severe droughts. Brackish groundwater and seawater are also employed for a range of nonpotable uses. Across the region, about 50% of islanders access improved water supplies, and this is reflected in high infant death rates from waterborne diseases (White et al., 2007).

The small islands most susceptible to climate variability are the low islands with no surface water and insufficient fresh groundwater, which occurs as thin freshwater lenses floating over seawater. These include the raised limestone islands of Nauru and Banaba, and the low coral sand atoll Funafuti and others in Tuvalu. These islands rely heavily on rainwater harvesting and storage. The large number of people in island households means that rainwater tanks are quickly exhausted in dry times. The next most vulnerable islands are the low, coral sand atolls, where the shallow, fresh groundwater lenses wax and wane with rain and drought, depending on island width and aquifer geohydrology. The high permeability of the coral sands overlying the groundwater lens also imposes an additional risk, particularly in urban areas, some of which have population densities greater than 10,000 people/km<sup>2</sup>. In these, surface contamination, particularly faecal material, is rapidly transported into the groundwater with major health risks. Large high islands with both surface and groundwater resources, such as Papua New Guinea and larger islands in the Solomon Islands and Vanuatu (Figure 1) are, in general, the least vulnerable. The most susceptible communities, therefore, are those in urban and peri-urban areas in low atolls and carbonate islands and those in isolated, remote regions and islands.

A recent study has compared the risks to water security in 14 selected PICs from climate change and non-climate factors. It found that the most significant risks up to the year 2030 are (Falkland, 2011):

- increasing water demands due to population growth and development (in some urban areas these projected increases lie between 70% and 240% by 2030, see Figure 2),
- pollution of water resources due to population growth, development and increasing urbanization (Ward, 1999) with consequent major health impacts
- salinisation of fresh groundwater due to seawater intrusion caused by over-pumping,
- leakage of water from many urban pipe distribution systems (which in many situations is 50% or higher),
- poor water governance and management, which are particularly evident during droughts,
- vandalism of water infrastructure, often as a result of property rights disputes between land owners and governments, and
- impacts from works that alter existing coastlines making them more vulnerable to erosion, or gravel mining that exposes shallow groundwater to direct evaporation and contamination.

The report concluded that the non-climate factors of increasing water demand due to expanding populations and leakage from pipe systems pose the greatest risks to water security out to year 2030.

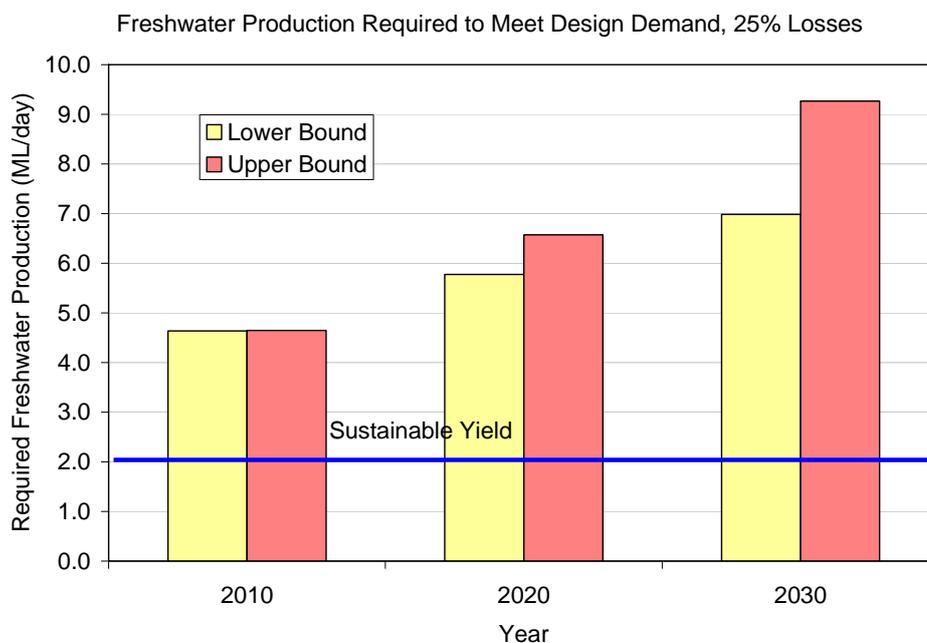


Figure 2: Estimated water production rates required to meet the projected future water demands in South Tarawa, Kiribati, for lower and upper bound population growths with an assumed water loss rate of only 25%. Solid blue line is the sustainable yield of current groundwater reserves (White, 2011a).

The general absence of clear government priorities, goals and directions compounds the risks, especially in PICs in the central and central-western Pacific, such as Nauru, which are subject to frequent, severe ENSO-related droughts closely coupled to sea surface temperature (Figure 3). The rainfall variation shown in Figure 3, meant that, for 6 month rainfall periods, Nauru experienced 12 severe droughts (<10<sup>th</sup> percentile rainfall) between 1946 and 2010 with a median 6 month rainfall of 77 mm, a median duration of 19 months, and a median interval between droughts of 5 years (White, 2011b). Almost all of these droughts were considered an emergency since most household rainwater storages, the preferred water supply source, fail usually within the first month of a severe drought.

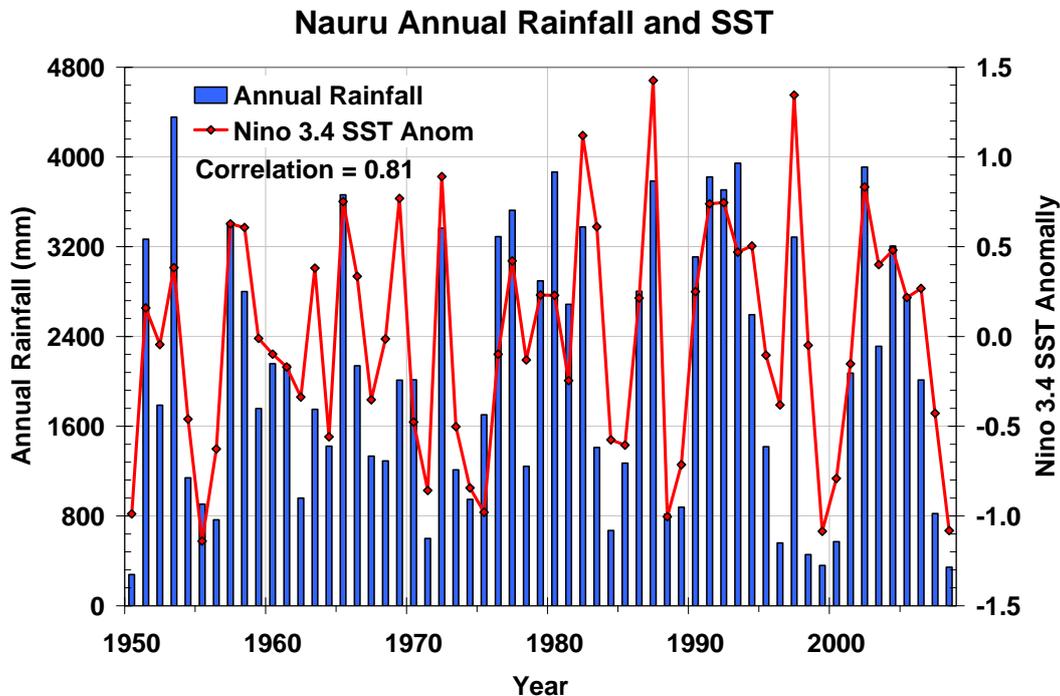


Figure 3: The strong correlation between annual rainfall in Nauru (Figure 1) and the sea surface temperature anomaly in the Niño 3.4 region in the central-western Pacific (White, 2011b).

## 2.1. Strategies for Improving Water Security

Given that Pacific island communities have survived large swings in climate over the past 4,000 years, practical strategies to improve water security should be feasible. Falkland (2011) considered that these strategies could be grouped under a number of categories:

- improving water governance,
- assessment and monitoring of water resources,
- improved management and protection of water resources,
- managing demand,
- planning for droughts and floods,
- capacity building and training,
- engaging the community by improved education, awareness and participation, and
- designing appropriate water supply systems for PICs.

Barnett (2005) proposed that the only rational approach to adaptation in PICs is to firstly build up their institutional structures and capacity. This paper focuses on only the first of the above categories, improving water governance, through the development of national water policy and implementation plans. Through these policy and implementation plans, however, it touches on the other categories.

### 3. WATER GOVERNANCE IN PICs

Despite the vital importance of freshwater in PICs, most governments have been generally reluctant to develop national water resource policy, legislation, implementation plans or define responsibilities and roles for ministries and departments. This reluctance is unsurprising, given that Australia only enacted its National Water Act in 2007. It also stems from the fact that in most subsistence cultures, freshwater was largely the responsibility of the extended family. In addition, in many PICs, customary law invested ownership of water in land owners (Talu et al., 1979) and in many PICs, the land from which public freshwater supply is sourced is privately owned. Land is the principal form of wealth and carries with it subsistence rights even in urban settings and has social, political and legal significance. It is hardly surprising that demand management through water pricing for government owned and operated reticulated schemes, where water is extracted from privately-owned land, is counter to traditional practice and is an anathema to some island communities. In addition, in some countries there is general uncertainty over the role of national public policy, even amongst public servants, and in some PICs, policy processes are poorly developed or nonexistent.

Barnett (2005) felt that: "Pacific communities have historically been able to adapt to a wide range of substantial exogenous and human induced changes" through 'indigenization of modernity' (Sahlins, 2000), where traditional systems incorporate the most suitable and useful aspects of modern society. In the case of water governance in population centres, traditional beliefs have largely prevailed resulting in conflict between the demands, and particularly the public health requirements and development needs, of growing, highly urbanised societies and the long-established traditions and practices of subsistence communities (Jones, 1997). In these urban settings, the well-developed local institutions, resilient social systems and sensitivity to environmental change are greatly diminished. Table 1 summarises progress in various components of water governance in selected PICs.

*Table 1 Summary of water governance progress for the 14 PICs. Legend: green - endorsed by Government; yellow - draft or interim version exists; red - does not exist (from Falkland, 2011).*

Country	Water and Sanitation Policy	Water Legislation	National Water and Sanitation Committee or similar	IWRM Plan(s) or similar
Cook Is	Yellow	Yellow	Yellow	Red
FSM	Red	Red	Red	Red
Fiji	Yellow	Yellow	Green	Yellow
Kiribati	Green	Red	Green	Green
Nauru	Yellow	Red	Yellow	Yellow
Niue	Yellow	Yellow	Yellow	Red
Palau	Red	Red	Yellow	Red
PNG	Yellow	Yellow	Yellow	Red
RMI	Yellow	Red	Red	Yellow
Samoa	Green	Yellow	Yellow	Yellow
Solomon Is	Yellow	Yellow	Yellow	Red
Tonga	Red	Yellow	Yellow	Red
Tuvalu	Red	Red	Yellow	Yellow
Vanuatu	Green	Yellow	Yellow	Yellow

Public policy can be viewed as an authoritative response by government to public issues or problems that provides leadership, direction, coordination and resources (Bridgman and Davis, 2004). The absence of national policy, legislation, implementation plans and whole-of-government and community national steering committees in some PICs means: that government priorities in the sector remain unspecified; that resources are not directed towards particular needs; that the roles and responsibilities of government agencies are not clearly defined; and, in many cases, that there is no legal protection for water sources.

### 4. DEVELOPING PUBLIC POLICY AND IMPLEMENTATION PLANS

We now describe the approach taken to assist PICs to develop national water policy and implementation plans. An implicit assumption underpinning many attempts to assist PICs to develop national policy and

plans is that the plethora of water policy frameworks and policy and planning “tool kits” available in developed world countries (see e.g. Global Water Partnership, 2003) are relevant and directly and rapidly transferable to developing countries. Experience has shown that quick, developed-world formulaic solutions that take no account of island priorities, traditions and practices which have evolved over millennia, are often politely ignored. There are no easy prescriptions for the rapid translocation of these relatively recent water governance reforms and water management frameworks from developed countries to small island developing countries. For example, in developed countries, there are frequently hundreds of people engaged in the planning, management and use of water whose ownership by the state is clearly specified. For them, some of the major priorities are addressing the environmental impacts of water supply and water effluent treatment systems, controlling demand through market mechanisms and accommodating the predicted impacts of climate change.

In many small PICs, there are often only one or two water professionals whose tasks may range from replacing washers in domestic taps, replacing groundwater pumps, unblocking clogged sewers to advising on national water policy and representing the country at international climate change meetings. The major daily challenges in water governance they face are maintaining supplies of adequate quantities of safe freshwater to growing populations, often in dispersed and isolated communities, with very limited resources, no economies of scale, as well as coping with the complex cultural, social and institutional changes necessary in the transition from subsistence to urban communities. The traditional belief that freshwater is the property of the landowners from whom the water is sourced is still very strong.

It is essential to ensure that the process of developing national water policy and plans incorporates the local priorities of the island country and not merely reflects the prevailing, developed-world, aid agency or donor priorities. Here we discuss the approach taken in assisting two PICs to develop national water policy and implementation plans. One the multi-island, and mainly atoll Republic of Kiribati and the single, raised limestone island of the Republic of Nauru (Figure 1). For both countries a five phase adaptive, interactive planning process modified from Ackoff (1999), summarised in Table 2 was used to assist policy and plan development.

*Table 2 The five phases of interactive planning. Adapted from Ackoff (1999)*

<b>Phase</b>	<b>Objective</b>	<b>Components</b>	<b>Principal Outputs</b>
<b>I. Formulation of the Issues</b>	Determine issues, problems and opportunities	Previous actions and policies, recognised issues, problems, opportunities, and their interactions; constraints to effective management	Issues to be addressed by policy, plans, legislation
<b>II. Ends Planning</b>	Determine where you want to be and the gaps between that and now	Extract vision, principles, goals, and objectives to achieve the desired ends.	Policy principles, Policy goals and objectives
<b>III. Means Planning</b>	Choosing mechanisms to achieve goals and objectives	Develop and select actions for achieving goals and objectives and indicators for completion of actions	Implementation Plan Actions
<b>IV. Resource Planning</b>	Determine resources required for planned actions	Define resource needs and identify if resources are available or how they will be generated or acquired	Implementation Plan resources needs
<b>V. Implementation and Control</b>	Determine responsibilities and schedules for implementation	Identify who is responsible for actions, when they are to be implemented and how implementation is to be monitored	Implementation Plan Schedule and Responsibilities for implementation. Ministerial Operations Plans

Phases I and II of this process lead to the formulation of policy, phases III to V help develop implementation plans. In PICs, where policy development is often a relatively new process, it is important to separate policy from implementation plans so that government priorities, goals and objectives can be unequivocally and clearly identified. Because the process in Table 2 is an adaptive, iterative process, it is fundamentally important that it is carried out with a whole-of-government and community-representative body. We now discuss the implementation of this process in the two PICs.

## 4.1. Kiribati

Kiribati and Colombia were the first countries in the world to be selected under the Global Environmental Facility (GEF) Strategic Priority on Adaptation (to climate change). In 2003, the Government of Kiribati (GoK), with support from the World Bank (WB), started the Kiribati Adaptation Program (KAP) with the key goal of reducing Kiribati's vulnerability to climate change, climate variability and sea level rise. The program was planned to have 3 phases. Phase I, Preparation (KAP I which ran from 2003-2005) aimed to incorporate adaptation into national economic planning, to prepare a National Adaptation Program of Action (NAPA) and to design an intermediate pilot implementation phase, KAP II, which ran from 2007-2011. KAP III, Expansion (20011-2015), is designed to gradually scale up the investments piloted under KAP II to cover all major islands and vulnerable sectors of Kiribati.

All of these activities were based on an extensive community consultation process throughout the main Gilbert Island group, as well as several technical studies in key affected sectors. During consultations, communities were asked for suggestions on adaptation strategies. Much to the surprise of the consultants, the top strategies identified by communities had little to do with the threat of sea level rise. Seven out of the top ten strategies were concerned with access to freshwater, water quality and the protection of freshwater sources. KAPI prioritised adaptation options under the following categories: Awareness; Water Resources; Inundation/Coastal Erosion; Agriculture; Health; Family Planning; Overcrowding/Migration; Fisheries and Waste Management. A range of pilot water resources projects were designed under the key Freshwater Component of KAPII. The lead projects were to assist the GoK in the development of: a national water resources policy; a 10-year national water resources implementation plan to put that policy into practice; and a 10-20 year Water Master Plan for Tarawa atoll, the location of the capital, South Tarawa, the country's main population centre.

In order to ensure whole-of-government and community inputs into the KAP process, the National Adaptation Steering Committee (NASC) was formed in 2004 to oversee KAP II and report to the Office of the President. This Committee has members from all key government agencies as well as community members from the National Council of Churches, the Chamber of Commerce and from the Women's Committee. Because national water policy and its implementation are essential over-arching components of integrated water resource management, which encompasses health, environmental, economic, social, cultural, infrastructural and technical issues, it was essential that all Ministries, agencies, community organisations and businesses with broad interests in freshwater participate in deliberations on specific water policy and plans. To steer the freshwater component of KAP II, a separate whole-of-government and community-representative body, the National Water and Sanitation Coordination Committee (NWSCC), under the lead water ministry, Ministry of Public Works and Utilities, and reporting through the Minister to Cabinet was established in 2007. Initially, there was opposition to the inclusion of community representatives in the NWSCC, since water was seen as "government business".

An extensive two-year process of development, discussion and refinement of the policy and implementation plans using the five phases in Table 2 was undertaken. Besides separate workshops with NASC and NWSCC, extensive consultations were undertaken with lead government ministers and agencies, local governments, non-government organisations, businesses, the accommodation industry, foreign diplomats and aid donors. These face-to-face discussions were extremely important in soliciting feedback since the oral rather than the written tradition is very strong in Kiribati. This process identified the policy goals and objectives in Table 3.

The policy expresses the vision of the people of Kiribati for the future of water resources and water supply in the country. It specified planned policy outcomes and provided short to medium-term (up to 3 years) and medium to long-term (3 to 10 years) strategies for achieving the policy objectives. Organisational, institutional, resource, financing and legislative implications of the policy were discussed and mechanisms for its implementation and review were outlined. Because of the general disconnect between pronouncement of public policy and its implementation, policy implementation was detailed in an accompanying 10-year National Water Resources Implementation Plan, developed in parallel with the policy using phases III to V in Table 2.

*Table 3 Three Policy goals and seven objectives of the National Water Resources Policy*

<b>Policy Goal 1. Provide safe, socially equitable, financially and environmentally sustainable water supplies to enhance the welfare and livelihood of I-Kiribati</b>
1. <i>Increase access to safe and reliable water supplies</i>
2. <i>Achieve sustainable water resource management</i>
<b>Policy Goal 2. Protect and conserve freshwater sources for public water supplies</b>
3. <i>Improve understanding and monitoring of water resources and their use</i>
4. <i>Improve protection of public water source areas</i>
5. <i>Increase community participation in water management and conservation</i>
<b>Policy Goal 3. Deliver freshwater efficiently and effectively.</b>
6. <i>Improve governance in the water and sanitation sector</i>
7. <i>Decrease unaccounted for water losses and improve cost recovery</i>

The Plan described the opportunities, issues, constraints and the possible future of water resource management and use. It used the goals and objectives of the draft National Water Policy as the framework for action and specified activities, measurable indicators or outputs and strategies to address priorities in the freshwater resources sector under each policy objective. The draft Implementation Plan also identified the Ministries responsible for each activity, provided a list of highest priority activities and a schedule for completion of activities. In addition, procedures were developed for the NWSCC to monitor and report to GoK Cabinet on the implementation of the policy and plans and for their periodic revision.

The National Water Resources Policy and National Water Resources Implementation Plan for Kiribati were approved by the GoK Cabinet on 14th January 2009.

## **4.2. Nauru**

The Nauru National Sustainable Development Strategy (NSDS) 2005-2025 (revised October 2009, RoN, 2009) provides the clearest description of the intents of the Government of Nauru (GoN) for water and sanitation. Unfortunately, the NSDS is a sectoral, economic approach which sees water and sanitation as part of the infrastructure sector, rather than as a cross-cutting theme, such as Environment. This means that many of the overlapping responsibilities are not identified explicitly. The NSDS also does not contain explicit recognition of the scarcity of water in Nauru, and its extreme sensitivity to climate variations, nor does it cover protecting water sources or recognize that water is not just "government business".

A significant strength of the NSDS is that it identifies the organisations responsible for carrying out the strategies in the NSDS and achieving identified, short, intermediate and longer-term milestones. The NSDS identified that the Department of Commerce, Industry and Environment (CIE), together with the Nauru Utilities Corporation (NUC), have responsibility for: development of a national water resource management policy to guide the sustainable use and management of water resources in Nauru; ensuring optimal use of groundwater resources; and providing cost-effective measures for water supplied through reverse osmosis desalination.

The national water policy development process in Nauru was supported by Applied Geoscience and Technology Division of the Secretariat of the Pacific Communities (SPC-SOPAC) with funding support from the European Union (EU) through the Integrated Water Resource Management (IWRM) National Planning Programme. It was also aided greatly by the GEF Pacific Adaptation to Climate Change (PACC) under the Secretariat of the Pacific Regional Environment Programme (SPREP), and both IWRM and PACC programmes have coordinators in Nauru. Fortunately, in Nauru, a whole-of-government and community-based-organisations joint committee, the CIE Projects Steering Committee (CPSC) supported by a Water Technical Committee (WTC), had been established to oversee development of policy. These were essential, since there was no formal process for policy development in Nauru. The policy development process followed is outlined in Figure 4. After

iterations of the draft policy, and final endorsement by CPSC, it was passed to the Minister CIE from presentation to the National Development Committee (NDC), made up of the Permanent Secretaries of Departments, the CEOs of GoN corporations and the Parliamentary Counsel, for consideration of its appropriateness as a submission to Cabinet.

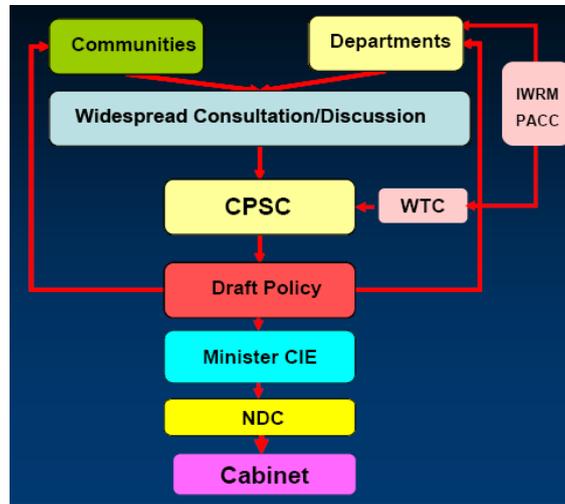


Figure 4: The policy development process used in Nauru..

The draft National Water, Sanitation and Hygiene Policy for Nauru has the theme developed by the CPSC: *Ebōk eiy itsimor, Ebōk eiy gaganado, Rañga kō wam ebōk bwain tsimorum ñage me iyamwan* (Water is life, Water is precious, Care for water for your life for today and for the future). The identified 38 priority issues (Phase 1 in Table 2) were grouped into seven policy areas: climate variability and change and water resource vulnerability; water quality and supply; sanitation and environment; demand; governance; and community awareness and participation. A general policy goal (Phase II in Table 2) was then identified under each policy area:

1. Adaptation to climate variability and change incorporated in all aspects of water and sanitation management
2. Reliable, safe, affordable, secure, efficient and sustainable water supply systems established.
3. Sanitation systems introduced which meet appropriate sanitation needs, minimise impacts on the environment and encourage improved hygiene
4. Equitable and fair systems created for controlling demand, conserving water and minimising waste and losses.
5. Clear, consistent and transparent system of water and sanitation policy, plans and laws established that identify lead organisations, and their roles, responsibilities for managing, conserving and protecting water resources.
6. Appropriate resources, capacity, skills training, information and organisations available for managing water and sanitation systems sustainably.
7. Community aware of the issues and actively engaged in planning, protection and conservation of water and improvements to and maintenance of household water and sanitation facilities.

Each of the policy goals has an associated set of policy objectives addressing the identified priority issues. The draft policy proposed the establishment of a Water Unit (WU) within CIE to oversee policy implementation. The draft policy was approved by the NDC for transmission to the GoK Cabinet in November 2011. GoN Cabinet approved the policy and the WU on 7 February 2012.

## 5. CONCLUDING REMARKS

Both Dovers (2009) and Barnett (2005) point out that, despite the enormity of the problem, especially in PICs, adaptation to climate change is not a blank slate. Communities have coped with climate variability for millennia. In some PICs, such as the two central Pacific examples here, the rainfall variability has been extreme. In densely-populated urban areas in low atolls and carbonate islands,

however, traditional coping strategies fail to address adequately the current problems. Barnett argued that the only rational adaptation strategy is: “to develop the general capacity of a society to cope with change by building up its institutional structures and human resources while maintaining and enhancing the integrity of ecosystems”. In this view any activity towards ecologically sustainable human development is adaptation. This is somewhat consistent with Connell (2003) who concluded that the international focus on adaptation to global climate change in PICs has distracted them from addressing the actual, local sustainability problems facing island communities.

When the alarming statistics for preventable infant mortalities due to water-borne illnesses in PICs are examined (White et al., 2007) together with the projected increase in demand across the region (Falkland, 2011), it is apparent that water security and human health are major sustainability issues. There has been, however, a general lack of commitment by some governments in the region to set priorities and identify goals and responsibilities, and to protect and conserve water sources adequately. This is at least partly due to customary beliefs and practices which are at odds with the needs of urban societies. The issues involved are complex and there are no simple, formulaic off-the-shelf solutions. We have described here a 5 phase adaptive planning approach to assist in the development of water policy and implementation plans in two PICs, part of the strengthening of institutional structures identified as necessary by Barnett (2005). An essential element in both approaches was formation of whole-of-government and community-representative committees to steer and adapt the process. An equally important element was the continued support of regional organisations such as SPC-SOPAC and SPREP, who help augment the limited human capacity within most PICs. A final element is sufficient time. The strengthening of institutional structures, enhancing human capacity and transitioning towards sustainable human development are long-term processes since they involve behavioural change.

## 6. ACKNOWLEDGMENTS

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