



Republic of Nauru

National Water, Sanitation and Hygiene Implementation Plan

An Integrated Water Resource Management Plan which mainstreams Adaptation to Climate Change and implements Cabinet's endorsed National Water, Sanitation and Policy providing reliable, safe, affordable, secure and sustainable water supplies to meet socio-economic development needs and appropriate sanitation systems for healthy communities and environments

**Ebōk eiy itsimor, 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**

Draft

June 2012

Acronyms and Abbreviations

ARMS	Atmospheric Radiation Measurement Station (Tropical Western Pacific)
BoM	Bureau of Meteorology (Australia)
BoS	Bureau of Statistics (Department of Finance)
CBO	Community-based Organisation
CCAAP	Climate Change Adaptation Action Plan
CPSC	CIE Project Steering Committee
CIE	Department of Commerce, Industry and Environment
DoE	Department of Education
DoFSD	Department of Finance and Sustainable Development
DoH	Department of Health
DoHA	Department of Home Affairs
DoJ	Department of Justice
DRM	Disaster Risk Management Unit
ENSO	El Niño Southern Oscillation
EC	The European Community
EU	The European Union
GoN	Government of the Republic of Nauru
ha	hectare (= 10,000 m ²)
IWRM	Integrated Water Resources Management
kL	kilolitre (= 1,000L = 1 m ³)
L	litre
L/pers/day	litre per person per day
m	metre
m ²	square metre
m ³	cubic metre (= 1,000 L = 1 kL)
ML	megalitre (= 1,000,000 L = 1,000 kL = 1,000 m ³)
mm	millimetre (= 0.001 m)
MDG	Millennium Development Goals
MED	Multi-effect distillation
NDC	Nauru Development Committee
NDRM	National Disaster Risk Management
NDRMO	National Disaster Risk Management Office
NISIP	National Infrastructure Strategy and Investment Plan
NMB	Nauru Media Bureau (Department of Home Affairs)
NOAA	National Oceanic and Atmospheric Administration (United States)
NSDS	Nauru National Sustainable Development Strategy 2005-2025 (revised 2009)
NRC	Nauru Rehabilitation Corporation
NUC	Nauru Utilities Corporation
NWSHIP	National Water, Sanitation and Hygiene Implementation Plan
NWSHP	National Water, Sanitation and Hygiene Policy
PACC	Pacific Adaptation to Climate Change
PAD	Policy and Aid Division (Department of Finance)
PCCSP	Pacific Climate Change Science Program
pers	persons
PIC	Pacific Island Country
PRAPSWM	Pacific Regional Action Plan for Sustainable Water Management
PWA	Pacific Water Association
RO	Reverse osmosis (desalination)
RoN	Republic of Nauru
RONPHOS	Republic of Nauru Phosphate Corporation
SOE	State-owned-enterprise
SOI	Southern Oscillation Index
SOPAC	Applied Geoscience Division of the SPC
SPC	Secretariat of the Pacific Community
SST	Sea surface temperature
ToR	Terms of Reference
USP	University of the South Pacific
WTC	Water Technical Committee
WU	Water Unit (CIE)

Table of Contents

Part I Purpose, Vision, Theme, Goals and Objectives of the Plan

1. Purpose of this Implementation Plan	6
2. Vision for this Implementation Plan.....	6
3. Theme for this Plan.....	6
4. Goals and Objectives of this Plan.....	7

Part II Rationale, Guiding Principles, Development Process, Opportunities for Successful Implementation and Support for the Plan Toc327524988

5. Rationale for Nauru's Water Policy and its Implementation Plan.....	11
6. Guiding Principles for this Plan	11
6.1 Principles of successful public policy implementation.....	11
6.2 Principles of Integrated Water Resource Management	12
6.3 Mainstreaming adaptation.....	13
6.4 Principles as a framework for developing this plan.....	13
7. Process Used to Develop this Plan.....	14
8. Opportunities for Successful Implementation of this Plan.....	15
8.1 Strengths of Nauruans	15
8.2 Local and regional support and expertise	15
8.3 Donor support	16
8.4 Whole-of-government-community approach.....	16
8.5 NSDS and NISIP.....	16
8.6 Nauru's international and regional commitments.....	16
8.7 Previous water and sanitation sector studies and reports	16
8.8 Initiatives in Disaster Risk Management, Education, Health and Climate Change..	16
9. Support for this Plan	17

Part III Issues Addressed in the Implementation Plan

10. Issues Addressed in this Plan.....	20
10.1 Geography and Climate	20
10.2 Water sources.....	20
10.3 Droughts	21
10.4 Water production, storage and distribution	22
10.5 Population and Water Demand.....	24
10.6 Control of water sources	25
10.7 Sanitation, water quality and public health.....	26
10.8 Community participation	28
10.9 Issues to be addressed.....	28
10.10 Prioritising the issues.....	31
11 Consistency of this Plan with Previous Government Initiatives	31

12 The Need for a Water and Sanitation Master Plan for Nauru	32
13 Implementation Plan as a Living Document in a Continuing Process.....	32

Part IV Activities, Indicators, Responsibilities & Schedule

14 Planned Activities to Implement Goals and Objectives.....	34
14.1 Policy Goal 1: Climate variability and change incorporated in all aspects of water and sanitation management.....	34
14.2 Policy Goal 2: Reliable, safe, affordable, secure, efficient and sustainable water supply established	36
14.3 Policy Goal 3: Sanitation systems introduced which meet appropriate sanitation needs, minimise impacts on the environment and encourage improved hygiene.....	41
14.4 Policy Goal 4: Equitable system for controlling demand, conserving water and minimising waste and losses created	43
14.5 Policy Goal 5: Clear, consistent and transparent system of water and sanitation policy, plans and laws established identifying organisations, roles, responsibilities for managing, conserving and protecting water resources	45
14.6 Policy Goal 6: Appropriate resources, capacity, skills training, information and organisations available for managing water and sanitation systems sustainably	48
14.7 Policy Goal 7: Community aware of the issues and actively engaged in planning, protection and conservation of water and improvements to household water and sanitation facilities	50

Part V Implementation, Monitoring, Review and Endorsement

15 Collaborative Implementation of this Plan.....	54
16 Incorporating Plan Activities into Annual Work and Operational Plans.....	55
17 Monitoring Policy and Plan Implementation.....	55
18 Submitting Agency	55
19 Implementation Agencies.....	56
20 Legislative Implications of this Plan	56
21 Review of Policy and Implementation Plan.....	56
22 Recommendation.....	56
23 Responsible Minister.....	56
24 Submission Date.....	56
25 References Used in Plan Preparation.....	57



Republic of Nauru

**National Water, Sanitation and Hygiene
Implementation Plan**

Part I

**Purpose, Vision, Theme, Goals and
Objectives of the Plan**

Title: Republic of Nauru National Water, Sanitation and Hygiene Implementation Plan

1. Purpose of this Implementation Plan

The National Water, Sanitation and Hygiene Implementation Plan (NWSHIP) is a fifteen year plan to implement the Republic of Nauru's 2011 National Water, Sanitation and Hygiene Policy (NWSHP), which sets out the visions, goals and objectives of the Government of the Republic for water and sanitation.

The purpose of this plan is to:

1. set-out activities to implement the Policy's goals and objectives
2. identify performance indicators for these activities and methods for monitoring performance
3. assign responsibilities for carrying out activities
4. mainstream integrated water resource management and climate change, and
5. give a timetable for implementing activities

2. Vision for this Implementation Plan

This implementation plan adopts the vision of the NWSHP which aims to engage the whole community in policy implementation. The 2005-25 Nauru National Sustainable Development Strategy (NSDS), revised in 2009, provides three goals for the water and sanitation, waste and sewerage and environment sectors. The Ministry of Commerce, Industry and Environment's (CIE) Project Steering Committee (CPSC) combined these NSDS goals to produce the vision for the NWSHP which is also the vision for this Implementation Plan:

“Reliable, safe, affordable, secure and sustainable water supplies to meet socio-economic development needs and appropriate sanitation systems for healthy communities and environments.”

3. Theme for this Plan

Water is everyone's business. A short, easy-to-remember Theme helps attract the community's attention and particularly that of children to the importance of water and its care and conservation. The theme chosen by the CPSC for both the NWSHP and this Plan is:

Ebōk eiy itsimor

Water is life

Ebōk eiy gaganado

Water is precious

**Raŋga kō wam ebōk bwain tsimorum
ñage me iyamwan**

**Care for water for your life today and
the future**

4. Goals and Objectives of this Plan

The goals of this plan are those identified by the CPSC and the WTC and are set out in the 2011 National Water Sanitation and Hygiene Policy.

Policy Goal	Policy Objectives
<p>1. Climate variability and change incorporated in all aspects of water and sanitation management</p>	<ul style="list-style-type: none"> 1.1 Nauru rainfall data collected, stored, analysed systematically and reported monthly 1.2 Early warning system for extreme seasonal climate events relevant to water supply developed. 1.3 Drought Management Strategy developed, endorsed and operational. 1.4 Procedures reviewed for drought declarations and warnings and modified where necessary 1.5 Heavy rainfall contingency plans developed and operational 1.6 Climate change adaptation action plans developed for water supply, demand, sanitation and hygiene
<p>2. Reliable, safe, affordable, secure, efficient and sustainable water supply established</p>	<ul style="list-style-type: none"> 2.1 Water Master Plan for the long-term development of Nauru's water sources and associated storage and supply infrastructure produced 2.2 Water quality standards established for Nauru and incorporated into water safety plans or water quality management plans 2.3 Sources of groundwater pollution identified, and plans developed to deal with them. 2.4 Stored and delivered RO water and public rainwater storages treated to standards 2.5 Guidelines for rainwater harvesting, storage and maintenance introduced 2.6 Rate of supply of fresh water increased 2.7 Unaccounted for water and water losses from RO system reduced to acceptable levels 2.8 Storage capacity for RO water and public rainwater systems increased. 2.9 Delivery capacity of RO water improved. 2.10 Delivery strategy for priority users such as the hospital, schools and community storages established 2.11 Infrastructure maintenance, investment and replacement program established. 2.12 Alternate, low energy-consumption sources of water developed 2.13 Full assessment of groundwater resources completed including sustainable yield, quality and fit-for-purposes uses 2.14 Public and private water sources protected from misuse, pollution and theft.

Policy Goal	Policy Objectives
3. Sanitation systems introduced to meet appropriate sanitation needs, minimise impacts on the environment and encourage improved hygiene	3.1 Sewage sludge and outfall systems introduced which minimise environmental impacts 3.2 Sanitation systems and practices introduced to minimise groundwater pollution and health impacts 3.3 Training programs for maintenance of household sanitation systems introduced 3.4 Non-potable water used for toilet-flushing
4. Equitable system for controlling demand, conserving water and minimising waste and losses created	4.1 System created to determine, update and report on water demand by different sectors from all sources in wet and dry conditions. 4.2 Fair system developed to control demand for RO water and recover costs of water supply. 4.3 Targets set for water use by sectors, especially in droughts 4.4 Equitable system in place to optimise groundwater extraction to no more than the sustainable yield 4.5 System established to manage fair water distribution from community water tanks
5. Clear, consistent and transparent system of water and sanitation policy, plans and laws established identifying organisations, roles, responsibilities for managing, conserving and protecting water resources	5.1 National water, sanitation and hygiene policy proclaimed by Cabinet 5.2 National 15 year IWRM water policy implementation plan adopted 5.3 Whole-of-Government – Community Nauru peak sector National Committee established under the National Development Committee 5.4 Whole-of-government Water Technical Committee (WTC) formally established 5.5 Water Unit (WU) created within the lead Ministry as the agency responsible for planning, managing, monitoring and reporting of Nauru’s fresh water resources in collaboration with the Water Technical Committee 5.6 Review of all legislation, regulations and policy relevant to water and sanitation conducted to determine the need for water and sanitation legislation or regulations to manage, conserve and protect fresh water 5.6 Implementation of policy goals, objectives and plan activities included in Departmental Agency and Corporations’ Annual Work or Operations Plans.
6. Appropriate resources, capacity, skills training, information and organisations available for managing water and sanitation systems sustainably	6.1 Water Unit operational and adequately resourced 6.2 Capabilities required for WU and WTC staff specified 6.3 Appropriate training programs identified 6.4 Coordinated water resources and sanitation monitoring and reporting system established 6.5 Centralised, accessible national water resources, sanitation and hygiene data bases established 6.6 System established for regularly informing the public on water resource issues

Policy Goal	Policy Objectives
<p>7. Community aware of the issues and actively engaged in planning, protection and conservation of water and improvements to household water and sanitation facilities.</p>	<p>7.1 Community based organisations, industry, commerce and woman represented on peak National Water, Sanitation and Hygiene Committee or its equivalent.</p> <p>7.2 Water, sanitation and hygiene programs incorporated into school curricula at all levels</p> <p>7.3 Local district water, hygiene and sanitation committees established</p> <p>7.4 Incentive programs created for improving and maintaining rainwater harvesting and storage at the household and business level.</p> <p>7.5 Incentive programs introduced for moving to sanitation systems that minimise groundwater pollution and use of potable water for flushing</p> <p>7.6 Public education, communication and engagement strategy to increase capacity, raise awareness and encourage participation in conserving water, protecting water sources and minimising waste of water established.</p> <p>7.7 Importance, protection and wise use of fresh water and good hygiene included in school curricula at all levels.</p>



Republic of Nauru

**National Water, Sanitation and Hygiene
Implementation Plan**

Part II

**Rationale, Guiding Principles,
Development Process, Opportunities
for Successful Implementation and
Support for the Plan**

5. Rationale for Nauru's Water Policy and its Implementation Plan

Both the national water, sanitation and hygiene policy and this implementation plan are direct responses to the Nauru National Sustainable Development Strategy 2005-25 (NSDS, revised 2009) and to wide-spread community concerns about the availability and quality of water supplies, particularly during Nauru's frequent, severe ENSO-related droughts, when domestic rainwater tanks fail. They also respond to government concerns about the impacts of climate change and the crippling public costs of supplying water from Nauru's energy-intensive desalination plants.

This Plan builds on many previous reports, studies, draft plans, planning frameworks and the NSDS 2005-25 and the 2011 National Infrastructure Strategy and Investment Plan (NISIP). This Plan also takes into account the Disaster Risk Management ACT 2008, The Disaster Risk Management Policy and Plan, the draft Climate Change Adaptation Action Plan, the draft Health Act and the draft Environment Act, particularly those sections which are directly relevant to water, sanitation and hygiene.

This Plan acknowledges that freshwater is essential for life and for the social, cultural and economic welfare of all peoples. In Nauru, freshwater is a vital and, at times, very scarce resource; supporting the health and well-being of communities and the Nation's economic growth. This Plan is built on the vision, theme, issues, goals and objectives of Nauru's NWSHP. It has been workshopped with and refined by the Department of Commerce, Industry and Environment's (CIE) whole-of-government Water Technical Committee (WTC) and the senior level, whole-of-government and community CIE Project Steering Committee (CPSC).

6. Guiding Principles for this Plan

This plan is based on the principles of good governance, the principles of integrated water resource management, and the principle of mainstreaming adaptation into all aspects of policy and planning, especially those that concern natural resources and human survival systems.

6.1 Principles of successful public policy implementation

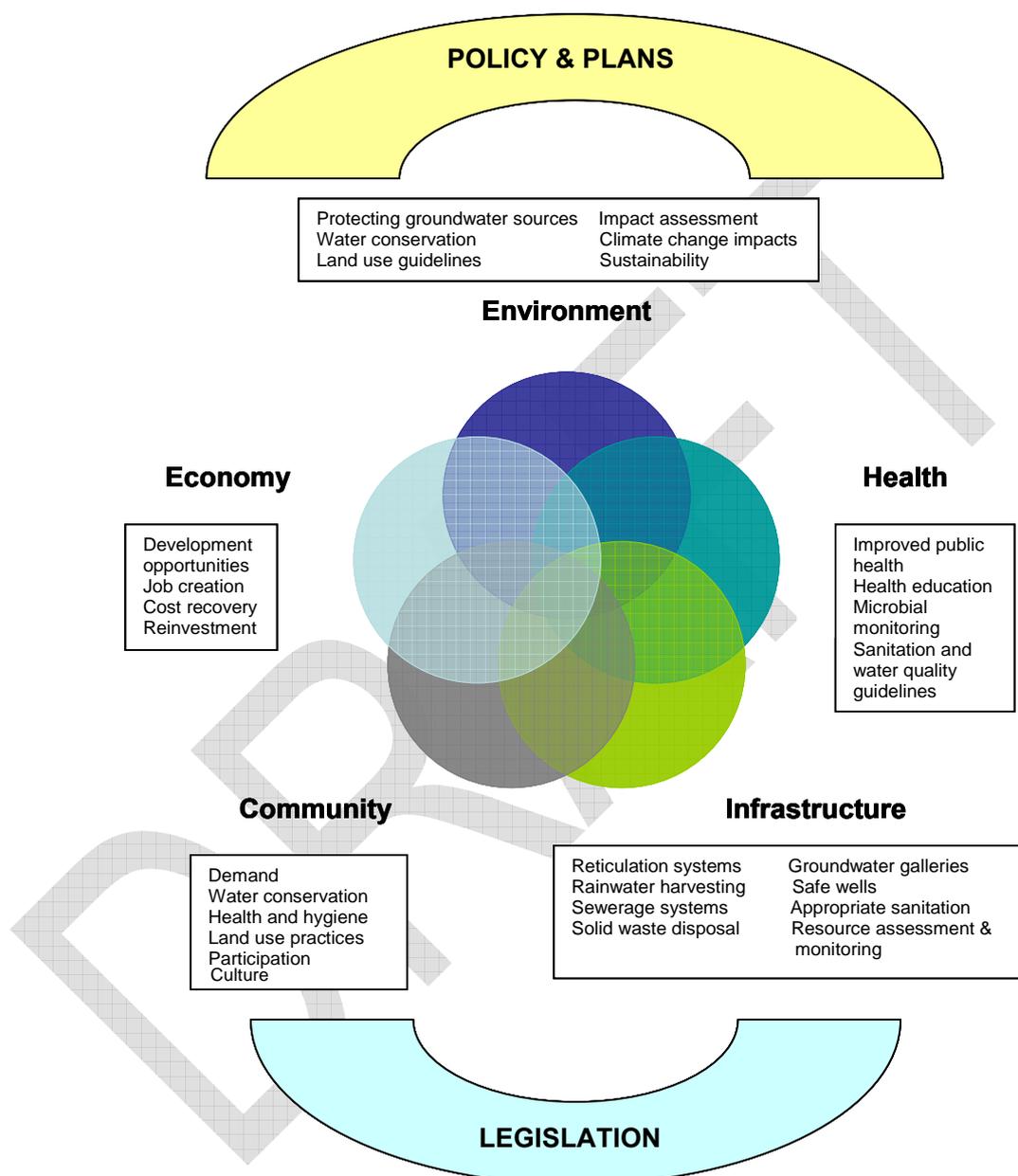
Analyses of successful policies and implementation mechanisms, that have been widely accepted by the public and have proven effective and efficient, show that they have a number of common principles. These are:

1. government whole-heartedly committed to the policy and implementation mechanisms;
2. policy and associated implementation mechanisms are based on sound theory and good information;
3. the policy and implementation mechanisms have clear policy goals and objectives;
4. those responsible for implementing the policy have clear directions, appropriate managerial and political skills, and adequate information and resources;
5. policy and its implementation mechanisms are actively supported by the community;
6. the goals and objectives of the policy and its implementation mechanisms are not undermined by other laws, policies, and implementation mechanisms, and
7. an appropriate management structure exists that facilitates collaboration, negotiations, and agreements, sharing of information and the monitoring, review and revision of the implementation process.

These constitute some of the key elements that must be addressed in developing and implementing national water, sanitation and hygiene policy. The endorsed NWSHP has addressed points 2 to 7 above and particularly the last point by specifying terms of reference for the Water Unit (WU) within CIE, a whole-of-government Water Technical Committee (WTC) drawn from all Departments with responsibility for water and a whole-of-government and community-based-organisations CIE Project Steering Committee (CPSC) to oversee development and implementation of the policy.

6.2 Principles of Integrated Water Resource Management

Integrated water resource management (IWRM) and planning is a partnership approach between government agencies, state-owned-enterprises, corporations with responsibilities for water and the communities who rely on water. It is based on recognition of the interconnectedness of the hydrogeologic, geographic, health, economic, social, cultural, governance, legal and political aspects of water and the importance of an integrated, collaborative approach to achieving sustainable, equitable and fair outcomes.



Integrated Water Resource Management and the Overarching Role of Policy and Plans and the Underpinning Role of Legislation and Regulations

The five basic principles of IWRM are based on the Dublin Principles presented at the World Summit on Sustainability in Rio de Janeiro in 1992:

- Principle 1:** Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
- Principle 2:** Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.

Principle 3: Women play a central part in providing, managing and safeguarding water.

Principle 4: Water is a public good with social and economic value in all competing uses.

Principle 5: IWRM is based on equitable and efficient management and sustainable use of water.

To make IWRM more relevant to Pacific island countries, the concept of an “*IWRM Island Style*” has been introduced with the following principles.

1. Island countries should manage water resources to take account of impacts on receiving coastal waters;
2. Drought and disaster preparedness planning should be addressed;
3. The small size of island countries requires a national approach to capacity building, awareness and governance;
4. The limited human and financial resource bases in most island countries need regional and international support and collaboration;
5. Rainwater harvesting should be incorporated in water management plans to augment water supply.

6.3 Mainstreaming adaptation

In the face of the uncertainties surrounding the magnitude and timing of climate change, its impacts and lack of detail of impacts on ecosystem functions in Pacific Island Countries (PICs), it has been 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 constitutes adaptation.

Despite the 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. The process undertaken to develop the policy and this implementation plan has built up institutional structures and human capacity and is itself contributing to adaptation.

There is a direct linkage between IWRM and climate change adaptation which has a number of key messages:

1. If our global energy habits are the focus for mitigation, the way we use and manage our water must become the focus for adaptation;
2. Changes in climate will be amplified in the water environment;
3. Improving the way we use and manage our water today will make it easier to address the challenges of tomorrow;
4. The best approach to manage the impact of climate change on water is that guided by the philosophy and methodology of IWRM;
5. There are no simple technical fixes;
6. In addressing water shortages, as much attention should be given to managing demand as to increasing supply, by introducing more efficient technologies as well as simply promoting a culture of conservation;
7. The challenge of “climate-proofing” the future requires that adequate funds are allocated today for water resource management.

6.4 Principles as a framework for developing this plan

The process used to develop the policy and this implementation plan has used the above principles and key messages as a guiding framework. Both the plan and policy were developed using a participatory process with all relevant government agency stakeholders and representative community-based organisations, and included women community leaders. Throughout the process, the extreme vulnerability and scarcity of Nauru’s water resources were emphasised by all participants, and the absolute dependence of island social, cultural

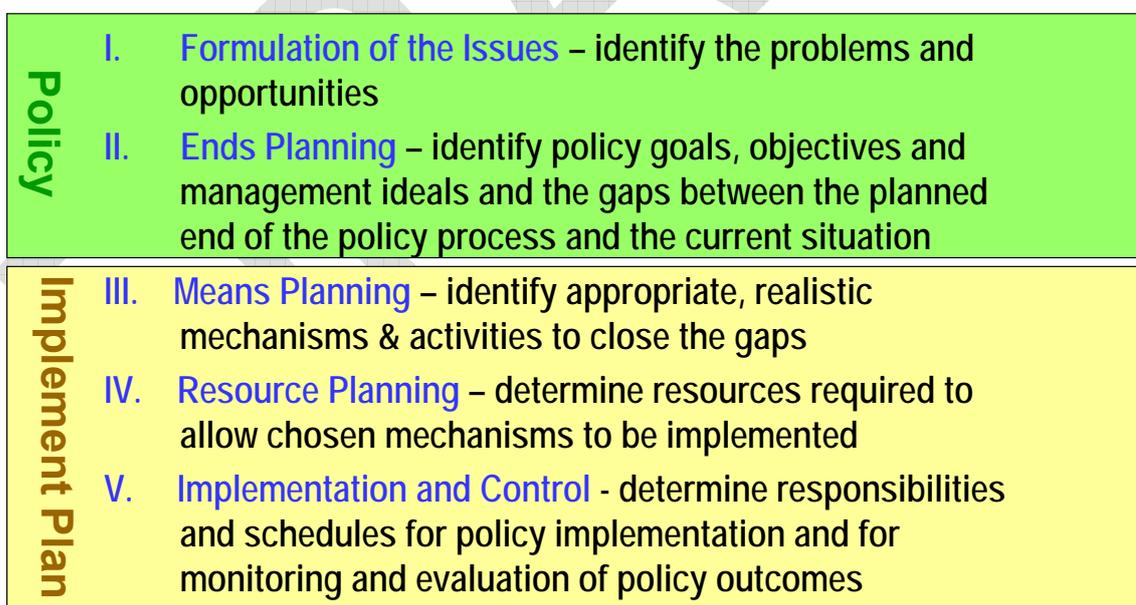
and economic life on freshwater as well as the social, cultural and economic value of water underpinned the discussions. Equity is a key consideration in Nauru and was raised during the development process. Efficiency is the driving force in the NSDS 2005-25 (revised 2009) and in NISIP 2011, on which the policy and this plan is based

7. Process Used to Develop this Plan

The policy and plan development process has involved individual consultations with key stakeholders as well as workshops with the WTC and the CPSC. Workshops were used to identify the issues to be addressed, the policy vision, theme, goals, objectives and priorities and the plan to implement the policy goals through selected activities with identified lead agencies and time lines. The process was facilitated by Professor Ian White of the Australian National University, supported by Louis Bouchet, consultant for SOPAC and PACC together with the IWRM and PACC coordinators Haseldon Buraman and Mavis Depaune respectively. Colleagues from CIE, WTC and the CPSC played a central role in developing the policy and its implementation plan. The process was supported by SOPAC, with funding support from the European Union (EU) through the IWRM project, which has provided a strong base for policy and plan development. It was also assisted by the Pacific Adaptation to Climate Change (PACC) under the Secretariat of the Pacific Regional Environment Programme. Both IWRM and PACC projects are hosted by Nauru.

The first step in the development of this IWRM framework policy and its implementation plan was to review previous Government policies, statements, and draft documents and key reports dealing with water and sanitation. The water and sanitation, sewerage and wastes and environment sectors of the NSDS and the conclusions of NISIP were used as a basis for policy and plan development.

A five stage adaptive planning process was carried out through the workshops with CPSC and WTC. These identified the key issues, defined the policy goals and objectives, refined the policy and developed its implementation plan.



An iterative, integrative approach was used to develop the policy and this has also been employed to develop this plan as shown schematically below. Key central elements in the process are the inputs from the whole-of-government WTC, facilitated by the IWRM and PACC coordinators, into the whole-of-government and community-based-organisations, CPSC and the oversight of the process by the high-level National Development Committee.



8. Opportunities for Successful Implementation of this Plan

8.1 Strengths of Nauruans

Nauruans are strong-willed, resilient and fiercely independent and have proven abilities to rise to and overcome challenges. For the past 3,000 years we have recognised the vital and central importance of water. There is widespread community concern about availability and quality of water and widespread recognition about our vulnerability to climate change and our need to adapt to it. Our population is well educated and we all live on one island where there is strong district community identity with established community-based-organisations.

8.2 Local and regional support and expertise

The local media in Nauru are very supportive of water, sanitation and hygiene reform and their news items attract wide and lively community interest. Community-based-organisations also have strong interest in the sector and have participated in the development of the NWSHSP and this plan. The 14 District Committees in Nauru provide a strong basis for local action.

Regional support through CROP and UN agencies, bilateral and international donors and loan agencies has been accessed effectively by Nauru. There are already established donor-funded projects on IWRM, Pacific Adaptation to Climate Change (PACC) and Pacific Hydrological Cycle Monitoring System (HYCOS) in the water and sanitation sector. These have initiated practical projects at the national, Ministry, community and household level and are supported by the regional organisations Applied Geoscience Division (SOPAC) of the Secretariat of the Pacific Community (SPC) and Secretariat of the Pacific Regional Environment Programme (SPREP). In addition the Pacific Water Association (PWA) provides a valuable venue for the pooling of experiences in water supply and sanitation services.

The Water Unit (WU) is made up currently of the IWRM and PACC coordinators within CIE. The WU together with other lead water agencies, state-owned-enterprises (SOEs), corporations and Ministries involved in the Water Technical Committee (WTC) have built up expertise in running water and sanitation projects using IWRM approaches and mainstreaming adaptation measures into practice. The approved NWSHSP provides terms of reference for: a permanent WU within CIE; the whole-of-government WTC, and the whole-of-government and community-based-organisation CPSC. The CPSC has oversight for developing and implementing this plan and reporting to Government on its progress.

8.3 Donor support

Nauru has a good record in attracting aid donor and loan projects. The policy and this policy implementation plan have the potential to attract additional, targeted external funds but focussed on Nauruan priorities.

8.4 Whole-of-government-community approach

CIE has established a whole-of-government-agency-community stakeholder steering committee, the CPSC, to oversee water and sanitation and environment projects and provide an integrated whole-of-government and community-based-organisation approach to national water and environment management. The CPSC is assisted by the whole-of-government and agency Water Technical Committee (WTC), drawn from Departments, agencies and corporations with direct responsibilities in the sector.

The CPSC and WTC have overseen the development of the NWSHP and this plan and are committed to its implementation. CPSC endorsed and submitted the policy to the National Development Committee and through NDC and the Minister to Cabinet. Part of the mandate of the water unit (WU) within the Environment Division of CIE is to work in close cooperation with the WTC, which in turn provides technical support for the CPSC, ensuring a whole-of-government approach which involves community representatives.

8.5 NSDS and NISIP

The NSDS 2005-2025 (revised 2009) and the 2011 National Infrastructure Strategy and Investment Plan (NISIP) lay a solid foundation for improvement in infrastructure in the water, sanitation and hygiene sectors. They formed part of the basis for the policy and this plan which has expanded the emphasis from solely infrastructure to include IWRM principles adaptation strategies. The NSDS sector goals were combined to give the vision for this plan.

8.6 Nauru's international and regional commitments

Finally, Nauru has strong commitments to the Millennium Development Goals, the 2005 Pacific Plan, the 2003 Pacific Regional Action Plan (RAP) for Sustainable Water Management, the 2005 Pacific Framework for Action on Drinking Water Quality and Health and the Pacific Islands Framework for Action on Climate Change 2006-2015. This strong support shows that the Government takes seriously its international and regional obligations. The policy and its implementation plan will further progress those commitments.

8.7 Previous water and sanitation sector studies and reports

There have been a large number of reports published on the state of Nauru's water resources, its water supply systems, threats to them and related environment and sustainability issues including climate change. These and other regional reports, as well as the NSDS and the NISIP and Workshops with the WTC and CPSC have provided the basis for identifying the issues that need to be addressed and have helped identify actions and strategies that are required for their solution. The reports used are listed at the end of this plan.

8.8 Initiatives in Disaster Risk Management, Education, Health and Climate Change

The Government of Nauru has recently passed the Disaster Risk Management Act, 2008, with its accompanying plan, the Education Act, 2011, and has a draft Public Health Bill awaiting submission to Parliament. In addition, preliminary work has been carried out on a draft Environment Management Bill and a draft Climate Change Adaptation Action Plan has been prepared. These all make reference to aspects of water, sanitation and hygiene showing the widespread recognition in Nauru of the fundamental and pervasive, importance of the sector.

Together, the above points indicate a strong potential for successful policy implementation.

9. Support for this Plan

The policy and its accompanying implementation plan were developed using an IWRM whole-of-government-community consultation process through the whole-of-government-community CPSC with assistance from the CIE Water Technical Committee, WTC. The CPSC is made up of representatives from the following Departments, agencies and organisations:

Department of Commerce, Industry and Environment

Environment Division

Agriculture Division

Tourism Division

Department of Health

Public Health Division

Nauru Utilities Corporation

Nauru Rehabilitation Corporation

Department of Education

Department of Finance and Sustainable Development

Planning and Aid Division

Bureau of Statistics

Department of Home Affairs

Business and Community-Based Organisations

National Disaster Management

The CPSC endorsed the draft policy at its meeting on 8 November 2011 for transmission to the National Development Committee (NDC) comprising the Permanent Secretaries of all Departments and the Chief Executive Officers of SOEs and corporations. The NDC considered the policy at its meeting on 11 November 2011 and approved it for transmission to Cabinet for its consideration. Cabinet endorsed the policy on 7 February 2012. This plan addresses implementation of the policy goals and objectives and was workshopped by the WTC on 24 May 2012 and by CPSC on 28 May 2012 to refine activities, priorities, responsibilities and time lines.



Republic of Nauru

**National Water, Sanitation and Hygiene
Implementation Plan**

Part III

**Issues Addressed in the
Implementation Plan**



Base 800205 (A05081) 12-88

Figure 1. Map of Nauru showing its 14 Districts

10. Issues Addressed in this Plan

10.1 Geography and Climate

The island of Nauru in the Central Western Pacific (Figure 1) is the smallest independent nation in the world. This confers both strengths and weaknesses. One of the difficulties Nauru has to face is the limited human and financial resources that it can allocate to key sectors. For example, Nauru has no meteorology office and the Government of Nauru only endorsed the formation of a small water unit and a whole-of-government water technical committee in February 2012, despite the paramount importance of water and climate. Table 1 lists some of the main geographic and climatic characteristics of Nauru.

Table 1. Summary of Geographic and Climatic Characteristics of Nauru

Property	Value
Geography	
Location	0°32' S 166°56' E
Island Type	Raised Carbonate Atoll on Eocene to Oligocene Volcanic Seamount
Area of Island	22 km ²
Area of 'Topside'	16 km ²
Area of Coastal Plain	6 km ²
Width of Coastal Plain	200-400 m
Maximum Elevation (m)	71 m above msl
Depth of surrounding sea	~4,300 m
Climate	
Mean Annual Rainfall (1894-2010)	2100 mm
Coefficient of Variation (CV) Annual Rain	0.55
Maximum Annual Rainfall (for 1930)	4,588 mm
Minimum Annual Rainfall (for 1950)	278 mm (13% mean)
Lowest 3 year Rainfall (period 1998-2000)	1,389 mm (22% of 3 year mean)
Mean Wetter Season (Nov-Apr) Rainfall (1895-2010)	1,277 mm
CV Wetter Season (Nov-Apr) Rainfall (1895-2010)	0.60
Maximum Wetter Season (Nov-Apr) Rainfall (in 1919)	2,729 mm
Minimum Wetter Season (Nov-Apr) Rainfall (in 1989 & 2000)	58 mm (4.5% of mean)
Mean Drier Season (May-Oct) Rainfall (1894-2010)	1,018 mm
CV Drier Season (May-Oct) Rainfall (1894-2010)	0.69
Maximum Drier Season (May-Oct) Rainfall (in 1993)	2,477 mm
Minimum Drier Season (May-Oct) Rainfall (in 1916)	75.9 mm (7.5% of mean)
Average Air Temperature	28°C
Average Maximum Air Temperature	32°C
Average Minimum Air Temperature	25°C
Estimated Average Sea Surface Temperature	29°C

One of the key characteristics in Table 1 especially relevant to water supply is the extreme variability of annual, as well as wetter and drier season rainfall.

10.2 Water sources

Nauruans use water currently from a variety of sources for both potable and non-potable use:

- Rainwater harvested from the roofs of households, government, commercial and industrial buildings and stored by them in rain tanks
- Desalinated water produced by reverse osmosis (RO) of seawater and distributed to household and community tanks by road tankers and to the hospital by pipeline
- Groundwater of varying quality sourced by households from shallow coastal plain wells. Most is brackish, with fresher groundwater in Eiwa and Antenan districts.
- Imported bottled water, and
- Seawater for non-potable uses such as toilet flushing, washing and bathing.

It has been estimated about 38% of the population have access to groundwater. Most of the groundwater extracted is for non-potable uses. In the past, water was also imported as ballast in incoming phosphate ships and stored in large land-based storage tanks. This no longer occurs. Most large storage tanks have now corroded and fallen into disuse.

Information on sources of drinking water was collected in the in the 2002 Census (Table 2).

Table 2. Main sources of drinking water from the 2002 Census

Main source	Households	
	Number	Percentage
Desalinated water	1,340	81%
Rainwater	236	14%
Groundwater	10	0.6%
Other/not stated	66	4%
Total House Holds	1,652	100%

In contrast a Demographic and Health survey in 2007 of about 25% of house holds found that 89% used rainwater as the main source of drinking. Only 8.5% used NUC tanker desalinated water as the main source of drinking water, while 0.3% (1 household) used groundwater for drinking. The heavy reliance on desalinated water revealed in the 2002 Census may reflect water use in the severe 1998-2000 drought. Together this data indicates how the community switches sources of water depending on the prevailing conditions. It also shows that shallow groundwater is a relatively minor source of drinking water.

10.3 Droughts

The information from the 2007 Demographic and Health survey emphasises the importance of rainwater harvesting in Nauru. Figure 2 illustrates the extreme variability of annual rainfall, evident in Table 1 and its strong dependence on sea surface temperature in the Central Western Pacific.

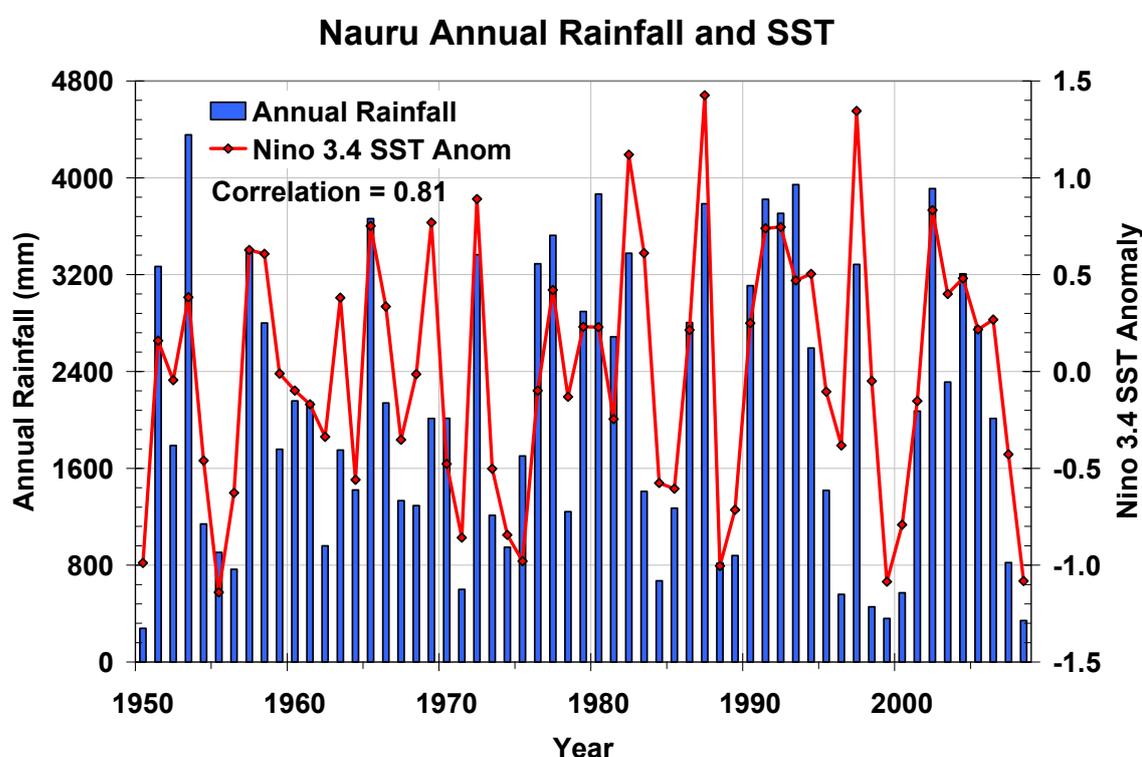


Figure 2. The extreme variability of annual rainfall in Nauru is strongly correlated with the variability in sea surface temperature anomaly in the region

This variability is tied to the El Niño – Southern Oscillation (ENSO) cycle and is strongly correlated with sea surface temperature (SST) in the Central Western Pacific. This strong coupling leads to frequent severe droughts in Nauru when SSTs are cooler. Table 3 summarises the characteristic of severe droughts (rainfalls less than 10 percentile) for rainfall over 6 month periods in between 1946 and 2010 when the rainfall record is most reliable.

Table 3. Characteristics of major 6-month rainfall droughts in Nauru, 1946 to 2010

No.	Start Date	End Date	Duration (months)	Lowest Ranking (percentile)	Drought Interval (years)	6 mths Rainfall (mm)
1	Sep-49	Apr-51	19	1.8	—	65
2	Jul-54	Feb-57	31	8.2	4.8	171
3	Jul-64	Jan-65	6	5	10.0	130
4	Sep-70	Feb-72	17	0.9	6.2	49
5	Jul-73	Jan-75	18	0.1	2.9	31
6	Aug-75	Mar-76	7	7.8	2.0	158
7	Aug-78	Feb-79	6	7.4	3.0	155
8	Dec-83	Mar-86	27	5.8	5.3	136
9	Jun-88	Jan-90	19	0.0	4.5	23
10	Aug-95	Mar-97	19	2.5	7.2	89
11	May-98	Aug-01	39	0.3	2.7	36
12	Jun-07	Aug-09	26	0.2	9.1	35.4
		Mean	19.4		5.2	89.8
		St Dev	10.2		2.6	56.7
		Median	19		5	77

These severe droughts have a median duration of 19 months and a median interval between droughts of only 5 years. In the most severe 6-month drought, starting in 1988, only 23 mm of rain fell. The severity of these droughts means that, with the limited storage now available in Nauru, it is not currently possible to harvest and store sufficient rainwater to maintain supply during major droughts. The frequency of these severe droughts means that drought contingency plans and strategies are essential. Climate change is expected to increase the frequency of extreme events. If the current extreme variability in Nauru can be accommodated in management plans, however, it will be a significant step to adapting to future climates.

10.4 Water production, storage and distribution

Nauru has very limited fresh groundwater mostly in the northern part of the coastal plain. Much of that and the brackish groundwater elsewhere in the coastal plain are contaminated with sewage and, in at least one district, Aiwo (Figure 1), with petroleum products. Residents are therefore forced to rely on energy-intensive and expensive desalination of seawater by reverse osmosis (RO) to supplement supply especially during prolonged dry periods.

Table 4 summarises estimated daily production rates from the various water sources.

Table 4. Daily water production rates from water sources in Nauru

Source	Production Rate (kL/day)
Rainwater - wetter period	N/A
Rainwater after 1 month no rain	0
Maximum NUC RO Plants 3x120 kL	360
Current NUC RO Production 2x~60 kL	~120
Bottled water	N/A
Non potable Groundwater	~300

Daily production or use rate of rainwater in wetter periods is currently unknown. After 4 weeks without rain all rain tanks are exhausted and RO desalination then supplies all potable water.

Currently, only two of the three NUC RO units are operating and only at about half capacity.

Rainwater is the preferred source of potable water when available and collection and storage are critical issues. In 2011, the Department of Commerce Industry and Environment (CIE, 2011) conducted a survey of 1038 rain tanks in both private and public use. Of these, 763 were connected to a roof catchment but only 50% were considered to be in an optimal state to collect and store rainwater. The estimated storage volumes in these tanks are given in Table 5.

Table 5. Estimated storage capacities of survey rain tanks in Nauru in 2011 (CIE, 2011)

Category	Number of Tanks	Total Storage Capacity (KL)	Percent of Total Capacity (%)	Mean Capacity (kL)	Maximum Capacity (kL)
Residential	940	25,598	90.5	27.3	252
Government:	18	1,697	6.0	99.8	474
Commercial	44	504	1.8	11.7	69
Community:	26	438	1.5	16.8	126
Unknown	10	39	0.1	3.9	21
Total	1038	28,275	100.0		

House hold collection and storage of rainwater is clearly a major water source. Of the 1038 rain tanks surveyed, 42 were in need of repair and 205 needed to be replacement. The CIE survey identified that the major use of rainwater was for drinking (Table 6). The major source of water accessed when rain tanks are exhausted during dry periods, the survey found that most access freshwater from the 26 community tanks scattered throughout the districts which are supplied from NUC water tankers (Table 6).

Table 6. Use of water from rain tanks and sources of water supply when rain tanks exhausted (CIE, 2011)

Rain Tank Water Use		Water Supply when Rain Tank Empty	
Drinking water only:	704	Community Tanks	611
Water for irrigation:	2	RO NUC Water Truck	13
Washing and drinking:	198	Well	89
Washing only:	134	None	166
		Unknown	117

Desalinated water produced from the NUC RO units is stored in 6 very recently refurbished, partially in-ground concrete tanks with total capacity 1,740 kL. These tanks also collect rainwater from the roof of the large shed which now encloses the tanks. Water from the concrete tanks is pumped to the one remaining serviceable 4,300 kL large mild steel tank (B13) out of the original 13 steel tanks. B13 has a current useable capacity of about 2,100 kL. Water is piped from this tank to the Hospital, which also has a small, 15 kL/day RO unit, primarily for patients on kidney dialysis. The Meñen Hotel also has a 120 kL/day RO unit and the Taiwanese mission and Capelle have small RO units.

Water from the RO units is also distributed to community, institutional and household tanks by 3 NUC water tankers (2x10 kL and 1x4kL) which operate 16 hours/day for 6 days per week in dry times. The maximum delivery rate for all tankers has been estimated to be about 180 kL/day, about half the maximum production rate of the RO units. In addition to tanker deliveries, until recently, house holders could also fill up containers free-of-charge from a tap at the RO units. It is been estimated that unaccounted for water from the RO units could be as high as 85%. There are currently no power meters on the RO units so their power consumption is unknown as is the cost of producing water, which appears much more than the current charge of \$2.50/kL for water delivered to private tanks. Communal tank deliveries are free of charge. It has, however, been estimated that power consumption was as high as 20 to 30% of the total annual power consumption of Nauru.

10.5 Population and Water Demand

Population statistics for Nauru are listed in Table 7. The total population of Nauru has fluctuated over the past decade due to the expatriation of workers back to Kiribati and Tuvalu. Since 2006, however, there has been a national population growth rate of just over 2% per year. That growth rate is not evenly distributed over all districts. The high density housing area, the 'Location' (the former NPC indentured labour settlement, see Figure 2) in Aiwo and Denigomodu districts had a growth rate of 6.9% between 2006 and 2009. This area presents significant problems because of the higher housing densities and lack of services, despite smaller average household sizes.

Table 7. Summary of the Demography of Nauru

Property	Population	Houses	Average Household Size
1992 Census	9,912	—	—
2002 Census	10,065	1,677	6.0
2006 Mini-census	9,086	1,538	5.9
District with highest population : Meneng	1,355	251	5.4
District with 2 nd highest population: Aiwo	1,165	202	5.8
District with 3 rd highest population: Location	1,059	276	3.8
2011 Census Prelim Results	10,086	1,660	6.1
District with highest population : Location	1,496	344	4.4
District with 2 nd highest population: Meneng	1,384	270	5.1
District with 3 rd highest population: Aiwo	1,267	188	6.7
Proportion Females 2002		49.0%	
Proportion Females 2006		49.4%	
Exponential Growth Rate 2006 to 2011		2.09%/year	
Location Growth Rate 2006 to 2011		6.9%/year	
Aiwo Growth Rate 2006 to 2011		1.7%/year	
Meneng Growth Rate 2006 to 2011		0.4%/year	
Per Capita Gross Domestic Product		\$AUD 2,035	



Figure 3. The crowded 'Location', in Aiwo and Denigomodu districts, the area with the highest population growth rate in Nauru between 2006 and 2011 (Google Earth).

At present reliable data on actual water consumption from various sources in Nauru are unavailable. Previous studies have adopted values assumed by WHO (2001), listed in Table 8, or used estimates from other Pacific Island countries. These WHO assumed values provide somewhat debatable estimates of current total water demands in Nauru, based on the 2011 population data in Table 7.

Table 8. Estimated current water demand in Nauru based on WHO (2001)

Water Use	Assumed Demand
Domestic potable water: (30 L/p/day: drinking & 70 L/p/day: cooking & washing)	100 L/person/day
Domestic non-potable water:for cleaning, toilet flushing, etc	70 L/person/day
Assumed total domestic demand potable water	1,000 kL/day
Assumed total domestic demand non-potable water	700 kL/day
Hospitals and related buildings	40 kL/day /day
Hotels and guesthouses	100 kL
Restaurants and cafes	40 kL/day
Laundry and workshops	30 kL/day
Commercial/offices	60 kL/day.
Assumed non-domestic demand non-potable water	150 kL
Total assumed current potable water demand	1270 kL/day
Total assumed current non-potable water demand	850 kL/day

This estimate of the current potable water demand is 10 times greater than the present rate of water production from the RO desalination plants in Table 4. While in wet seasons, rainwater harvesting is relied on as the main water source, in severe droughts, the rainfall storage capacity in Table 5 would be exhausted after about 22 days if demand was that in Table 8 and continued without restrictions. When that occurs, the RO desalination plants are the main source of water. During severe droughts, the present rate of water production, if totally assigned to domestic use, is equivalent to 12 L/pers/day, enough to satisfy the barest minimum drinking and cooking requirements. Even if the NUC RO plants were operating at their maximum rated production rate, the current road tankers are only able to supply water at a rate equivalent to 18 L/person/day.

Estimates can be made of the size of the catchment and storage required to supply the assumed demand in Table 8 from rainfall alone. Using the historic 1946-2010 rainfall, the catchment area and storage required to meet demand without failure are 100 hectares and 462,000 kL respectively. Were drought water restrictions applied these could be reduced.

The demand for non-potable water in Table 8 is 2.8 times the estimated daily production rate of non-potable groundwater. The latter may not be a significant problem since non-potable demand could partly be met by using seawater.

If the 2006-11 exponential growth rate of the population in Nauru were to continue to 2025, the expected population then would be over 13,500. Assuming that non-domestic demand is about 30% of domestic demand, the total potable water production required, based on the values in Table 8, could be as high as 1,800 kL/day.

These estimates of current and future demand are highly speculative and will remain so until actual water use from various sources is surveyed in both wet and dry periods. What these figures do point out is the importance of maximising rainfall harvesting and increasing water storage as well as the production and efficient distribution of desalinated water in droughts.

10.6 Control of water sources

Government of the Republic of Nauru (GoN) currently has direct control over RO water produced and distributed by the Nauru Utilities Corporation (NUC), rainwater stored in rain tanks fed by Government buildings and imported bottled water. Since domestic rainwater

harvesting and groundwater are also widely used, GoN has limited ways of influencing use and management of these sources, especially since there are no legislation or regulations governing groundwater extraction where ownership is the customary right of land owners.

The draft Health (Water) Regulations under the draft Public Health Bill do specify powers of the Minister and Director of Public Health for ensuring the wholesomeness of supplies of potable water from groundwater, rainwater, desalinated and imported water, including exercising control over all sources of supply of potable waters in Nauru. Under the draft regulations, the Director of Public Health may direct the owner or occupier of any land or premises where there is a well, tank or any receptacle used for the collection or storage of water intended for human consumption to treat the water where deemed necessary. The draft regulations also specifies that the interference with or pollution of any potable water supply which results in the loss of water, or making it a health risk or unfit for domestic use is a criminal offence.

The Education ACT 2011 requires the principal of a school to ensure that the school has an adequate supply of clean running water and that there are sufficient toilet and bathroom facilities for students in working order during school hours. If the principal is unable to fulfil these and the problem cannot be resolved promptly, the Secretary of Education is obliged to order the temporary closure of the school.

The Disaster Risk Management Act 2008 gives the President the power to declare a State of Disaster in the whole or any part of Nauru when the President is satisfied that:\) the Disaster is of a type which constitutes or is likely to constitute a significant and widespread danger to life or property; the nature and the type of Disaster to be confronted requires a coordinated Response; and the declaration of a Disaster is in the best interests of Nauru. It also gives the Resident the power to revoke or vary the declaration. The Act also establishes a Cabinet-appointed National Disaster Risk Management Council which has overall responsibility for Disaster Management. Included in its responsibilities is ensuring that effective community awareness and education programs are conducted to assist communities in their ability to contribute to the Mitigation of and Response to Disaster. While not specified in the Act, floods, droughts, water supply failure, disease outbreaks and coastal inundation could fall within the general definition of a Disaster under the Act.

Private ownership of groundwater, a customary land ownership right, presents a major challenge as excess pumping by one landowner could threaten freshwater availability for the surrounding community. While land is private property, groundwater is a common pool resource shared by many. At present, individual landowners have the ability to influence the availability and quality of groundwater of their neighbours by over-pumping their wells and enhancing seawater intrusion.

10.7 Sanitation, water quality and public health

Wastewater, sewage and septic sludge are disposed directly to the sea in Nauru. The 2002 Census showed that 55% of households use “septics” to dispose of their sewage effluent to “septics” most of which are cesspits. At the time of the Census, 39% of households, mainly in crowded ‘Location’ area (Figure 3) discharged their wastes into a salt-water flushed sewerage network that empties into the sea. This salt-water system is no longer operational. Instead RO water has been employed by households and the system has become partially or completely blocked. It has been estimated that 50% of the population do not have access to improved sanitation systems. Septic tank systems are limited to some government-owned buildings and a few houses.

Nauru has an estimated 1000 cesspits which are mostly 2m deep with no lining at the base. They present a significant threat to groundwater quality and human health, especially in heavy rain when groundwater in the low-lying coastal plain rises to the surface. A survey *E-coli levels* of 274 domestic wells, mostly in the coastal plain, in April 2010 showed widespread faecal contamination of groundwater (Figure 4).

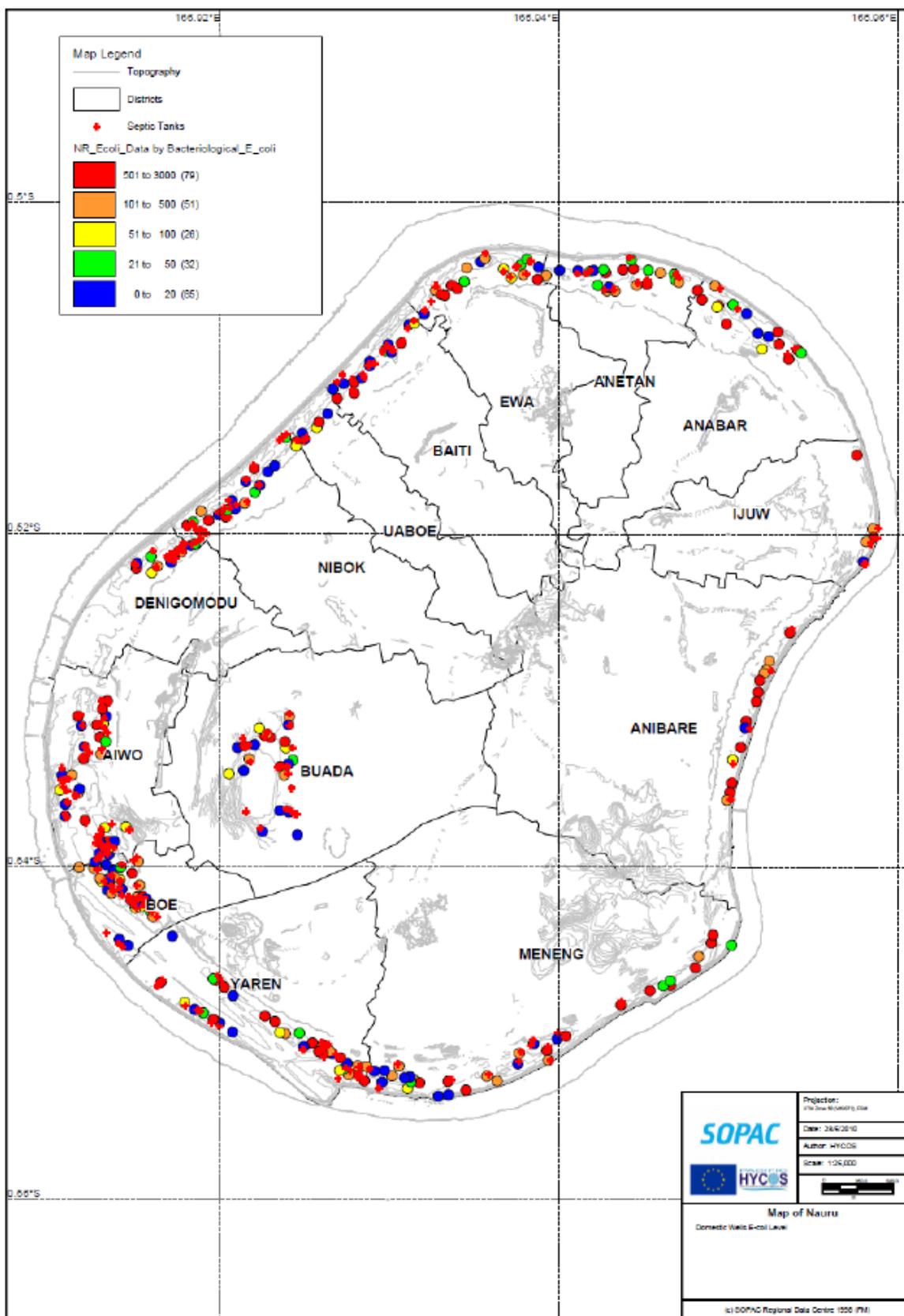


Figure 4. *E. coli* levels (MPN/100 mL) in domestic water wells sampled in April 2010 (Bouchet and Sinclair, 2010).

Partly as a consequence of water contamination, Nauru has a very high diarrhoea prevalence rate, with many experiencing chronic diarrhoea and with incidence rates reported to be twice

that in other PICs.

The NRC currently manages sewage sludge and disposal. Sewage sludge is collected with a pumper truck, which discharges the sludge to the ocean via an existing ocean outfall pipe. In some PICs, such as Tonga, sludge is composted and returned after testing as a soil ameliorant. In view of the major task facing Nauru in rehabilitating mined-out phosphate areas, there is the potential for applying this process here.

A recent study (Kasenga, 2010) investigated a range of sewage disposal and treatment options for Nauru:

- i. Improvements to existing cess pits/ septic tanks – using well-lined double chamber septic tanks and constructed soakaways;
- ii. Setting up communal septic systems coupled with central anaerobic digesters plus sludge drying beds;
- iii. Compost toilets;
- iv. Compact mechanised bio-treatment units (as in use at Meñen Hotel);
- v. Establishing centralised sewage stabilisation ponds; and
- vi. Establishing a centralised conventional treatment plant, for instance an activated sludge plant.

The problem of obtaining landowner approval for the location and construction of communal treatment facilities was noted as a major impediment for some of these options. The study recommended complete rehabilitation of the 'Location' sewage system using brackish groundwater although it noted significant algal growth in the area adjacent to the sewage outfall. For households below an elevation of 24 m above msl, improved double chamber septic tanks appeared the best option. The advantages of compost toilets, particularly in not requiring water for flushing, were also recognised as were the barriers to their implementation. Any trials require extensive social marketing and identification of households who would easily accept them for trial.

The draft regulations of the Draft Public Health Bill specify that every owner of a septic tank must ensure that waste from the tank is removed to avoid overflow and disposed of in a manner that does not create any health hazard. Regulations governing emptying, transport and disposal of septic tank waste are yet to be developed.

10.8 Community participation

Nauru has established District community committees and there have been recent initiatives under both the IWRM and PACC projects to increase community outreach, awareness and participation. This has resulted in the inclusion of representatives of community-based organisations (CBOs) on the peak CPSC. At the grass roots, however, much remains to be done in raising awareness of the vital importance of water, its conservation and protection, equitable sharing, demand management, cost recovery, maintenance of rainwater collection and storage hygiene and sanitation.

One critical area is that in the past the Government provided electricity, water services and maintenance of household rainwater and sanitation systems free-of-charge. The general perception is that water is "government business". Changing this perception so that the community sees water and sanitation as everyone's business is a major but essential on-going challenge. District committees can play a central role in this process. Also of fundamental importance is the inclusion of water and hygiene as central elements in school curricula at all levels to increase awareness and promote participation and behavioural change.

10.9 Issues to be addressed

.Many past reports and studies have detailed and repeated the urgent water resource constraints in Nauru, detailed above, which require government policy and planning intervention. These issues have been reviewed and refined by the CPSC and WTC who grouped them into seven general policy areas in the Cabinet-endorsed NWSHP. The areas

and their associated issues are:

I Climate variability, change and water resource vulnerability– The variability of Nauru’s rainfall, which is coupled to ENSO events, is a major challenge for water management in Nauru with both quality and availability being affected. Nauru oscillates between having too much water during heavy rainfalls to having significant deficits during droughts. The impact of climate change may increase these challenges. Nauru has no meteorology service and there are no approved contingency plans for extreme events especially our frequent droughts.

CPSC identified the following specific issues to be addressed:

1. Frequent ENSO-related major droughts leading to scarce freshwater availability
2. Climate change may add to the complexity of water management
3. Drought and over-use of groundwater cause seawater intrusion
4. Local flooding and groundwater pollution increases in heavy rains

II Water quality and supply – There are no water quality guidelines or standards in Nauru. The quality of Nauru’s scarce fresh groundwater is compromised by household sanitation systems, seawater intrusion, leaking petroleum products and wastes. In dry times, Nauru is heavily reliant on expensive, fossil-fuel intensive desalinated RO water whose production and distribution capacities in droughts are inadequate to meet reasonable demand. Existing RO units are aging and no longer operating at peak capacity. There is a lack of maintenance of water supply, storage and distribution infrastructure. Most rainwater harvesting and storage systems are sub-optimal and poorly maintained. Useable public storage capacity is insufficient to cope with Nauru’s frequent droughts and there is restricted distribution of supply. Both increased storage and improved distribution systems are urgently required. The high priority hospital, dialysis clinic and schools frequently run short of safe, potable water and there is no system for supplying high priority water consumers.

CPSC identified the following specific issues to be addressed:

5. No water quality standards
6. High rate of diarrhoea and health impacts from poor quality water
7. Brackish and limited quantity of groundwater resources
8. Groundwater contaminated by sewage, oil, waste pits and other contaminants
9. Reliance on energy intensive desalinated water (up to 1/3 of Nauru power production)
10. Lack of storage, maintenance of infrastructure and delivery capacity for RO water
11. RO production capacity of desalinated water is insufficient in major droughts
12. Unaccounted for water and water loss up to 85% of RO production
13. Effective strategy needed for water delivery to priority users such as schools, the hospital and dialysis unit
14. Public and household rainwater harvesting and storage is insufficient, and is poorly maintained and inefficient

III Sanitation and Environment - Many of the household sanitation systems have polluted the local groundwater with sewage and in some areas petroleum products and wastes have added to contamination. Septic tank sludge and the salt water sewage system at the Location discharge directly onto the reef. The RO system also discharges saline wastewater directly into the sea. The consequences of these discharges on near-shore ecology are unknown.

CPSC identified the following specific issues to be addressed:

15. Sanitation systems that pollute groundwater and are not maintained adequately.
16. Septic tank sludge and sewage outfall to the reef
17. Sanitation systems that use precious freshwater

IV Demand – There is no current, accurate data on water demand or use by different sectors or use from different water sources in Nauru. There is an imperfect, ineffective system for controlling demand of expensive RO water. Unaccounted for water together with water losses of RO water are unacceptably high. There is no control of groundwater use so that individual overuse can salinise the groundwater of a whole neighbourhood. There is no system for ensuring equitable and fair use of water from public water storage tanks.

CPSC identified the following specific issues to be addressed:

18. No current data on water demand and use from different sources and by different sectors
19. Imperfect, very limited, inequitable system for managing water demand
20. No system for controlling equitable water use from community water storages
21. No control of groundwater use

V Governance – There was no water legislation or national policy for water, sanitation and hygiene sectors and limited strategic planning. There are no drought contingency plans and no clear statement of roles and responsibilities in the sector. Coordination between government departments and agencies was limited and there is no systematic reporting to government. Water sources have no legal protection and the RO is financially unsustainable.

CPSC identified the following specific issues to be addressed:

22. No water legislation or national policy for water, sanitation and hygiene sectors
23. Limited strategic planning and objectives for water and sanitation management
24. No drought contingency plans or strategies
25. No clear roles and responsibilities for water management
26. Limited coordination between departments and agencies
27. No legal protection of water sources
28. Inadequate cost recovery mechanisms for RO water, which is financially unsustainable

VI Capacity - The number of trained people to manage water resources and sanitation in Nauru is very limited. The human and financial resources available for water management are limited. There is no training program for increasing capacity in the sector of government staff, industry or at the household level. There is no national water resource data base and no coordinated system for monitoring and reporting on the Nation's water resources across the Departments and agencies with responsibilities in the sector.

CPSC identified the following specific issues to be addressed:

29. Very limited number of local, trained people for water management and production
30. Very limited resources for planning, maintenance and refurbishment of infrastructure
31. Very limited resources for monitoring, assessment and evaluation
32. No national water resource data base, limited assessment of groundwater
33. No coordinated water resource monitoring, analysis and reporting program

VII Community awareness and engagement – There is limited community awareness about water resource vulnerability, protection and conservation and limited community participation in the planning, protection and conservation of water resources and in the installation and maintenance of rainwater harvesting and improved sanitation systems. Raising awareness and engaging school children in the water, sanitation and hygiene sector is a key strategy and there is a need for improved school curricula at all levels on water, sanitation and hygiene issues. There are no incentives for encouraging improvement of household rainwater harvesting and sanitation systems and limited information on maintaining and repairing them.

CPSC identified the following specific issues to be addressed:

34. Limited awareness about water resource vulnerability, protection and conservation
35. Limited community participation in the planning, protection and conservation of water resources and in promoting improved sanitation systems.
36. Poor maintenance of household water and sanitation infrastructure.
37. No incentives for encouraging the improvement of household rainwater harvesting and sanitation systems.
38. The need for improved school education programs at all levels on water, sanitation and hygiene.

These issues are addressed through the NWSHP goals and their underlying policy objectives. This Plan adopts these and identifies activities required to implement the policy objectives.

10.10 Prioritising the issues

The Water Technical Committee deliberated the above policy areas and issues in a Workshop on 24 May 2012. While it was acknowledged that all of the issues listed above are priority issues, some required urgent attention and indeed some are already being addressed through the IWRM and PACC projects. The WTC ranked the general policy areas in order of priority. Some areas were of equal priority:

- I Water Supply; Governance;
- II Community awareness and engagement; Capacity;
- III Climate variability and change and water resource vulnerability; Water Quality; Sanitation and Environment;
- IV Demand

The order reflects the urgency of the water supply situation and the need to improve governance, community awareness and engagement. Demand was rated as a lower priority, which suggests that it is seen as a difficult issue requiring a longer process to achieve change.

The WTC also ranked the priority of the issues to be addressed. The top priority issues were:

- I RO production capacity of desalinated water is insufficient in major droughts
- I No water legislation or national plan for water, sanitation and hygiene sectors
- I Poor maintenance of household water and sanitation infrastructure

The next highest priority issues were:

- II Unaccounted for water and water loss up to 85% of RO production
- II Rainwater harvesting and storage is insufficient, poorly maintained and inefficient
- II No drought and extreme rainfall events contingency plans or strategies
- II No legal protection of water sources
- II Limited community participation in the planning, protection and conservation of water resources and in promoting improved sanitation systems.

Again these issues reflect urgent concerns over water supply, losses and storage, especially during dry times, the absence of water resources legislation and the need for increased community engagement. Groundwater issues were seen as a lower priority, reinforcing the data above that for most people groundwater is a secondary source of non-potable water.

11 Consistency of this Plan with Previous Government Initiatives

In developing this policy a wide range of studies, reports, previous Government initiatives, policy statements, legislation and regional and international agreements which Nauru has endorsed have been examined. These include the draft Public Health Bill, the Education Act 2011, the Disaster Risk Management Act 2009, the draft Environment Management Act 2006, the draft Nauru Utilities Policy, the draft Nauru Utilities Bill, the NNSDS 2005-2025 (revised October 2009), the 2009 Review of the NNSDS, the 2011 NISIP, the RoN Framework for Climate Change Adaptation, the Pacific Plan 2005, the Pacific Regional Action Plan for Sustainable Water Management, endorsed in Auckland in 2003, Pacific Islands Framework for Action on Climate Change 2006-2015, the UN Framework Convention on Climate Change, the Kyoto protocol, the Copenhagen Accord, the Stockholm Convention for Persistent Organic Pollutants, the UN General Assembly's Declaration in 2000 of the Millennium Development Goals, and the World Summit on Sustainable Development in Johannesburg in 2002.

The NNSDS 2005-2025 (revised 2009) sets down some clear goals for the water and sanitation, waste and sewerage sectors and for the environment which are of direct relevance to this policy:

1. Provide a reliable, safe, affordable, secure and sustainable water supply to meet socio-economic development needs.
2. Effective management of waste and pollution that minimizes negative impacts on public health and environment.
3. Sustainable use and management of the environment and natural resources for present and future generations

The 2011 NISIP used these goals in deciding on infrastructure investment priorities in the water sector. Water, sanitation and hygiene, however, involve much more than infrastructure. People are a key factor and have been taken into account in the development of the policy and this implementation plan. The above together were used as guidance for developing the policy goals and objectives which were endorsed by Cabinet on 7 February 2012. The goals and objectives of the policy provide the basis for this Implementation Plan

12 The Need for a Water and Sanitation Master Plan for Nauru

The critical issues identified above in water and sanitation have been repeatedly emphasised in reports, workshops and consultations. All stakeholders involved in the preparation of the Policy and Plan as well as those involved in the preparation on NISIP emphasised the urgent need for a coordinated water supply Master Plan that comprehensively assesses:

- water sources
- production, storage, treatment and delivery of water
- current and projected future water demand
- demand management, water tariffs, equity and restrictions in droughts
- safe, sanitation systems, sewage and sludge treatment options
- options for investment, and
- political and community support for a detailed and sustainable strategy.

Because sanitation is a critical element in both using scarce water supplies and in the contamination of groundwater and coastal waters, it is essential that sanitation also be included in that plan. Some of the activities in this Implementation Plan are designed to feed directly into the Master Plan.

A central issue concerning the Master Plan is that it is not just about infrastructure. The demand for water is driven by people. People's expectations, behaviour and understanding are key drivers of water demand. Options on how to convince the community of the vital importance of water, of its great value and scarcity, of the national value in protecting it, conserving it and using it wisely, and engaging the community in active involvement will be key components in the Master Plan and some of the activities in this Implementation Plan are designed as direct contributions to the development of the Master Plan.

In endorsing the National Water, Sanitation and Hygiene Policy on 7 February 2012, Cabinet of the Government of Nauru set the policy objective of: ***Water master plan for the long-term development of Nauru's water sources and associated storage and supply infrastructure produced*** (Policy objective 2.1). It is therefore a government policy directive to develop a long term Master Plan for Nauru.

13 Implementation Plan as a Living Document in a Continuing Process

Water reform is a dynamic, continuing process. The studies and reports on water, sanitation and hygiene that have been produced over the past three decades in Nauru are contributions to continuing water reforms. Some of the suggestions raised in these have already been or are being now put into practice. Some of the priority issues raised in the policy development process are already being addressed through various initiatives and projects under IWRM and PACC. For completeness, these have been included in this plan.

As reform progresses, the completed activities in this Plan will no longer be relevant and the Plan will need revision. It is suggested that the Plan be revised every 5 years.



Republic of Nauru

National Water, Sanitation and Hygiene Implementation Plan

Part IV

Activities, Indicators, Responsibilities & Schedule

14 Planned Activities to Implement Goals and Objectives

14.1 Policy Goal 1: Climate variability and change incorporated in all aspects of water and sanitation management

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
1.1 Nauru rainfall data collected, stored, analysed systematically and reported monthly	1. Establish a data base for storing rainfall and climate data.	Rainfall data base installed on network	WU	BoS, WTC, ARMS,, PCCSP, SOPAC	September 2012
	2. Establish agreements for timely feedback of Nauru's rainfall and climate data from BoM and ARMS	2. Agreements on timely data transfer	CIE Environment Division	WU, ARMS, BoM, PCCSP	September 2012
	3. Develop a system for monthly reporting of climate data to WTC, and public.	3. Reporting system developed & monthly reports produced on network	WU	WTC, NMB, SOPAC	September 2012 and continuing
1.2 Early warning system for extreme seasonal climate events relevant to water supply developed.	1. Secure licence for BoM SCOPIC program	1. Licensed SCOPIC program on Nauru	CIE Environment Division	WU, NUC, NDRM,	December 2011
	2. Training for operation of SCOPIC	1. Training programs accessed and completed	BoM	WU, NUC, WTC, ARMS, NDRM	September 2012
	3. Reporting system for seasonal predictions of rainfall established	Reporting system & monthly reports of rainfall predictions	WU	WTC, NDRM, BoM, SOPAC	September 2012 and continuing
	4. Legal implications of making seasonal rainfall predictions publicly available explored	Brief report to CIE, CPSC, Water Unit on legal liability of public predictions	DoJ	WU, WTC, SOPAC	August 2012
	5. Seasonal predictions available publicly	Seasonal predictions posted monthly on CIE Web Site	WU	NUC, WTC	September 2012 and continuing

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
1.3 Drought management strategy developed, endorsed and operational.	1. Drought Management Strategy developed	Draft Drought Management Strategy	WU, NUC, NDRM	WTC, CPSC, BoM SOPAC, SPREP	December 2011
	2. Drought Management Strategy endorsed	Endorsed Drought Management Strategy	Cabinet	NDC, CIE	July 2012
	3. Prioritised responses to drought established	Drought risk communication system and response plan	WU, NUC, NDRM	WTC, CPSC, NMB	July 2012
1.4 Procedures reviewed for drought declarations and warnings modified where necessary	1. Legal implications of drought declarations and warnings analysed.	Brief report to CIE, CPSC, Water Unit on legal liability of public predictions	DoJ	WU, WTC, CPSC	August 2012
	2. Procedures established for publicly announcing drought risk declarations and warnings	Systematic legal procedure for drought risk declaration and warning	DoJ, NDRM, WU	WTC, NMB, CPSC	September 2012
	3. Robust system for communicating risk of drought established	Drought risk communication system	NDRM, WU, NMB	WTC, CPSC	September 2012
1.5 Heavy rainfall contingency plans developed and operational	1. Contingency plan developed to cope with local flooding and health impacts of contaminated flood and groundwater.	Local flooding contingency plan	NDRM, DoH, WU	WTC, CPSC, SOPAC, WHO	January 2013
	2. SCOPIC used to predict higher than average seasonal rainfalls.	Seasonal rainfall predictions posted monthly on CIE Web Site & announced in Media	WU, NUC, NDRM	WTC, BoM	September 2012 and continuing
1.6 Climate change adaptation action plans developed for water supply, demand, sanitation and hygiene	1. Climate Change Adaptation Action Plan developed	Draft Climate Change Adaptation Action Plan	WU	WTC, SPREP, SOPAC	May 2012
	2. Endorsement of Climate Change Adaptation Plan	Plan available on network	Cabinet, NDC	CIE	July 2012
	3. Public awareness campaign on Climate Change Adaptation	Campaign commenced information on network	WU, NMB, DoE	WTC, CPSC	August 2012 and ongoing

14.2 Policy Goal 2: Reliable, safe, affordable, secure, efficient and sustainable water supply established

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
2.1 Water master plan for the long-term development of Nauru's water sources and associated storage and supply infrastructure produced	1. Master Plan developed on current and projected future demand, and future needs for all water sources, storages, distribution and treatment, demand management, tariffs and financial sustainability, sanitation system options and community engagement.	Draft Nauru water supply and sanitation Master Plan.	NUC, DoH, WU,	WTC, CPSC, NDC, SOPAC, PWA	December 2012
	2. Mater Plan endorsed by Cabinet	Endorsed Master Plan	Cabinet, NDC	NUC, DoH, CIE, CPSC	May 2013
	3. Investment plan for funding priority master plan strategies.	Water supply investment plan	DoFSD, NDC	NUC, CIE, DoH, CPSC	September 2012
	4. Funding sought for highest priority projects	Funding secured	PAD	NUC, CIE, DoH	July 2013
	5. Installation of priority infrastructure	Priority infrastructure installed	NUC, DoH	WU	2014-2025
2.2 Water quality standards established for Nauru and incorporated into water safety plans or water quality management plans	1. Review of Pacific water quality standards	Report recommending system for Nauru water	DoH, NUC, WU,	WTC, SOPAC, WHO, PWA	December 2012
	2. Water quality standards established for Nauru	Water quality standards incorporated into Public Health Regulations	DoH, DoJ	NUC, WU, WTC,	February 2013
	3. Water quality standards incorporated into water safety or water quality management plans.	Water safety or water quality management plan based on water quality standards.	DoH, NUC, WU	WTC, CPSC, SOPAC, WHO, PWA	July 2013

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
2.3 Sources of groundwater pollution identified, and plans developed to deal with them.	1. Resurveys of water quality of household wells and NRC bores and identification of contaminants under wet and dry conditions	Report detailing the quality of groundwater in Nauru and its safety for human use	DoH, NRC, WU,	WTC, SOPAC, WHO	December 2014 and periodic on-going
	2. Identification of sources of groundwater pollution	Maps showing sources of polluted or contaminated groundwater on network	DoH, WU	WTC	December 2014 and on-going
	3. Groundwater quality management plan developed including communication strategy	Groundwater quality management plan and public communication strategy	DoH, WU	WTC, SOPAC, WHO	July 2015
2.4 Stored and delivered RO water and public rainwater storages treated to standards	1. Treatment systems installed at RO water storages and distribution systems	Treatment systems and strategies in place	NUC, DoH,	WTC, SOPAC, WHO, PWA	August 2012 and on-going
	2. Survey of water quality in public water storages	Report on the quality of public water storages to WTC, CPSC	DoH, WU	WTC, CPSC	December 2012
	2. Review of systems available for treating public rainwater storages	Report to WTC & CPSC recommending robust, effective and simple system	DoH	NUC, WU, WTC, CPSC	May 2013
	3. Funding sought for treatment systems	Funding secured	PAD	DoH, NUC, WTC, CPSC, NDC	July 2013
	4. Installation of treatment systems for public rainwater storages	Systems installed progressively starting with hospital & schools	DoH, NUC,	WU, WTC	2013-2018

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
2.5 Guidelines for rainwater harvesting, storage and maintenance introduced	1. Guidelines for installation of rainwater harvesting and storage produced.	Guidelines publicly available on network	WU	WTC, SOPAC	December 2012
	2. Instruction manual for maintenance of household rainwater harvesting and storage systems	Instruction manual publicly available, hardcopy and on network	WU	WTC, SOPAC	December 2012
	3. District committee training sessions developed on installation and maintenance of household rainwater harvesting and storage systems	Training sessions in operation	WU, District Committees, CBOs	WTC, SOPAC	December 2012 and on-going
	4. Rainwater harvesting and storage building code established for all new government buildings.	Building code in place and operational	NDC	WU, WTC, CPSC, SOPAC	July 2013
2.6 Rate of supply of fresh water increased	1. New RO unit installed	New RO unit operational	NUC		July 2013
	2. Investigation of potential for a full or partial water reticulation pipeline (Master Plan)	Report in Master Plan on feasibility	NUC, WU	WTC, CPSC, NDC, PWA, SOPAC,	December 2012
	3. Survey of the potential for increasing rainwater harvesting, storage and distribution from public infrastructure (Master Plan)	Report in Master Plan detailing potential for increasing public rainwater storage	WU, NUC	WTC, SOPAC	December 2012

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
2.7 Unaccounted for water and water losses from RO system reduced to acceptable levels	1. Water leakage and loss detection program conducted for public RO production, storage and distribution system	Report to WTC, CPSC detailing unaccounted for water	NUC	PWA, SOPAC, WU, WTC, CPSC	July 2013
	2. Prioritised program of leak and losses reduction commenced	Leakage and loss rate of RO water reduced to acceptable standards, reported annually	NUC	PWA, WTC, CPSC, NDC	September 2013 and on-going
2.8 Storage capacity for RO water and public rainwater systems increased.	1. Existing storages refurbished and repaired	Increased capacity for storage of RO water	NUC	NRC	May 2012 and on-going
	2. Potential for increasing RO water storages explored (Master Plan)	Report in Master Plan on feasibility of increasing storages	NUC	WU, WTC, CPSC, PWA SOPAC,	December 2013
2.9 Delivery capacity of RO water improved.	1. Increase number of water tankers	More delivery water tankers	NUC, PAD	CPSC, NDC	December 2013
	2. Investigation of potential for a full or partial water reticulation pipeline (Master Plan)	Report in Master Plan on feasibility	NUC,	WTC, PWA, SOPAC,	December 2013
2.10 Delivery strategy for priority users such as the hospital, schools and community storages established	1. Protocol developed for supplying water to priority users such as the hospital, clinic, schools and community storages particularly in droughts	Protocol operational and available on network	NUC, Health, Education,	DoJ, CBOs, WTC, PWA	July 2013
2.11 Infrastructure maintenance, investment and replacement program established.	1. Develop a prioritised schedule for maintenance, investment and replacement of water and sanitation infrastructure (Master Plan),	Schedule developed and endorsed	NUC, DoFSD, NDC	CIE, PWA	December 2013

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
2.12 Alternate, low energy-consumption sources of water developed	1. Analysis of the feasibility of using renewable energy sources and new energy storage systems to produce freshwater (Master Plan).	Report in Master Plan on feasibility	NUC,	WTC, SOPAC, UNIDO	December 2013
	2. Funding sought for renewable energy sources and storage systems	Funding proposal	PAD	NUC, NDC, WTC, SOPAC, UNIDO	May 2014
2.13 Full assessment of groundwater resources completed including sustainable yield, quality and fit-for-purposes uses	1. Assessment of groundwater resources in Nauru including water quality, fit-for-purpose uses and sustainable yield to minimise seawater intrusion	Report showing the distribution, sustainable yield and quality of groundwater sources and their appropriate use on network	WU, DoH, NRC,	WTC, CPSC	December 2015
	2. Trials of household systems to treat polluted groundwater.	Trials established and report detailing effectiveness of treatment, ease of use, and cost benefit analysis	WU, DoH	WTC	December 2011 and ongoing.
2.14 Public and private water sources protected from misuse, pollution and theft.	1. Review of all legislation and regulations pertaining to water	1. Report to CPSC detailing the legal protection of water sources in Nauru	DoJ	DoH, WU, DoE, WTC, CPSC	July 2012
	2. Introduction of legislation or regulations establish drinking water quality standards, prevent contamination of water sources, water theft and inappropriate use	2. Legislation or regulations establishing drinking water quality standards, protecting water sources (Public Health Bill)	DoJ, DoH	WU, WTC, CPSC	July 2012 and ongoing

14.3 Policy Goal 3: Sanitation systems introduced which meet appropriate sanitation needs, minimise impacts on the environment and encourage improved hygiene

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
3.1 Sewage sludge and outfall systems introduced which minimise environmental impacts	1. Establish regulations for the disposal of septic tank and cess pit wastes	Regulations within Public Health Bill	DoH	WU, WTC, SOPAC, WHO	December 2014
	2. Assessment of ecosystem impacts of discharges onto reef	Report to NDC, CPSC, WTC detailing impacts and suggesting solutions posted on network	CIE, Fisheries,	WTC, SOPAC, SPREP	December 2013
	3. Investigate alternate systems for treatment of septic tank and cess pit sludge (Master Plan)	Report in Master Plan on feasibility	DoH, WU, NRC	Agriculture, WTC, CPSC, SOPAC, WHO	December 2013
	4. Design sludge treatment and disposal system to minimise impact on reef	Design produced	NRC, DoH	Fisheries, CIE SOPAC	July 2014
	5. Sludge treatment and outfalls refurbished.	New sludge treatment and redesigned outfalls.	NRC, DoH, PAD	WU, WTC, SOPAC, SPREP Aid Donors	December 2014
3.2 Sanitation systems and practices introduced to minimise groundwater pollution and health impacts	1. Trials of improved septic tank systems	Report to CPSC detailing performance and impacts on groundwater quality posted on network.	WU, DoH	WTC, CPSC, SOPAC	December 2011 and on-going
	2. Trials of composting toilets in households and school	Report detailing performance and acceptance on network.	WU, DoH	WTC, SOPAC	December 2011 and on-going
	3. Awareness campaign on sanitation systems	Community aware of the issues	WU, DoH	WTC, NMB, SOPAC	December 2012 and on-going
	3. Complete refurbishment of the 'Location' sanitation system	Location sanitation system fully operational	DoH	WU, WTC, SOPAC, AusAID	December 2014

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
3.3 Training programs for maintenance of household sanitation systems introduced	1. Training program designed and supported.	Training program in operation	DoH, WU, CBOs	WTC, SOPAC, WHO	July 2013 and on-going
3.4 Non-potable water used for toilet-flushing	1. Feasibility study of introduction of regulations for use of non-potable water for toilet flushing	Report on feasibility to CPSC, WTC	WU, DoH	WTC, CPSC, SOPAC	December 2014
	2. Brackish groundwater flush system designed	Design produced.	NRC, DoH, WU	WTC, SOPAC	July 2015
	3. Systems progressively installed in selected areas	Brackish water flush systems in place	NRC, WU, PAD	WTC, SOPAC Aid donors	December 2015 and on-going

14.4 Policy Goal 4: Equitable system for controlling demand, conserving water and minimising waste and losses created

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
4.1 System created to determine, update and report on water demand by different sectors from all sources in wet and dry conditions.	1. Survey questions on household, business, industry and institutional water use designed for all future Census.	1. Set of water use survey questions for Census forms.	BoS, NUC, WU	WTC, SPC, SOPAC, PWA	July 2013
	2. Water use survey questions included in future Census	Future Census forms contain water use questions	BoS	WU, WTC	December 2013 for distribution with next Census
	3. Sub-Sample household, business and industry water use survey designed	Sub-sample water use survey form	BoS, NUC, WU	WTC, SPC, SOPAC, PWA	September 2012
	4. Sub-sample household, business and industry survey conducted in all districts and analysed	Report to NDC, CPSC, and WTC on results of water use from sub-sample survey.	BoS, NUC, WU	WTC, CPSC, NDC	January 2013 and every 5 years
	5. Establish representative metered households to monitor water use	Report to CPSC, WTC on monitored household use in wet & dry periods	NUC, BoS, WU	WTC, SOPAC	December 2015
4.2 Fair system developed to control demand for RO water and recover costs of water supply.	1. Facilitate discussions in District Committees and Parliament on equitable and fair systems for controlling demand for RO water	Report to NDC, CPSC, and WTC on conclusions from discussions.	NUC, WU	WTC, CPSC, NDC, SOPAC, PWA	December 2014
	2. Facilitate discussions in District Committees and Parliament on the cost of RO water and how communities can recover those costs	Report to NDC, CPSC, and WTC on conclusions from discussions.	NUC, WU	WTC, CPSC, NDC, SOPAC, PWA	December 2014
	3. Fair and equitable demand management system established.	Widely accepted system in place	Cabinet, NDC	NUC, CIE, CPSC, WTC	December 2015 and on-going

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
4.3 Targets set for water use by sectors especially in droughts	1. Facilitate discussions in District Committees and Parliament on fair targets for water use and restrictions during droughts. .	Report to NDC, CPSC, and WTC on conclusions from discussions.	NUC, WU	WTC, CPSC, NDC, SOPAC, PWA	December 2013
	2. Endorse water use targets and drought water restriction regulations	Widely accepted regulations on drought water restrictions in place	Cabinet, NDC	NUC, CIE, DoH, CPSC	July 2014
4.4 Equitable system in place to optimise groundwater extraction to no more than the sustainable yield	1. Survey of the distribution of salinity, sustainable yield and fitness for use of groundwater in Nauru	Report to NDC, CPSC, WTC on distribution, sustainable yield and fitness for use of groundwater	NRC	WU, DoH, WTC, CDSC, NDC	December 2013
	2. Facilitate discussions in District Committees and Parliament on impacts of over pumping of groundwater.	Report to NDC, CPSC, WTC on conclusions from discussions	WU	WTC, CPSC, NDC, SOPAC,	July 2014
	3. Introduce regulations on the pumping capacities and number of groundwater pumps.	Regulations in place limited total groundwater pumping rates to less than the sustainable yield	DoJ, WU	WTC, CPSC	December 2014
4.5 System established to manage fair water distribution from community water tanks	1. Facilitate District Committee discussions on fair system for sharing water from community tanks	Report to NDC, CPSC, WTC on conclusions from discussions	WU,	WTC, CPSC, NDC	December 2015
	2. Run competition between districts to find best solution	Competition run & winner(s) announced	WU, NMB	WTC, CPSC	July 2016
	3. Introduce winning management system in all districts	System for managing fair distribution of water from community tanks	WU	WTC, CPSC	December 2016 and on-going

14.5 Policy Goal 5: Clear, consistent and transparent system of water and sanitation policy, plans and laws established identifying organisations, roles, responsibilities for managing, conserving and protecting water resources

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
5.1 National water, sanitation and hygiene policy proclaimed by Cabinet	1. Draft Policy with terms of reference for WU, WTC and CPSC submitted to Cabinet	Policy endorsed by Cabinet	Cabinet NDC, CIE	WU, WTC, CPSC SOPAC,	7 February 2012
	2. Public launch of Policy	Public launch	CIE, NMB	WU, WTC, CPSC	September 2012
5.2 National 15 year IWRM water policy implementation plan adopted	1. Draft Implementation Plan developed	Draft Implementation Plan	CIE, CPSC, WTC	WU, SOPAC	June 2012
	2. Draft Implementation Plan submitted to Cabinet	Implementation Plan approved by Cabinet	Cabinet, NDC, CIE	CPSC, WTC, WU	August 2012
	3. Public launch of Implementation Plan	Public launch with Policy	CIE, NMB	WU, WTC, CPSC	September 2012
5.3 Whole-of-Government – Community Nauru peak sector National Committee established under the National Development Committee	1. Terms of reference for the Whole-of-Government – Community Nauru peak sector National Committee, CPSC, submitted to Cabinet with Policy	Policy & CPSC TOR endorsed by Cabinet	Cabinet, NDC, CIE	CPSC, WTC, WU	7 February 2012 and on-going
5.4 Whole-of-government Water Technical Committee (WTC) formally established	1. Terms of reference for the Whole-of-Government – Community WTC submitted to Cabinet with Policy	Policy & WTC TOR endorsed by Cabinet	Cabinet, NDC, CIE	CPSC, WTC, WU	7 February 2012 and on-going

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
5.5 Water Unit (WU) created within the lead Ministry as the agency responsible for planning, managing, monitoring and reporting of Nauru's fresh water resources in collaboration with the Water Technical Committee	1. Terms of reference for the Water Unit, WU, within CIE submitted to Cabinet with Policy	Policy & WU TOR endorsed by Cabinet	Cabinet, NDC, CIE	CPSC, WTC, WU	7 February 2012 and on-going
5.6 Review of all legislation, regulations and policy relevant to water and sanitation conducted to determine the need for water and sanitation legislation or regulations to manage, conserve and protect fresh water	1. Carry out review of legislation, regulations and policies.	1. Relevant policies and legislation such as the DRM Act 2008 and Plan, the Education ACT 2011, the Draft Public Health Bill 2012 and the Draft Environment Management Bill surveyed in this draft Implementation Plan	DoJ, WU	WTC, CPSC	June 2012
	2. Identify gaps in existing regulations and laws relating to water quality guidelines, groundwater extraction, theft of stored water, disposal of wastes.	Report to NDC, CPSC, WTC identifying areas requiring water and	DoJ, WU, DoH	WTC, CPSC, NDC, SOPAC	December 2012
	3. Draft appropriate legislation, regulations as part of a draft Environment Bill	Draft legislation, amendments and regulations	DoJ	WU, DoH, WTC, CPSC	July 2013

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
5.7 Implementation of policy included in Departmental, Agency and Corporations' Operations Plans	1. Review of Water and Sanitation Activities and Responsibilities identified in this Plan	2. Workshop of CPSC to discuss responsibilities for activities identified in this Plan & report to Departments	CPSC	WTC	Aug 2012
	2. Identified Plan activities included in Departmental, Agency or Corporation Operations Plans	Plan Activities specified in Departmental, Agency and Corporation Operation Plans	CIE, DoH, DoFSD, DoE, DoHA, NUC, NRC, NDRM	WU	Sep 2012 and on-going
	3. Contributions to whole-of-government WTC and CPSC included in Departmental, Agency or Corporation Operations Plans	Departmental, Agency and Corporation Operation Plans identify contribution to whole-of-government WTC, CPSC	CIE, DoH, DoFSD, DoE, DoHA, NUC, NRC, NDRM	WU	Sep 2012 and on-going

14.6 Policy Goal 6: Appropriate resources, capacity, skills training, information and organisations available for managing water and sanitation systems sustainably

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
6.1 Water Unit operational and adequately resourced	1. Resources allocated to support WU including IWRM and climate change adaptation activities identified in this Plan	CIE Budget line or external funding source for Water Unit	DoFSD, PAD, CIE	AusAID, NZaid, GEF, EU, GIZ	July 2012 and on-going
6.2 Capabilities required for WU and WTC staff specified	1. Capabilities defined for WU, WTC staff based on activities required in this Plan	Capability statements for WU, WTC staff	CIE, Public Service	SOPAC	August 2012
6.3 Appropriate training programs identified	1. Training programs identified for WU and WTC Staff	Number of WU and WTC staff receiving training	CIE	SOPAC, USP	December 2012 and on-going
	2. School curricula introduced to increase interest in technical fields including water supply and sanitation	Percentage of high school graduates with technical skills	DoE	CIE, NUC, NRC, RONPHOS	July 2013 and on-going
6.4 Coordinated water resources and sanitation monitoring and reporting system established	1. Establish comprehensive monitoring system for RO water production, storage, quality, use, losses, groundwater quality & use, rainwater harvesting & storage, sanitation systems, & sludge removal	Coordinated monitoring system established	WTC, NUC, WU, DoH	CPSC, SOPAC	December 2013
	2. Data analysis & reporting system established	Annual coordinated reports to NDC, CIE & Cabinet	WTC	WU, NUC, CPSC, DoH	December 2013

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
6.5 Centralised, accessible national water resources, sanitation and hygiene data bases established	Establish national water, sanitation and hygiene data base	Accessible web-based data base established	WTC, WU, NUC, DoH	CPSC, DoH, SOPAC	December 2014 and on-going
6.6 System established for regularly informing the public on water resource issues	Regular reports to the community on conditions of the Nations water resources	Regular publicly available brief reports on web and Media announcements	WU, NUC, NMB	CPSC, DoH,	December 2014 and on-going

14.7 Policy Goal 7: Community aware of the issues and actively engaged in planning, protection and conservation of water and improvements to household water and sanitation facilities

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
7.1 Community based organisations, industry, commerce and woman represented on peak National Water, Sanitation and Hygiene Committee	1. Peak national committee for water, sanitation, hygiene and other issues formed with whole-of-government and community based organisations represented.	Peak national body with representatives of all relevant government agencies and corporations and industry, commerce and community-based organisations, CPSC formed.	CIE		2011
	2. Peak CPSC committee recognised as a sub-committee of NDC	Formal recognition by Government of CPSC as a sub-committee of NDC	Cabinet	NDC, CIE	7 February 2012 and on-going
7.2 Water, sanitation and hygiene programs incorporated into school curricula at all levels	1. Review of water, sanitation and hygiene programs in school curricula and identification of gaps	Report to CPSC, WTC on current program and suggestions for improvements	DoE	WU, NUC, DoH, WTC, CPSC, SOPAC, USP, NGOs AusAID,	December 2012
	2. Development of curricula for all levels emphasising the vital importance of water, hygiene and sanitation and the protection, conservation and wise use of water	Curricula in place in schools	DoE	WU, NUC, DoH, WTC, CPSC, SOPAC, USP, NGOs	December 2013 and on-going

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
7.3 Local district water, hygiene and sanitation sub-committees established	1. Discussions with District Committees on the formation of local sub-committees	Brief report to CPSC, WYC on outcomes of Discussions	WU, District Committees	WTC, CPSC	December 2012
	2. Development of TOR for sub-committees	TOR developed	WU, District Committees	WTC, CPSC	December 2012
	3. Where appropriate sub-committees established	Sub-committees in place	WU, District Committees	WTC, CPSC	July 2013 and on-going
7.4 Incentive programs created for improving and maintaining rainwater harvesting and storage at the household and business level.	1. Review rainwater incentive schemes in other PICs including revolving loan fund schemes	Report to CPSC, WTC on incentive schemes with recommendations for Nauru	WU, DoFSD	WTC, CPSC SOPAC	December 2013
	2. Establish appropriate Incentive schemes	Incentive schemes operating	PAD, WU	CPSC WTC, Aid donors	July 2014 and on-going
7.5 Incentive programs introduced for moving to sanitation systems that minimise groundwater pollution and use of potable water for flushing	1. Review of incentive schemes in other PICs including revolving loan fund schemes	Report to CPSC, WTC on incentive schemes with recommendations for Nauru	WU, DoFSD	WTC, CPSC SOPAC	December 2013
	2. Establish appropriate Incentive schemes	Incentive schemes operating	PAD, WU	CPSC, WTC, Aid donors	July 2014 and on-going

Policy Objective	Activities	Indicators	Responsible Agencies		Scheduled Completion
			Lead	Support	
7.6 Public education, communication and engagement strategy to increase capacity, raise awareness and encourage participation in conserving water, protecting water sources and minimising waste of water established	1. Review public education, awareness and engagement initiatives in the water sector in other PICs	Brief Report to CPSC, WTC on successful strategies.	WU, DoHA	NUC, DoH, WTC, CPSC. SOPAC	December 2013
	2. Develop public education, communication and engagement plan using the District sub-committees	Public education, communication and engagement plan developed	WU, DoHA, District Committees	NUC, DoH, WTC, CPSC. SOPAC	July 2014
	3. Implement public education, communication and engagement plan	Plan implemented	WU, DoHA, District Committees	NUC, DoH, WTC, CPSC.	September 2014



Republic of Nauru

**National Water, Sanitation and Hygiene
Implementation Plan**

Part V

**Implementation, Monitoring, Review
and Endorsement**

15 Collaborative Implementation of this Plan

Water, sanitation and hygiene are vital to current survival and future development in Nauru. The issues outlined in Section 10 are complex and varied and involve much more than just infrastructure. The processes used to develop Nauru's National Water, Sanitation and Hygiene Policy and this Implementation Plan revealed a large number of major challenges that must be addressed. The tasks required are numerous and cut across administrative jurisdictions. The human and financial resources available to tackle them are limited so that a collaborative effort between Departments, State-owned Enterprises and the community is required to implement this Plan. Regional organisations also have expertise that could assist.

Although CIE has been designated the lead sector agency many other agencies also have key roles in the sector. Because of that, Cabinet has endorsed the whole-of-government Water Technical Committee to collectively implement its policy and this Plan in an integrated way. The process is overseen by the whole-of-government and community-based-organisation peak national committee, the CIE Projects Steering Committee, a sub-committee of the National Development Committee which reports to Cabinet. Figure 5 shows the relations between the committees and the organisations with water and sanitation responsibilities.

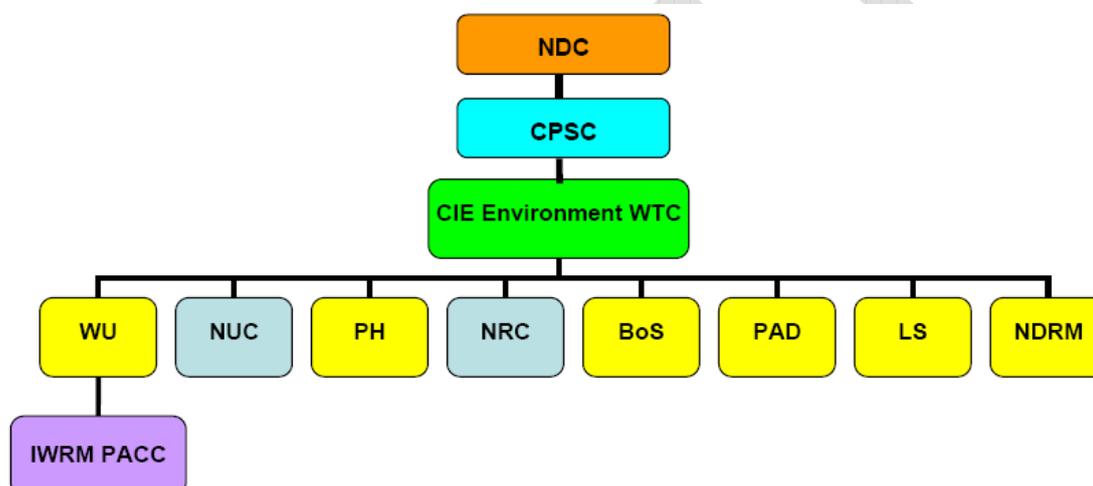


Figure 5. Composition of the Water Technical Committee and its Management Reporting Structure

1. National Development Committee (NDC)
2. CIE Project Steering Committee, a Sub Committee of NDC (CPSC)
3. Department of Commerce, Industry and Environment, Environment Division (CIE Environment) Water Technical Committee which oversees implementation of the plan and reports to CIE and NDC on progress.

Members of the WTC carry out the activities in this plan and implement Plan activities are:

4. The CIE Water Unit CIE (WU)
5. The Nauru Utilities Corporation (NUC)
6. Public Health Division, Department of Health (PH)
7. The Nauru Rehabilitation Corporation (NRC)
8. The Bureau of Statistics, Department of Finance and Sustainable Development (BoS)
9. The Planning and Aid Division, Department of Finance and Sustainable Development (PAD)
10. Lands and Survey Division, Department of Home Affairs (LS)
11. National Disaster Risk Management Office (NDRM)
12. Coordinators of the Integrated Water Resources Management (IWRM) and Pacific Adaptation to climate change (PACC) projects in Nauru contribute to the WTC.

In addition to these, the Department of Education, a member of CPSC has some specified activities in the Plan.

16 Incorporating Plan Activities into Annual Work and Operational Plans

In order to mainstream implementation of Plan activities, the Departments and Corporations whose divisions and units make up the WTC in Figure 5 need to incorporate activities assigned to the divisions, units and departments in their annual work or operational plans so that resources can be allocated to these tasks

17 Monitoring Policy and Plan Implementation

The National Policy and this Implementation Plan are without value unless there is a concerted effort to monitor the progress of activities implementing the Government’s policy goals and objectives. The terms of reference assign that responsibility to the CIE Project Steering Committee, a sub-committee of NDC, which is assisted by the WTC. The WTC is required to report annually to CPSC on progress of plan activities. CPSC, in turn, is required to report annually through CIE to NDC who then transmits approved report summaries to Cabinet. A schematic of the Policy monitoring framework and its direct linkage to policy implementation is illustrated in Figure 6.

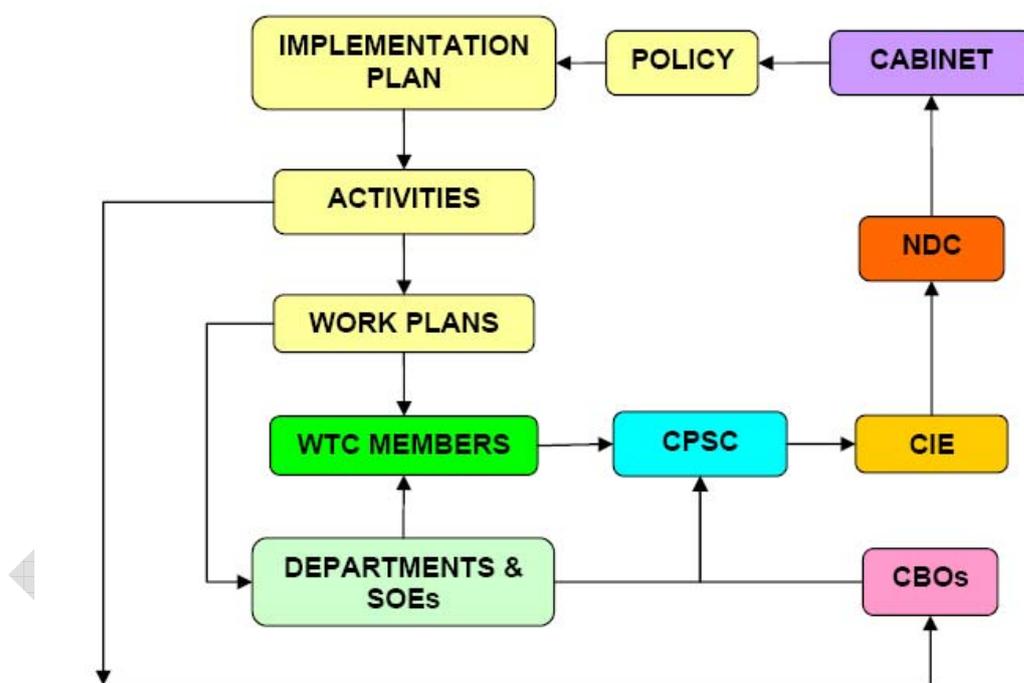


Figure 6. National Water, Sanitation and Hygiene Policy Implementation and Monitoring Framework

18 Submitting Agency

This Implementation Plan is required by the Government’s National Water, Sanitation and Hygiene Policy and submitted to Cabinet by the designated lead water agency the Department of Commerce, Industry and Environment. The Plan was developed through the whole-of-government and community-based-organisations CIE Project Steering Committee, a sub-committee of the National Development Committee, assisted by the whole-of-government Water Technical Committee.

19 Implementation Agencies

The Department of Commerce, Industry and Environment is the lead agency responsible for implementation of this Plan. Other key agencies participating in implementation are the Department of Health, the Nauru Utilities Authority, Nauru Rehabilitation Corporation, Department of Education, Department of Finance and Sustainable Development, and the Ministry of Home Affairs. Organisational Implications of this Plan

The endorsed Policy has established a water unit within CIE to focus the national initiatives in water, sanitation and hygiene and to be the lead implementing agency for this Plan, in collaboration with members of the endorsed whole-of-government Water Technical Committee. It will coordinate monitoring, planning and management of Nauru's water resources and sanitation systems, centralise data storage, analysis and reporting and develop incentive schemes for improved rainwater harvesting and sanitation systems.

20 Legislative Implications of this Plan

There is a need to review all legislation, regulations and building codes pertaining to water and sanitation, to the protection of community rainwater storages and groundwater supply sources, water quality guidelines and to the statutory basis for agencies with responsibilities in the sector. Rationalisation, improvements and new legislation may be required. A review of existing regulations and incentives for compliance and their performance is also necessary.

21 Review of Policy and Implementation Plan

The NWSHP and this accompanying Implementation Plan are living documents which are designed to be updated as progress occurs. Where necessary, the Policy and Plan should be revised to reflect progress and ensure continued relevance on an annual basis. They will be formally reviewed 5 years after being endorsed.

22 Recommendation

That Cabinet approves this policy Implementation Plan.

23 Responsible Minister

Signed

Hon Frederick Pitcher MP

Minister

Department of Commerce, Industry and Environment

24 Submission Date

XX June 2012

25 References Used in Plan Preparation

- Ackoff, R. L. (1999) *Ackoff's Best. His Classic Writings on Management*, John Wiley and Sons, New York, 356 pp.
- Barnett, J. (2001) Adapting to Climate Change in Pacific Island Countries: The Problem of Uncertainty, *World Development*, 29 (6): 977-993.
- Barnett, J. (2005) Titanic states? Impacts and responses to climate change in the Pacific Islands. *Journal of International Affairs*, 59 (1): 203–219.
- Bouchet L. (2011). *Water Sanitation and Climate Outlook Nauru, An overview of water and sanitation management in Nauru*, July 2011, Pacific Islands Applied Geoscience Commission (SOPAC), Suva, Fiji Islands, 33 pp.
- Bouchet L., Sinclair, P. (2010) *Assessing Vulnerability of Shallow Groundwater Domestic Wells In Nauru*. Pacific Hydrological Cycle Monitoring System (HYCOS) and The Disaster Risk Reduction in Eight Pacific ACP States (B-Envelope) projects. June 2010, SOPAC, Suva, Fiji Islands, 114 pp.
- Bredehoeft, J.D. (1997). Water Management in the United States-A Democratic Process (Who are the Managers?). In: *Reflections on Hydrology: Science and Practice*. N. Burras (ed.) American Geophysical Union, Washington D.C., pp 36-61.
- BoM and CSIRO (2011). *Climate Change in the Pacific: Scientific Assessment and New Research. Volume 1: Regional Overview*. Pacific Climate Change Science Program, Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation, Melbourne, 257 pp.
- BoM and CSIRO (2011). *Climate Change in the Pacific: Scientific Assessment and New Research. Volume 2: Country Reports*. Pacific Climate Change Science Program, Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation, Melbourne, 273 pp.
- Bridgman, P. and Davis, G. (2004). *The Australian Policy Handbook*. 3rd Edition. Allen and Unwin, Australia, 198 pp.
- CIE (2011). *CIE Project Steering Committee (CPSC)*. April 2011.
- CIE, BoM and CSIRO (2011). *Current and Future Climate in Nauru*, Pacific Climate Change Science Program, Nauru Department of Commerce, Industry and Environment, Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation, Melbourne
- Crennan L (2007). *Sustainable sanitation manual and construction guidelines for a waterless composting toilet*. IWP-Pacific Technical Report (International Waters Project) no. 52, Pacific Regional Environment Programme, Apia, Samoa, ISBN 978-982-04-0375-8, 31 pp.
- Crennan L, Berry G (2002) *Review of community-based issues and activities in waste management, pollution prevention and improved sanitation in the Pacific Islands Region*. IWP Technical Report 2002/03. In: Wright A, Stacey N (eds). *Issues for community based sustainable resource management and conservation: considerations for the Strategic Action Plan for the International Waters of the Pacific Small Island Developing States*. The International Waters Programme, South Pacific Regional Environment Programme, Apia, Samoa
- Dovers, S. (2009). Normalising adaptation. *Global Environmental Change*, 19 (1): 4 – 6.
- Duncan, D. (2011). *Freshwater under Threat: Pacific Islands Vulnerability Assessment of Freshwater Resources to Environmental Change*. SPC-SOPAC, prepared for Regional Office for Asia and Pacific, United Nations Environment Programme, Bangkok,

-
- Thailand, ISBN: 978-92-807-3132-3, DEW/ 1339/BA, pp 58.
<http://www.sopac.org/index.php/virtual-library>
- Falkland, A. (2002) *Nauru Water Management Visit Report 28th Oct – 1st Nov 2002*. Australian Agency for International Development, December 2002. Ecowise Environmental, Canberra, 48 pp.
- Falkland, A. (2011). *Report on Water Security and Vulnerability to Climate Change and Other Impacts in Pacific Island Countries and East Timor*. For Pacific Adaptation Strategy Assistance Program, Department of Climate Change and Energy Efficiency, Australian Government, GHD Pty Ltd, 133 pp.
- Black, M., and Fawcett, B. (2008). *The Last Taboo – Opening the door on the global and sanitation crisis*, 1st edn, Earthscan, Camden High Street, London, 254 pp.
- GoN (2001) *Revised Draft National Water Plan: Plan for Long Term Water Supply for Nauru*. WHO Mission to Nauru on Water Plan Prepared by Dr Ian Wallis September 2001. Government of Nauru, 8 pp.
- Jacobson G., Hill P.J. (1988) *Hydrogeology and groundwater resources of Nauru Island, Central Pacific Ocean*. Bureau of Mineral Resources Record No. 1988/12 Canberra, Australia, 87 pp.
- Jacobson G., Hill P.J., Ghassemi F. (1997) Geology and hydrogeology of Nauru Island. Chapter 24. In: Vacher HL and Quinn TM (eds.) *Geology and hydrogeology of carbonate islands, Developments in Sedimentology* 54, Elsevier, Amsterdam, 707-742.
- Hara, K. (2010). *Wastewater Management Component – Feasibility Study*. Nauru Integrated Water Resources Management Project. June 2010, 76 pp.
- Hebblethwaite, D. (2009) *Initiating Integrated Water Resources Management in the Republic of Nauru*. Pacific Integrated Water Resources Management National Planning Programme, SOPAC, Suva, Fiji Islands, 34 pp.
- Kuleshov, Y., Jones, D., Hendon, H.H., Charles, A., Cottrill, A., Lim, E-P., Langford, S., de Wit R., Shelton, K., Spillman M., Amjadali, A., Pahalad, J., Kaniaha, S. and McClymont, D. (2012). *Pacific Adaptation Strategy Assistance Program: Seasonal Climate Prediction for the Pacific*. In Proceedings, Water and Climate: Policy Implementation Challenges. Practical Responses to Climate Change 2012, 1-3 May 2012, Engineers Australia, Canberra, ISBN 978-0-85825-911-9, 8 pp
- PIF (2004). *The Auckland Declaration*. Pacific Islands Forum Special Leaders' Retreat, Auckland, 6 April 2004, 3 pp.
<http://www.forumsec.org/resources/uploads/attachments/documents/AUCKLAND%20Declaration1.pdf>
- PIFS (2007). *The Pacific Plan for Strengthening Regional Cooperation and Integration*, 2005, Revised October 2007. Pacific Islands Forum Secretariat, Suva, Fiji, 52 pp.
- PCCSP (2010). Pacific Climate Change Science Program-Climate Variability and Change in the Pacific islands and East Timor. Australian Government (AusAID, Bureau of Meteorology and Department of Climate Change and Energy Efficiency).
<http://www.cawcr.gov.au/projects/PCCSP/publications/PCCSP%29 COP.pdf>
- RoN (1999). *Climate Change Response, Republic of Nauru Response, 1st National Communication -1999, Under the United Nations Framework Convention on Climate Change*, October 1999, Republic of Nauru, 79 pp.
- RoN (2006) *Preliminary Draft Environment Management Bill*, Republic of Nauru 20 pp.
- RoN (2008). *Disaster Risk Management Act 2008*, Act No. 15 of 2008, Parliament of Nauru, 18 December, 2008, Republic of Nauru, 18 pp.
- RoN (2008). *Nauru, National Disaster Risk Management Plan, Final Draft*, May 2008.

- Republic of Nauru, 32 pp.
- RoN (2009). *National Sustainable Development Strategy 2005-2025, Review*, October 2009, Republic of Nauru, 133 pp.
- RoN (2009). *National Sustainable Development Strategy 2005-2025*, as revised 2009. October 2009, Republic of Nauru, 90 pp.
- RoN (2010). *Framework for Climate Change Adaptation, RONADPT*, April 2010, Republic of Nauru, 67 pp.
- RoN (2010). *Country Implementation Plan for Improving Water Security in the Republic of Nauru*, Support to Disaster Risk Reduction In Eight Pacific ACP States, Funded by the European Commission from the EDF9 National B-Envelope, by the Pacific Islands Applied Geoscience Commission (SOPAC), January 2010 (Prepared by Tony Falkland). Department of Foreign Affairs, Government of Republic of Nauru, 81 pp.
- RoN (2011). *Nauru Infrastructure Strategy and Investment Plan*, 15 February, 2011, Republic of Nauru, 61pp.
- RoN (2011). *Education Act 2011*. Republic of Nauru,
- RoN (2012). *Draft Public Health Bill*. Regulations to the Bill Part 8 Vector Control, Part 9 Water, Part 11 Water, Republic of Nauru.
- Solanes, M., and Jouravlev, A. (2006). *Water governance for development and sustainability*. Recursos Naturales e Infraestructura Serie 111, United Nations, Santiago, Chile, 84 pp
- SOPAC (2007). Nauru, Republic of Nauru KRA 2 (Water) Mission Report, 27 October to 5 November 2006. EU-SOPAC (EDF9) Project Report 76, Reducing the Vulnerability of Pacific ACP States, Compiled by Stephen K. Booth, March 2007, Pacific Islands Applied Geoscience Commission (SOPAC), Suva, Fiji Islands, 50 pp.
- SOPAC (2007). *Nauru National Integrated Water Resource Management Diagnostic Report*. Sustainable Integrated Water Resources and Wastewater Management in Pacific Island Countries. SOPAC Miscellaneous Report 640, November 2007, Prepared by I. Wallis and L. Russ, with contributions by S. Debao and B. Starr. , Pacific Islands Applied Geoscience Commission (SOPAC), Suva, Fiji Islands, 45 pp.
- SOPAC (2009). *Survey of Nauru Rainwater Harvesting Assets, 07 – 27 March 2008*. EU EDF 8 – SOPAC Project Report 146 Reducing Vulnerability of Pacific ACP States, May 2010. Authors: Elizabeth Lomani, Vilisi Tokalauvere, Linda Yuen, Pacific Islands Applied Geoscience Commission (SOPAC), Suva, Fiji Islands, 7pp.
- SOPAC (2009). *Initiating Integrated Water Resources Management in the Republic of Nauru*, Pacific Integrated Water Resources Management Planning Programme, prepared by Dave Hebblethwaite with contributions from CIE, Pacific Islands Applied Geoscience Commission (SOPAC), Suva, Fiji Islands
- SOPAC (2010) *Country Implementation Plan for Improving Water Security in the Republic of Nauru*, as part of the Multi-Country Project Support to Disaster Risk Reduction in Eight Pacific ACP States funded by the European Commission from the EDF9 National B-Envelope and implemented by the Pacific Islands Applied Geoscience Commission (SOPAC), prepared by T. Falkland and J. Tagiilima, SOPAC, Suva, Fiji Islands, January 2010, 81 pp.
- SOPAC and ADB (2003) *Pacific Regional Action Plan on Sustainable Water Management*. South Pacific Applied Geoscience Commission and Asian Development Bank, Suva, Fiji, 53 pp.
- SPC (2011). *Project Brief: Coping with Climate Change in the Pacific Island Region*. Secretariat of the Pacific Community, Noumea New Caledonia, 4 pp, <http://www.spc.int>
- SPC (2012). *Global Climate Change Alliance: Pacific Small Island States. Project Overview*

- 2012, Secretariat of the Pacific Community, Noumea New Caledonia, 4 pp.
<http://www.spc.int>
- SPC-SOPAC (2010). Strategic Plan 2011-2015, October 2010. SPC Applied Geoscience and Technology Division (SOPAC), Suva, Fiji, 40 pp.
<http://www.sopac.org/index.php/strategic-plan-2011-2015>
- SPREP (2005). *Pacific Islands Framework for Action on Climate Change 2006-2015*. Final Approved Framework 12 June 2005 Secretariat of the Pacific Regional Environment Programme, Apia, Samoa, 10 pp.
http://www.sprep.org/att/publication/000438_PI_Framework_for_Action_on_Climate_Change_2006_2015_FINAL.pdf
- SPREP (2011). *Pacific Regional Environment Programme Strategic Plan 2011-2015*. SPREP, Apia, Samoa, ISBN 978-982-04-0400-7, pp 35.
- UN (2010). *General Assembly adopts resolution recognizing access to clean water, sanitation as human right, by recorded vote of 122 in favour, none against, 41 abstentions*. UN General Assembly, Sixty-fourth General Assembly Plenary 108th Meeting (AM), GA/10967, 28 July 2010, UN Department of Public Information, News and Media Division, New York. <http://www.un.org/News/Press/docs/2010/ga10967.doc.htm>
- UNDESA (1994). *Report of the Global Conference on the Sustainable Development of Small Island Developing States (SIDS)*, Bridgetown Barbados, 25 Apr - 6 May 1994, UN Department of Economic and Social Affairs, Division for Sustainable Development. 77 pp. <http://www.un.org/documents/ga/conf167/aconf167-9.htm>
- UNDP (2009). *An overview of Modelling Climate Change Impacts in the Caribbean Region with Contribution from Pacific Islands*. United Nations Development Programme, Barbados West Indies, 14 pp.
- UNWWAP (2006). *Water, a shared responsibility*. The United Nations World Water Development Report 2. UNESCO Paris and Berhann Books, New York, 584 pp.
- White I. (2006) *Republic of Kiribati Pilot Project . A Whole-of-Government Approach to Water Policy and Planning Final Report*. EU-SOPAC Pacific Programme for Water Governance. ANU Canberra, 51 pp.
- White I, Falkland A, Crennan L, Jones P, Metutera T, Etuati B, Metai E (1999) *Groundwater recharge in low coral islands Bonriki, South Tarawa, Kiribati. Issues, traditions and conflicts in groundwater use and management*. UNESCO IHP-V, Technical Documents in Hydrology, No. 25, UNESCO, Paris, France, 39 pp.
- White I, Falkland A, Rebgetz M., Overmars M., Katatia M., Metutera T. (2009b). Development of National Water Resources Policy and Implementation Plans for the Kiribati Adaptation Program. In *Proceedings 32nd Hydrology and Water Resources Symposium* 30 November-3 December 2009, Newcastle, Australia, ISBN 978-08258259461. Engineers Australia. p 1603 – 18.
- WHO (2001). *Mission Report to Nauru on Water Plan*, 23 September – 1 October 2001. Prepared by Ian Wallis, Consulting Environmental Engineers, October 2001, 8 pp.
- WHO (2005). *Pacific Framework for Action on Drinking Water Quality and Health*. Workshop on Drinking Water Quality Standards and Monitoring in Pacific Island Countries, 7-10 February 2005, Nadi, Fiji. World Health Organisation, Regional Office for the Western Pacific, Manila, Philippines, 11 pp.

www.pacificwater.org/userfiles/file/DWQ%20and%20Health.pdf