DRAFT National Water, Sanitation and Climate Outlook

Forward

The provision of safe water and sanitation in the Cook Islands is a national priority, as it impacts directly on the quality of life of the people and overall productivity of the population. The Cook Islands is a signatory to the Millennium Development Goals (MDG), which were agreed upon goals aimed to reduce poverty in all its forms around the world. The MDG Goal Seven is to 'Halve, by 2015, the proportion without sustainable access to safe drinking water and basic sanitation.' Consequently, water, sanitation and climate change are among the key issues emphasized under the National Sustainable Development Plan (NSDP), which is a strategic framework for building a sustainable future that meets the economic and social needs without compromising prudent economic management, environmental integrity, social stability and Cook Islands Maori culture, and the needs of future generations.

Economic growth, urban development, and changing water usage are imposing rapidly growing demands and pressures on water resources, and contributing to rising water pollution. Water management is complicated due to commercial activities and conflicting interests in water uses in the face of a strategy for increasing tourism, increasing water pollution, increasing water consumption and climate changes. At the same time, any new development of water resources to meet the ever-increasing demand faces rigorous scrutiny from environmentalists, climate change activists and community groups.

The way forward to a prosperous and sustainable future is by assessing and monitoring water use, education and capacity-building in communities, and developing water resources with an environmentally and financially sound strategy. Integrated Water Resources Management (IWRM) is an approach towards integrating and effectively coordinating policies, programmes and practices addressing water-related issues, and takes into consideration socio-economic development and environmental conservation.

The Cook Islands National Water, Sanitation and Climate Outlook identifies the Government's priorities to address driving forces of change in these key areas. It will guide the development and delivery of water services and reform for the next 20 years and will ensure that efforts are focused on supporting sustainable development of water resources for all Cook Islanders.

Introduction to the National Water Sanitation and Climate Outlook

Pacific Regional Action Plan on Sustainable Water Management (Pacific RAP) was developed by Pacific Small Islands Developing States (SIDS) in 2002, identifying IWRM as a solution to managing and protecting water resources, improving governance arrangements and therefore improving water supply and sanitation provision. In 2003, the Pacific RAP was formally endorsed by 14 Pacific Heads of State, Cook Islands included.

Whilst the RAP is still very relevant in providing direction and guidance for regional support programmes in the sector, there is an inherent need for its review to ensure it holistically reflects current country water and sanitation priorities and recent international water policy commitments. The focus in coming years is the challenges in the provision of safe drinking water and sanitation, and these will be further exacerbated by climate variability and climate change.

The National Outlook provides summarizes the status, trends, threats and priorities for water and sanitation in the Cook Islands. Contributions from community groups, government agencies and civil society in the Cook Islands have been assessed to prioritise the urgent national requirements for sustainable water and wastewater management. A consultative framework has been used to build capacity in the management of national water and sanitation issues and secure ownership at a national level. The National Water, Sanitation and Climate Outlook strengthens Cook Island's ability to fulfil its obligations associated with the access to safe drinking water and sanitation, and supports the Pacific community to engage globally on these critical issues.

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Acronyms

ADB	Asia Development Bank
AusAID	Australian International Aid and Development Agency
CIMRIS	Cook Islands Ministry of Marine Resources Institutional Strengthening Project
CITC	Cook Islands Tourism Corporation
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
ENSO	El Nino Southern Oscillation
EU	European Union
GDP	Gross Domestic Product
GOCI	Government of Cook Islands
GEF	Global Environment Facility
IPCC	Inter-governmental Panel on Climate Change
IWRM	Integrated Water Resource Management
IWP	International Waters Project
MoH	Ministry of Health
MDG	Millennium Development Goals
MFEM	Ministry of Finance and Economic Management
MMR	Ministry of Marine Resources
MOIP	Ministry of Infrastructure and Planning
NCSA	National Capacity Self Assessment
NES	National Environment Service
NSDP	National Sustainable Development Plan
NWC	National Water Committee
NZAID	New Zealand International Aid and Development Agency
PIC	Pacific Island Country
PICCAP	Pacific Islands Climate Change Assistance Programme
RAP	Pacific Regional Action Plan
SIDS	Small Island Developing States
SOPAC	Pacific Islands Applied Geosciences Commission
SPREP	South Pacific Regional Environment Programme
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNESCO	United Nations Education, Scientific and Cultural Organisation
WHO	World Health Organisation
WMD	Waste Management Division
WSP	Water Safety Plan
WWD	Water Works Division

1 Overview of Cook Islands

The Cook Islands is comprised of 15 widely dispersed islands located in the South Pacific Ocean, with a total land area of 240 square kilometres. They are a Polynesian island group located between latitudes 140°S and 220°S, and longitudes 1590°W and 1640°W. The country consists of two main island groups: The Northern Group consisting of Manihiki, Nassau, Penrhyn, Pukapuka, Rakahanga and Suwarrow and the Southern Group consisting of Aitutaki, Atiu, Mangaia, Manuae, Mauke, Mitiaro, Palmerston, Rarotonga and Takutea. The geographic dispersal of the islands and relatively small numbers of people provide a challenging environment in which to plan and develop water and sanitation services and infrastructure.

The total resident population in 2010 was 22,600, with an annual population growth rate of 1.1% (2009 Cook Islands Statistics Office). Rarotonga is the largest and most populated island, and is the administrative capital of the Cook Islands. The Cook Islands has one of the best performing economies of the Pacific Island Countries, with a GDP per capita of $14,623 (2009 Cook Islands Statistics Office). The Cook Islands also perform well on social indicators, achieving the highest human development index (HDI) among the region's independent nations (ADB, 2008).

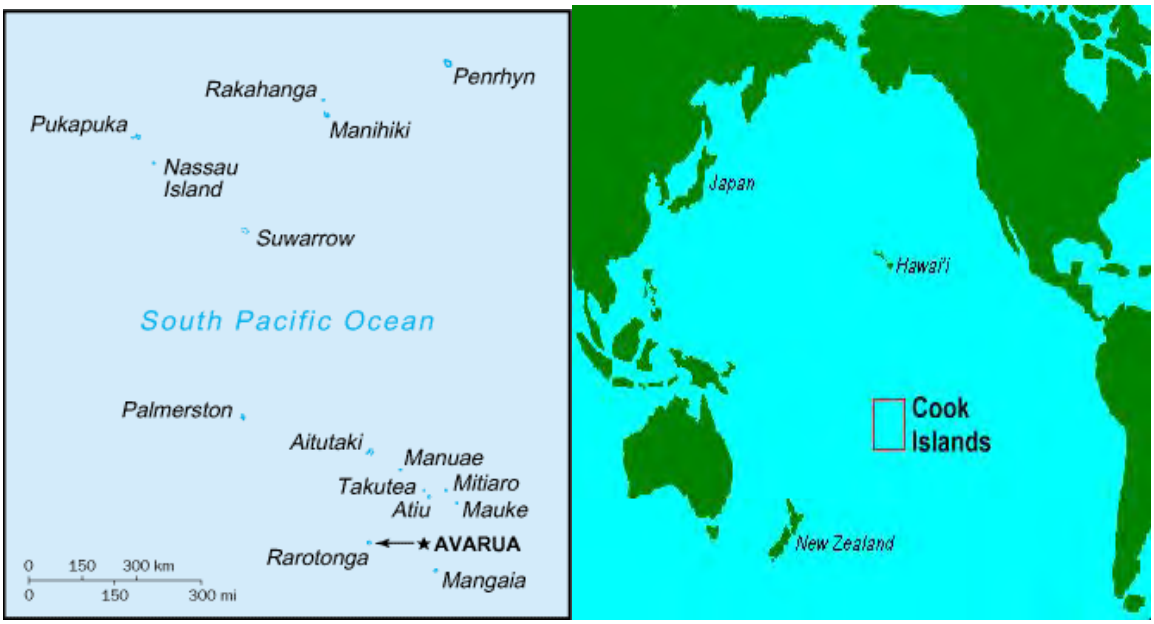


Figure 1: Relative location of the fifteen Cook Islands

The issues in water and sanitation within the Cook Islands involve increased pollution from septic and agricultural waste, and consequent degradation to lagoon, surface and groundwater resources. These issues are concentrated in Rarotonga, which has 70% of the country's total population, and faces the greatest environmental stress. Rarotonga is also the main focal point for tourism in the Cook Islands, and almost all of the annual visitors are either based in, or spend time on Rarotonga. Because of these factors, much of this report will focus on the main island of Rarotonga.

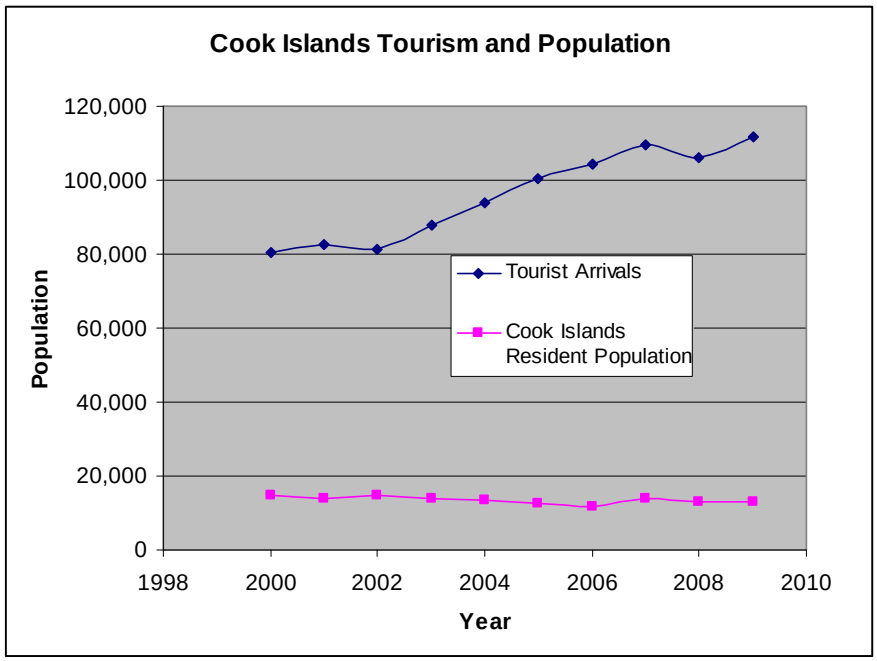
2 Driving Forces

The ability for the Cook Islands to continue to provide delivery of water and sanitation services is dependant on the rate of change in three key areas, as established through a broad consensus with water sector stakeholders during the National Water Outlook development workshop. Tourism Development, Changing Demography and Climate Change are the driving forces that threaten the state of water, environment and health in the Cook Islands. These are cross-cutting issues whose impact national water and sanitation will be discussed throughout the report.

2.1 Tourism Development

The Cook Islands economy is dependant on tourism, with restaurants and accommodation alone accounting for 13% of GDP in 2009 (Cook Islands Statistics 2010 Office 2010). Benefits from the tourism industry flow to other related industries such as the retail trade, transportation and construction. The Cook Islands Tourism Corporation (CITC) has adopted a policy to significantly increase visitor arrivals to 7% annually, a significant figure compared to the annual resident population growth of 1.1% (CITC Strategic Plan, 2010). Because tourism activities are concentrated on Rarotonga and Aitutaki, these islands will experience the face the majority of the financial and environmental impacts from increased tourism.

Figure 1: Visitor arrivals to the Cook Islands per year from 1998-2009 compared with resident population



Source: Cook Islands Statistics Office 2009

The environment on Rarotonga is already under stress and a policy to significantly increase the growth in visitor arrivals will put additional pressure on the environment. The three areas of environmental concern which can most clearly demonstrate the effects of rapid growth in tourism are solid waste, liquid waste and water. The tourism industry overall is a major contributor to the deterioration of lagoon water quality through increased volume of sewage generated on the beachfront. Existing services and facilities will not be able to cope with the demands of a growing tourist industry in the next few years without proper planning. The Cook Island Government realises that a sustainable tourist industry will only be achieved through fundamental changes to sanitation services that protect the health of the public and the ecological sustainability of the coral lagoons.

2.2 Changing Island Demography

The social and economic development disparities between Rarotonga and the Outer Islands remain a critical issue that requires addressing. This disparity is seen as another reason for emigration from the outer islands. All islands except for Rarotonga and Aitutaki show a decline in population, with Manihiki most affected, followed by Pukapuka and Penrhyn. Population distribution reveals that over 70% of the country's population resides in Rarotonga.

The Cook Islands government acknowledges that the sustainable development efforts taken must target not only the betterment of life for the people in the Cook Islands, but must act as incentives to Cook Islanders to remain in the Cook Islands or to return home from abroad (MDG 2009). The key challenge for the Cook Islands is to provide nationwide coverage of water and health services by addressing the disparity of health between Rarotonga and the outer island. With a long-term decline in depopulation of the Outer Islands, the challenge further exacerbates the struggle to provide quality health services to fewer people and subsequently having fewer personnel to carry out improvements to water and sanitation infrastructure and services.

2.3 Climate Change

As a nation of low-lying small islands, the Cook Islands is extremely vulnerable to the effects of climatic extremes and threats to water supplies. The isolated populations of the Outer Islands are especially vulnerable to the anticipated changes in climate. Sources of potential risk for the Cook Islands include:

- Extreme rainfall events;
- Drought;
- High sea levels and extreme wave heights;
- Strong winds; and
- Extreme high air temperatures

The impacts from climate change will affect infrastructure and activities in all important economic industries, including tourism development, agriculture and fisheries. The risks, impacts and government responses to climate change are further addressed in Section 7: Climate. Because climate change planning and mitigation needs to be addressed in a way that requires fundamental changes to the way Cook Islanders manage and use their water resource, this key area is the most important driving force of change.

3 Governance

3.1 Legislation and Policy Framework

The Cook Islands currently does not have an overarching policy and legal framework for water resource management to ensure access to safe drinking water. Nor does it have a national plan for managing sewage. There are three different government agencies with mandates on water supply, sanitation and wastewater management (Table 1). The mandates for each government agency were enacted many years apart, making it difficult to define roles and responsibilities under the current legislation. The lack of clarity of roles and responsibilities of relevant agencies and organisations related to water resources management has led to a fragmented water sector with duplication or omission of activities, policy gaps and conflicting mandates (NCSA 2008).

Table 1: Agencies mandated with sanitation and wastewater management.

Agency	Legislation	Roles and Responsibilities
Ministry of Infrastructure and Planning	Rarotonga Water Works Ordinance 1960	Provides mandate for the planning, installation, operation and maintenance of public water systems in Rarotonga and selected outer islands
	Supportive Services Act 1973-74	Provides mandate to establish, provide and maintain an adequate water supply and reticulation service on all islands.
	Cook Islands Act 1915	Provides local government with authority to establish reserves for water supply.
	Building Control and Standards Act 1991	Establishes standards for interior plumbing and septic tank construction
	Waste Management Division	Tasked with the operation and management of the Rarotonga Waste Management Facility
Public Health Department	Public Health Act 2004	Provides mandate for ensuring the 'safety and safe use' of water provided through the public reticulation network by monitoring the 'biological' quality of water. Establishes the Public Health (Sewage) Regulations 2008 which empowers the Public Health Sewage Code to set comprehensive standards for operation and maintenance of sewage systems Registers sanitary professionals, septic tank manufacturers and approved sewage treatment unit design. Establishes the coastal zone as a protected or highly sensitive area in terms of impacts of sewage and improper sanitation
National Environment Service	Environment Act 2003	Provides mandate for the 'protection, conservation and management of the environment in a sustainable manner.' The protection, management and prevention of, damage or pollution to internal and inland waters, including water catchment areas.

		Establishes the Environmental Impact Assessment process which requires permits for activities that will cause significant impacts to the environment.
Ministry of Marine Resources		Not directly mandated to address sanitation and wastewater, but ministry is required to manage marine resources which deal with effects of land-based pollutants. MMR provides field and laboratory support for lagoon environment and water quality monitoring in Cook Islands.

Ministry of Infrastructure and Planning (MOIP)

The Ministry of Infrastructure and Planning is the key agency responsible for delivery of water on Rarotonga through the Water Works Division. MOIP is also responsible for the delivery of water services to the Outer Islands.

The Waste Management Division (WMD) within the Ministry of Infrastructure and Planning is responsible for the management and operation of the Rarotonga and Aitutaki Waste Management Facilities. The Water Works Division (WWD) within MOIP is responsible for planning, installation, operation and maintenance of public water systems in Rarotonga, and several Outer Islands including Atiu, Aitutaki and Mangaia.

Public Health Department

The Public Health department established within the Cook Islands Ministry of Health (MOH) is the primary organisation regulating wastewater and sanitary management in the Cook Islands. The Public Health department administers the Public Health Sewage, empowered under the Public Health (Sewage) Regulations 2008, which dictates the processes required to install, operate and manage sewage systems in the Cook Islands.

National Environment Service (NES)

NES is responsible for the protection, control and correct pollution of water and land resources in the Cook Islands. Under the Environment Act (2003), NES regulates activities that cause potential impact to specific areas of concern, namely foreshore, wetlands and streams. The legislation further defines specific areas of concern (foreshore, wetlands and streams) where activities within these areas require a stringent permitting process. The Environment Act 2003 is not applicable nationally; individual islands are required to adopt the legislation in order for it to take affect, to date the legislation only applies to Rarotonga, Aitutaki, Atiu, Mauke, Mitiaro, and Suwarrow. NES is undertaking a National Capacity Self-Assessment Project (NCSA) to protect the environment at a national level by focusing on biological diversity, climate change and international waters (NCSA, 2007).

The Ministry of Marine Resources (MMR)

The Ministry of Marine Resources is responsible for the management of coastal waters around the Cook Islands. They have a role in monitoring and managing lagoon pollution from surface water runoff and sewage runoff from land-based activities including agriculture and tourism.

3.2 Institutional Capacity

The Cook Islands, like many Pacific Island Countries, suffers from lack of capacity to implement large-scale integrated resource management plans. There are many opportunities for government agencies to share responsibilities in the areas of water supply and sanitation provision and environmental protection. However, the government is highly sectoral, with responsibilities for natural resource management and public health protection dispersed amongst several agencies. This leads to program fragmentation, duplication or omission of activities, policy gaps and conflicting mandates. The key issues in institutional capacity are summarized below:

1. *Information and data management*: basic baseline data for environmental and coastal resources is severely lacking. Baseline data is needed on the full extent of water resource demand and supply and the current situation on all islands. Most government agencies lack appropriate hardware and software to develop or improve their data management systems. This inhibits informed decision-making at systemic and institutional levels needed to ensure resources are sustainably managed. Websites are limited to several government agencies, including MMR, NES, IWRM under MOIP, and MoH. However most of these websites are static and provide only basic information.

2. *Lack of staff and qualified personnel*: It is a fact of life that in small island communities, a smaller population means that a few qualified people are expected to carry out a wide number of tasks. Although many of the staff have an excellent understanding of water management issues, most government agencies are inundated with projects and do not have adequate staff members to take on new initiatives. There are limited resources to train and build capacity of staff members, and training consists of on-the-job experience and guidance from other staff members. This is especially apparent in the Outer Islands.

3. *Financial Resources and Funding Mechanisms*: the staffing levels and operational budgets for government agencies are insufficient to carry out their expected activities. There is limited funding support for the implementation of local programs and a lack of national incentive mechanisms related to water resource management and environmental activities and products.

The Cook Islands enjoy strong relationships with international development partners such as NZAID, CIDA and organisations such as UNDP, SOPAC, SPC and SPREP. These agencies are important for contributing towards local infrastructure development and community-based programs. There is a need to coordinate efforts between regional and international organisations working with various Cook Island government agencies and community groups to prevent duplication of efforts and maximise the impact from using limited resources. The following projects are examples of development partners are working with the Government of Cook Islands (GOCI) to develop institutional capacity-building in Rarotonga and the Outer Islands in the water and sanitation sectors:

- The Infrastructure Services Delivery Improvement Project (ISDP) is an ADB-funded technical assistance projects designed to assist the GOCI to improve governance and

institutional capacity development with respect to infrastructure management and planning, including the water and sanitation sector. The GOCI and ADB have entered into a loan agreement to fund capital works needed to compliment infrastructure governance changes that are needed.

- The Cook Islands Marine Resources Institutional Strengthening (CIMRIS) Project 2005-2010, funded by NZAID and AusAid provided training to build the capacity of MMR and related agencies
- The GEF-funded International Waters Project (IWP) in 2006 assisted in developing the Takuvaine Catchment Committee to strengthen capacity and provide lessons for best practices and appropriate methodologies for sustainable resource management.

One of the important milestones in the ISDP project was the Infrastructure Forum was convened on in July 2010 with the theme of 'Determining a new direction for infrastructure development in the Cook Islands.' The forum presented an opportunity to discuss a framework for planning and coordinating the delivery of infrastructure development by government, private sector and development partners. The outcomes and priorities for the water and waste sector were identified by the forum, and can be found in Appendix 1.

3.3 Community Participation and Ownership

Non-governmental organisations (NGOs), community groups and youths are important for contributing towards national policy development, planning and awareness-raising in the areas of water, sanitation, environment and climate change. NGOs and community groups such as Taporoporoanga Ipukarea Society (TIS) and the Takitumu Conservation Area (TCA) act as 'watchdogs' of government activities and also prove communities with a platform for lobbying for government and international support on public environment issues. Muri Environment Care and the Titikaveka Grower's Association are involved in community outreach, education and training on issues such as the proper agricultural practices to reduce sediments entering freshwater and groundwater systems. A full list of stakeholders in the water sector consulted for this report is available in Appendix 1.

Community input in programmes and participation in their implementation is crucial to the successful outcome of projects. Although communities are involved in stakeholder consultations and initial meetings for planning and project development in the water sector, the extent of their participation in decision-making is limited. Civil society engagement and participation takes place in the form of invited meetings, and decisions are open to only limited broader debate. The government must provide the necessary resources to NGOs and local community groups to continue to take the lead in capacity building exercises at local community level.

3.4 The Role of Integrated Water Management

Water supply, water quality monitoring and sanitation are being carried out by many different agencies. Integrated Water Resources Management (IWRM) is a planning and management approach which aims to manage both water and land resources through improved collaboration between government functions, civil society and communities. The IWRM Diagnostic Report

(Parakoti & Davie, 2007) highlighted key water resource management issues that would benefit from an IWRM approach in the Cook Islands, including addressing the institutional capacity and community participation issues listed above. The NSDP has since identified the development and implementation of an Integrated Water Resources Management Policy as a priority (NSDP, 2007). The Pacific IWRM Cook Islands IWRM Demonstration Project in Muri Lagoon is currently underway to demonstrate the immediate benefits of IWRM planning and management.

Box 1 Muri Lagoon IWRM Demonstration Project

The pollution levels in Muri Lagoon have caused major algae outbreaks and compromised the ecology of our beautiful lagoon. Should we allow the wastewater from septic tanks and piggeries to continue to wash into our creeks and seep into our groundwater, ultimately reaching the lagoon, the Muri Lagoon may no longer be a safe place to swim.

With support from donor partners, the project is now underway to demonstrate the effectiveness of different low-cost wastewater treatment systems in the Muri Lagoon. The demonstration project to improve septic systems was developed with MOIP as the main operational partner, working closely with NES, Public Health and MMR in consultation with business and civil society stakeholders to address the problems in Muri.

The project complements the strategy of the Cook Islands National Sustainable Development Plan 2007-2010 to "improve the management of solid, liquid and other forms of wastes, minimising the human health effects and impacts on the environment". So far the project has highlighted the need for strengthened national co-ordination mechanisms for water, as well as higher level reforms to Water Resources and Sanitation Policy.

3.4.1 National Water Committee

At a national level, the government needs to establish and support a National Water Committee to develop and coordinate implementation of policy, legislation and a strategy for water resource management in a way that contributes to the NSDP. The Water Resources Management Act (draft), which will provide a platform for an integrated national water strategy. Included within the Act is the mandate to establish a National Water Committee to 'provide a coordinated approach to decision-making on water resource planning, policies and implementation programmes.'

A workshop organized by MOIP was held on April 28, 2011 to establish support and a consensus for the National Water Committee. The workshop was attended by a cross section of stakeholders with significant interests in the water sector, including government agencies, civil society, non-governmental organisations (NGOs) and the private sector. The establishment of the National Water Committee was widely supported, with a possible arrangement for the National Water Committee shown in the figure below.

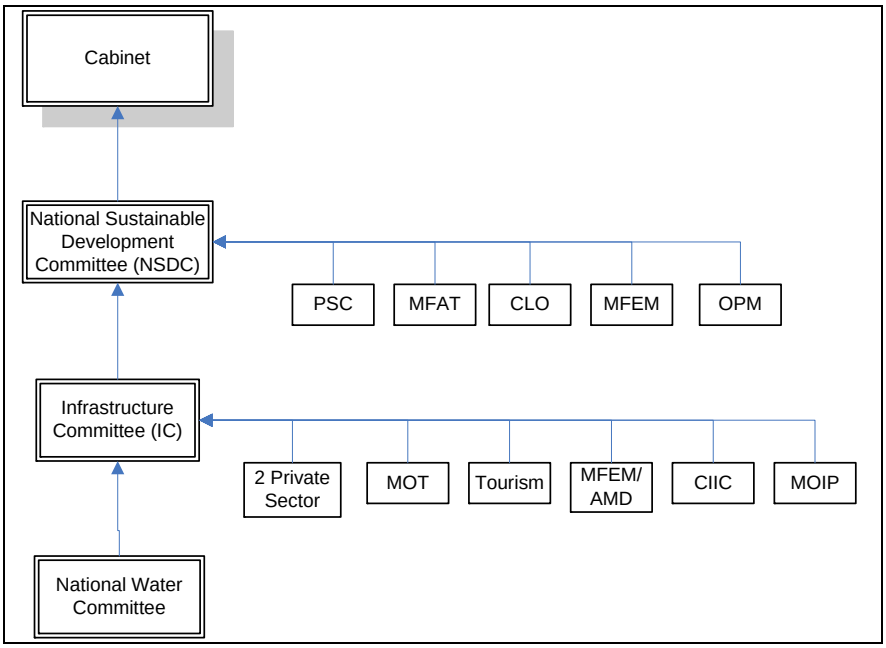


Figure 2: Suggested National Water Committee Structure

The NWC should be comprised of key agencies mandated in water resource management, and have community representation through NGOs and civil society. The need for community and outer islands representation must be carefully considered in forming the members and institutional arrangements of the national water committee. This current structure does not provide a path for communities and NGOs to influence decision-making at cabinet level.

4 Security of Water Supply

4.1 Water Resources

4.1.1 Existing Water Sources

In the Cook Islands potable water comes from two main sources. In the Southern Group of islands, which includes the main island of Rarotonga (volcanic origin), surface water is sourced from springs and streams within catchments valleys. In the Northern Group of islands (coral atolls), water is sourced from rainwater and groundwater.

The water supply systems for each of the Cook Islands are summarized in Table 1. The Southern Group, are mostly serviced by reticulated water supply from boreholes, wells, aquifers and galleries using diesel or electric pumps. The Northern Group is predominantly reliant on rainfall to provide their water supply, which is stored communally or in privately owned water tanks.

Table 2: Cook Islands Water Supply Systems

Island	Population	Area (km^2)	Water Supply
Rarotonga	14,155	67	Reticulated from stream sources
Southern Group			
Aitutaki	2,204	18	Reticulated from galleries
Mangaia	640	52	Reticulated from streams and boreholes
Atiu	569	27	Reticulated from wells and independent household rainwater harvesting
Mauke	390	18	Reticulated from boreholes
Mitiaro	219	22	Reticulated from cave sources
Manuae	0	6	N/A
Takutea	0	1.3	N/A
Northern Group			
Pukapuka	507	1.3	Rainwater harvesting
Manihiki	353	5	Rainwater harvesting
Penrhyn	254	10	Rainwater harvesting
Rakahanga	141	4	Rainwater harvesting
Nassau	75	1.3	Rainwater harvesting
Palmerston	63	2	Rainwater harvesting
Suwarrow	0	0.4	Shallow well
Total Cook Islands	19,570 population	237 km^2	

Sources: 2006 Cook Islands Census; Thompson, 1986

Water resources available in the Cook Islands is considered to be adequate during normal years, but stressed during drought years (IWRM Diagnostic Report 2007). Water security is a concern especially in the Outer Islands, where they have experienced critical water shortages in the past. In the Northern Group, water availability is limited by rainwater harvesting and are extremely vulnerable to climate variability and change, and in particular to periods of drought and saltwater intrusion (NCSA, 2007).

On Rarontonga, periods of prolonged drought (after four weeks without rainfall) have caused streams provide intakes with water to dry up, leading to a search for alternative water sources. Although records from Rarotonga's water intakes have been available since 2000, the data has not been analysed to determine the safe yield of the streams.

4.1.2 Water Resource Protection

The twelve water intake areas on Rarotonga are protected public water catchment areas. These areas are indicated with signs in both Maori and English, prohibiting human activities such as

littering and swimming. However, the catchment areas and intakes themselves are not secured areas, aside from a simple gate barring road access, and only one filtration is housed in a secure area to prevent tampering. Most catchments are affected by tourism-based activities, where cross-island treks pass through or very close to intake areas. Farm livestock such as cows, goats and pigs freely roam the catchment areas, and have access to intake areas, making them susceptible to contamination (WSP, 2006). Contamination of water and poor water quality highlight the limited management of activities in areas surrounding water catchments, water sources and intakes, and the inadequacies of the few mechanisms in place to protect and preserve water resources.

4.1.3 Alternative Sources of Water

Rainwater has been identified as a viable water source to allow for Rarotongan residents to be self-sufficient, and reduce stress on the existing system. Islands that are dependant on rainfall and surface water are subject to seasonal variations, and storage is needed to ensure continuous supply during seasonal variation and anticipated extreme weather events. During the recent National Economic Summit which took place April 12-13, 2011, Finance Minister Mark Brown said if the 2000 households on Rarotonga each had a 5000-litre water tank there would automatically be about 10 million litres of extra water storage capacity on the island, which would prove useful in emergencies and during extreme weather events. This news was received with wide support throughout Rarotonga and the Outer Islands. The Cook Islands Government has committed $3M to fund every household on Rarotonga with a water tank, increasing the island's storage capacity by approximately 10 million litres, and providing storage capacity during periods of drought, cyclones or when pipes are broken. Project implementation is expected to take place within the 2010/2011 financial period (CI Audit, 2011).

4.2 Water Supply

4.2.1 Water Supply Infrastructure

Rarotonga has a gravity-fed distribution system that operates generally at high pressures and is the most comprehensive water supply infrastructure in the Cook Islands. Streams and freshwater sources are collected from 12 intakes (Table 2) that are gravity-fed into storage tanks or into the distribution system. The distribution is an extensive pipe network, consisting of one ring main circumnavigating the entire island, and a series of cross mains and submains connecting water users. The reticulated network supplies residential homes, commercial and industrial sectors and major public institutions on Rarotonga. The intakes are located inland, away from developed residential, commercial and industrial activities. Rarotonga is currently in the process of replacing the entire ring main as part of an ADB-funded project to assist with infrastructure services delivery improvement in the Cook Islands (ADB, 2010).

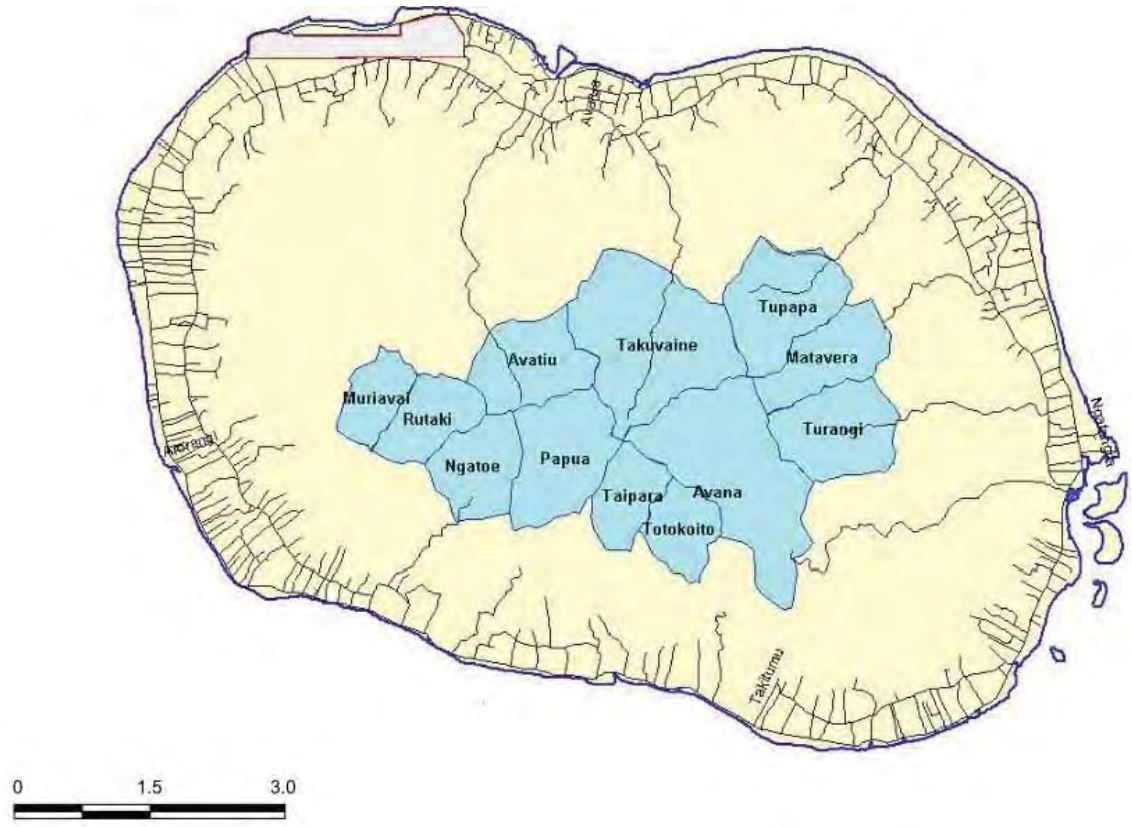


Figure 3: Map of surface catchments and reticulated water system on Rarotonga (Obtained from the Urban Planning Department, MOIP, GOCI)

Table 3: Rarotonga Intakes Catchment Areas

Intake Name	Catchment Area (ha)	Elevation (m)	Filter Type
Avana	243	80.9	Open intake
Avatiu	135	80	Filter in-stream
Matavera	82.5	65	On-bank chamber
Muriavai	144	63.5	Open intake
Ngatoe	98.1	65	On-bank chamber
Papua	163	49.3	Open intake
Rutaki	109	51	Filter in-stream
Taipara	84	50	Filter in-stream
Takuvaine	161	9	Filter in-stream
Totokoitu	70	64.8	Open intake
Tupapa	100.6	65	On-bank chamber
Turungi	118	72	Filter in-stream

Source: Water Safety Plan 2006

The existing reticulated water supply system in currently under stress from excessive and irresponsible water usage (WSP 2006). In the past Rarotonga has experienced extended periods of drought, with a noticeable decline in stream flows after four weeks without rainfall. In 2009 MOIP was forced to investigate other viable water sources, resulting in sourcing water from streams and building temporary sandbag dams to collect water for the island. The current storage is not sufficient to maintain water supplies during drought periods (WSP, 2006).

Figure 4: Sandbag dams to collect alternative water sources at Avatiu intake constructed during November 2009 drought (Obtained from MOIP, GOCI)

4.2.2 Storage and Treatment

There are two storage tanks in operation on Rarotonga, both of them located in the Takuvaine catchment area. One tank has a 126,000 L capacity and the other with 2.3 million L capacity. The bigger tank holds approximately two days water storage for the main town of Avarua. The storage tanks also act as settling tanks as the water passes through a weir into the holding tank (WSP, 2006). Discussions with community groups and traditional leaders have revealed that the area of greatest concern for water use is increasing water storage and having filters installed at all the intakes.

4.2.3 Water Infrastructure Maintenance

Water losses from an aging infrastructure are uncertain, but high. The Water Works division within the Ministry of Infrastructure and Planning have reported water losses ranging from 30-70% (ADB, 2009) but recent upgrades to the ringmain will have reduced the figure to 20%water losses through leaks. The Water Works Division (WWD) within MOIP is responsible for the operation and maintenance of the water supply system on Rarotonga. There is no maintenance schedule for the reticulation network, and system repairs are done on an ad hoc basis, depending on the urgency of the work needed. The intakes have regularly scheduled cleanings, but the ability to carry out tasks as scheduled is dependant on staff availability and resources. The remote location of the intakes makes it difficult to carry out regular cleaning processes. The WWD has an extremely limited capacity to fulfil its role in maintenance and upkeep of the water supply infrastructure with its current level of resources and staff.

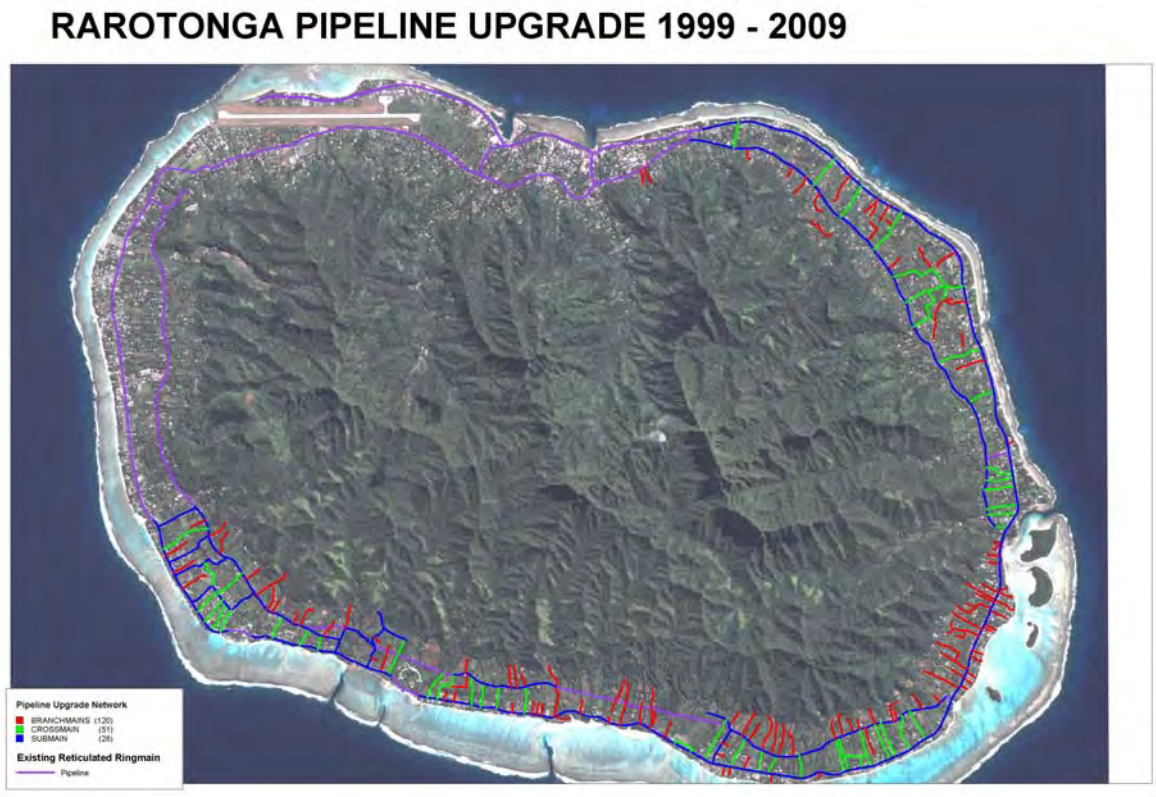


Figure 5: Upgrades to Rarotonga's reticulated water network as of August 2009. (Obtained from MOIP, GOCI).

4.2.4 Funding for Water Supply

Water is provided free of charge in Rarotonga and the Outer Islands. The operation of reticulated water supply is subsidized by the National Government. On Rarotonga, the Ministry of Infrastructure and Planning is tasked with maintaining the reticulated network, and the

budget comes directly from central government. There is no legislation in place to allow for charging for provision of water supply.

It is recognised that the introduction of paying for a service will encourage a number of benefits to the overall service, including quality and reliability of water (WSP, 2006). However, communities will only allow a user-pays system for the reticulated water supply on Rarotonga if water quality and supply are guaranteed. During discussions with stakeholders, many emphasized that major commercial water users should pay for the full cost of water.

4.2.5 Quality of Water Supply

Drinking water in the Cook Islands in untreated except for simple gravel filtration at the source of reticulated water systems (Table 2). Water tests on Rarotonga and Mangaia are now consistently showing the presence of coliforms from the presence of wild animals and runoff from piggeries at the intakes (Parakoti & Davie, 2007). This is a threat to public health, and the government has advised tourists and locals to boil their drinking water. Community surveys during the ADB project preparations revealed that boiling water is not a universal practice, and considerable numbers of the community drink raw, untreated water. There is a strong risk of this leading to water-borne bacteria and water-related diseases (ADB, 2009).

Rarotonga is prone to floods during periods of heavy rainfall, during which shallow streams become inundated with sediment, rock and debris affecting the water supply. Flooding causes high turbidity, and the short passage time in the storage tanks fails to remove sediments, causing water users to complain of muddy water coming out of their taps (WSP, 2006).

4.3 Water Use

4.3.1 Water Users

There is an absence of detailed current information on the number of connections, type of consumer and the daily average consumption. Metering of water in Rarotonga has been piloted in several sites around the island since 2008. An estimation of total water usage and breakdown by user group is based upon the previous analysis by Brockman Tym International using the 2008 metered results. Table 3 shows 2009 estimated demand and a comparative estimation of likely water consumption in 2019.

Agriculture is the largest water user on Rarotonga, whose uses include watering small vegetable plots and gardens for household consumption and commercial sale. The tourism industry is comprised of hotels, commercial businesses and makes up the largest industry in terms of water consumption. Fish processing, the Avarua brewery and the airport are other industries that use potable water on Rarotonga.

Table 4: Estimated Demand on Rarotonga

User Group	2009 Estimated Demand (m^3/day)	2019 Estimated Demand (m^3/day)
Agriculture	4100	4606
Domestic	2670	2932
Hotels	1200	1430
Industrial	880	970
Commercial	670	734
Schools	220	239
Government Offices	132	132
Other	38	41
Total daily demand	9910	11084

Source: Brockman Tym International: TA No. 30865-C00, February 2000

4.3.2 Water Use Efficiency

There are no policies on water conservation and water use in the Cook Islands, and no incentives to conserve water except for environmental conscience. Water wastage is a serious issue on Rarotonga, where previous studies have indicated that the average water usage falls between 150 to 300 litres per capita each day (ADB, 2009). Water conservation is not widely practised and there are many wasteful water behaviours such as taps left running constantly. Free and unrestricted water usage for consumers, including commercial enterprises, has encouraged a wasteful attitude and placed pressure on the limited water supply (NCSA, 2007).

Where water resources are scarcer as in the outer islands, people are more inclined to conserve water. The Northern Group Islands, by way of example, have experienced prolonged dry periods, and consequently have higher water conservation rates compared to Rarotonga (Paul Maoate, MOIP, water presentation Apr 28, 2011).

4.3.3 Awareness

There is no long-term awareness-raising strategy for water conservation and the need to reduce demand on finite water resources and the changing public perception regarding a user-pays system. On Rarotonga, public awareness campaigns are carried out during periods of drought to limit water consumption (IWRM Diagnostic Report, 2007). The Cook Islands IWRM Demonstration Project involves extensive community engagement through government agencies and community groups, and is a mode for educating the pubic on sustainable water use and the impacts of sanitation on health and the environment.

4.3.4 Forecasted Water Demand

Information on water supply, consumption and usage patterns are difficult to obtain. Record-keeping and information gathered by the WWD at MOIP does not provide sufficient data for determining current demand, or forecasting for future demand. The estimated demand for Rarotonga (Table 4) relies on information gathered from previous studies.

Table 5: Comparison of Water Supply and Estimated Water Demand for Rarotonga

Water Supply from catchment intakes		Water Demand	
Maximum in October (m^3/day)	Minimum in August (m^3/day)	Estimated Demand in 2009 (m^3/day)	Estimated demand in 2019 (m^3/day)
15720	8346	12500	11084

Source: WMI Burgeap, 1992 and Brockman Tym International: TA No. 30865-C00, February 2000

Each island at the present has an adequate water supply and water storage facilities on each island under normal or average climatic conditions. The water supply yield from catchment intakes exceeds estimated demand on Rarotonga during the rainy season as shown in Table 4, but may not meet demand during drought periods.

5 Environment

5.1 Environmental Setting

Lagoons, freshwater streams, groundwater lenses and wetlands are important ecosystems for the Cook Islands. They function as sinks for pollutants and can tolerate certain levels of pollution, and their ecosystem health is necessary for maintaining environmental resilience.
The coastal and inland zones in Cook Islands have an interacting mix of terrestrial, estuarine and marine ecosystems that support a wealth of biodiversity. The preservation of coastal biodiversity is important to support a broad range of commercial activities dependant on healthy ecosystems, including subsistence fishing and seafood gathering, tourism and recreation, coastal agriculture and trade. The coastal zones have also important social, cultural and indigenous values, including coastal landscapes, cultural and indigenous values, amenity and access (NCSA 2007).

Rarotonga is a volcanic island surrounded by a low coastal fringe and is further encircled by coral reefs. The area of shallow water within the coral reef is referred to as the 'lagoon'. In Rarotonga, the different soils range from highly permeable coral sands along the coastal area to heavy volcanic clays inland. Approximately 75% of houses and tourist developments are situated over permeable sand zones (ADB, 2009). Freshwater supply sources on Rarotonga are located between 40m to 90m above sea level, and the total catchment area is about 15 km^2, or about 22% of the island's land mass (ADB, 2009). The catchments are mainly covered in natural vegetation, and are interspersed with walking tracks, plantations and limited settlement. They are also populated with bird life and some wild animals and livestock.

5.1.1 Land-use Activities Causing Water Pollution

Environmental degradation from land-based activities have major impacts on the marine environment, particularly on the more developed islands of Rarotonga and Aitutaki. The Cook Islands priority environmental concerns report (Island Friends, 2004) emphasises the main land-based activities contributing to pollutants entering freshwater and marine habitats, and the cumulative impacts of those activities are listed in Table 5.

Table 6: Land-use activities and Marine Impacts

Activities	Environmental Pressures	Water Quality Impacts	Consequences
1. Urban and industrial construction sites	Altered landscape and sediments in streams	Decreased water clarity	Increased turbidity
2. Agriculture practices (tilling, vegetation removal)	Sediments in streams, herbicide and pesticide runoff, fertiliser runoff	Decreased water clarity, higher nutrient concentrations	Increased turbidity, algae growth, decreasing reef health
3. Piggeries and livestock operations	Livestock and animal waste runoff	Higher nutrient concentrations, increased bacteria levels	Algae growth and decreasing reef health, contaminated water
4. Improper storage and disposal of liquid and solid waste	Septic leakage and sewage	Higher nutrient concentrations, increased bacteria levels	Algae growth and decreasing reef health, contaminated water

1. Urban and Industrial Construction Sites

Large-scale excavations on sloping lands are a major problem contributing to soil erosion on Rarotonga and the Mangaia Islands of the Southern Group. Sloping lands are becoming one of the fastest-growing areas for development on Rarotonga. Between 1999 and 2004, 21 acres of sloping lands were subject to development which has led to increased silt in wetland areas (Island Friends, 2004).

Tourism development has focused on the development of the foreshore areas of Rarotonga, which includes construction of tourist facilities and developing existing properties. Problems associated with tourism development include clearing natural vegetation and the replacing it with ornamental species not well suited to the environment; and impacts from increase liquid waste disposal. In Aitutaki all tourism facilities are directly accessible to the foreshore area. The developments along the island's coastal areas have compromised the health of the lagoon and coral reefs from sediments and increased wastes entering lagoon waters (Island Friends, 2004).

2. Agriculture Practices

Clearing of land for agricultural purposes involves the use of tractors to cut and slash and then ploughing to obtain the right soil texture for planting (Island Friends, 2004). Taro cultivation is common throughout the Cook Islands, and causes sedimentation and soil erosion problems. For example, in Rarotonga taro is grown in high wetland valleys, and sedimentation poses a problem for the resource protection of the reticulated water system. Poor agricultural practices common throughout the Cook Islands include overuse of pesticides, applying inorganic fertilizers and poor land systems management.

3. Storage and disposal of liquid and solid waste

Septic effluent from on-site sanitation systems on contain nitrogen and phosphorous. Septic tanks directly overflow into soak holes, which are located on permeable coral sands in Rarotonga (as discussed above) with a shallow groundwater table 1-4 m below the ground. Nitrogen, phosphorous and pathogens leach into the groundwater, which then flows into the shallow lagoon (ADB, 2009). The issue of waste storage and disposal is further discussed in the Section 6.2.2 Wastewater and Sanitation Facilities.

4. Piggeries and Livestock

There are four large piggeries (housing up to 100 pigs) and many smaller ones in operation around Rarotonga (Parakoti & Davie, 2007). Many of the piggeries are located near stream sources to allow the untreated waste discharge to be washed away directly to the ground or adjacent stream. Piggery waste contains 4.9 times more nitrogen than human waste (Barrett Consulting Group, 1995:7-7).This practice contributes to a considerable nitrogen load in adjacent streams and to the lagoon.

5.1.2 Marine zone impacts

The consequences from the land use activities listed above have resulted in a noticeable deterioration in the lagoon and reef environment. Aitutaki and Rarotonga are more impacted because they have higher population and intense tourism industry, with more intensive land use activities impacting coastal areas. The Ministry of Marine Resources (MMR) water quality programme was initiated in September 2004 to provide baseline water quality data for Rarotonga. Samples are collected on a monthly basis from 14 lagoon sites and 8 streams. The results are analysed each year, and information is disseminated to the public through annual Rarotonga Lagoon Report Card.

Water quality test results in Rarotonga and Aitutaki over the past three years show that while *Enteroccoci* bacteria levels frequently meet WHO standards for recreational swimming water (WHO, 2001), the results are gradually worsening. Whereas the lagoon samples were once always within the WHO "safe" category of less than 200 *Enterococci* per 100ml , monitoring results show that these levels are now exceeded on some sites. Stream water samples show extremely high bacteria levels, an indication that significant contamination enters the lagoon via streams.

Nutrients such as nitrates and phosphate are higher at most test sites than is considered acceptable for sustainable lagoon ecosystems (Bell, 1992). Nutrients contribute to algal growth, and higher nutrient concentrations lead to algal blooms that potentially damage coral reefs (Solomona D et al, 2006). The pollutants come from three main wastewater sources; domestic households, tourist accommodations and piggeries (Evans and Dakers, 2010). Algal growth is dependant on nutrient concentrations, and algal blooms are occurring with increasing frequency (ADB, 2009). Algal blooms form mats of algae, and when they decay a foul odour persists in the lagoon. These factors all present a very real risk of long-term damage to the lagoon and foreshore areas of Rarotonga, and the potential damage to the tourism industry.

5.2 Awareness

Environmental awareness-raising is response-driven rather than using a planned strategic approach in the Cook Islands. Preparing educational materials for schools and communicating messages to the general public is an expensive process (Island Friends, 2004). Despite the need for people to fully understand the laws for protecting environmentally sensitive areas such as wetlands, foreshore, sloping and marine areas, the budgetary allocations for government agencies are inadequate. Acknowledgement of the importance of local knowledge, content and experiences including using the local language for delivery of education and awareness programmes is crucial in getting people understand their environmental responsibilities.

6 Human Health and Sanitation

6.1 Governance

The health of the environment has an immediate effect on the health of the population. The key issues are in health and sanitation are access to safe water, including drinking water and water in the lagoons and rivers, improved sanitation for all communities, and access to a safe waste disposal system. The Ministry of Health's role in these areas is to ensure compliance to standards and monitoring the quality of the environment through the Public Health Code 2008. A high standard of sanitation services is needed on Rarotonga and the Outer Islands to meet the public health needs of the islands permanent residents and to protect the lagoon ecosystems, which are a major attraction essential to the tourism industry.

Although there is currently no national sanitation plan, the state of the lagoon, and the risks to public health and the lagoon itself are such that waiting to produce a national plan is not recommended (Evans and Dakers, 2011). Instead the Waste Management Initiative (WMI) has been established as an immediate intervention to carry out the objectives of national sanitation improvement. The main impediment to achieving a high degree of compliance with the sewage regulations is the enormous variation in knowledge and skill within and between government agencies and lack of capacity to enforce sewage regulations.

Box 2 Waste Management and Sanitation Improvement Programme

The Waste Management Initiative is a national program to address urgent waste management Rarotonga and Aitutaki. The WMI project has cross-cutting objectives in the provision of waste management and sanitation infrastructure, including

- Reviewing existing sewage regulations
- Upgrading all of the septage ponds and associated facilities on Aitutaki and Rarotonga
- Upgrading all domestic household sewage systems on Aitutaki and Rarotonga (with the Tikioki catchment area as a priority)
- Upgrading piggery effluent management in Tikioki
- Establishing a 'warrant of fitness' for tourist operators to undertake annual property inspections
- Initiating the awareness campaign with the community

NES, MOIP, Public Health and Tourism are all government agencies that have mandates in provision of sanitation services. Through these agencies, the WMI is working with the IWRM Demo project in Muri to gain understanding of pollution sources from waste disposal and trial two appropriate technologies in wastewater treatment systems.

6.2 Sanitation

6.2.1 MDGs and Access to Water and Sanitation

The Cook Islands is committed to meeting its Millennium Development Goals (MDGs) by 2015 by incorporating goals into medium and long-term national planning frameworks (MDG, 2009).

Table 7: Cook Islands Progress on Millennium Development Goals

MDG Goals	MDG Report 2009	JMP Report 2010	Will Indicators be met by 2015
Indicator 7.8 Proportion of population with access to sustainable improved water source	95.1%	98%	Unsure
Indicator 7.9 Proportion of population with access to improved sanitation	90% (2006)	100%	Probably

Source: JMP Report 2010 and Cook Islands MDG Report 2009

Improved Water Access

In the Northern Group islands there is no public water pipeline system and most households rely on their own or public water tanks or ground water in public boreholes or wells for their water. About 35.4% of the Northern Group population cart or carry water to their house. This represents approximately 5% of the total resident population of the Cook Islands (MDG Report, 2009). Nearly all households on Rarotonga have access to the reticulated water system, with 99% of households connected to the system (Parakoti & Davie, 2007). Households that are located at elevations higher than 30m are responsible for their own water supply, usually through rainfall captured through on-site water storage tanks or water bags.

Improved Sanitation

Access to 'improved sanitation' facilities is defined by the 2005 Cook Islands MDG Report as having a flush or pour-flush toilet. Toilets in the Outer Islands are installed on a per household basis, and are usually counted during the National Census which takes place every four years, making it difficult to estimate the population using improved sanitation. Although access to flush toilets has improved since adopting the MDGs in 2000, poor quality of construction and maintenance of septic tanks contribute to freshwater lens and lagoon pollution (MDG, 2009). There is a clear disparity between Rarotonga and the outer islands in the technologies and services offered in water and sanitation.

Impact on Poverty
Despite improvements in access over the past two decades, there is still critical concern and clear disparity in access to quality of water between Rarotonga and the Outer Islands. Economic development on selected islands has been hindered by the lack of reliable and continuous water supply. The limited economic growth has resulted in the younger populations leaving for better opportunities in Rarotonga and overseas.

Reporting on MDGs
According to the 2010 WHO and UNICEF Joint Monitoring Programme (JMP) Report, 98% of the population has access to safe drinking water with 100% access to improved sanitation in the Cook Islands. This number does not truly reflect the water situation in the Outer Islands. Data collection for sanitation facilities relies on the national census being conducted every four years. The last reliable set of information was collected during the 2006 Cook Island Census, and although access to 'improved sanitation' has steadily improved since then, data will not be available until the release of the 2010 Cook Island Census.

6.2.2 Wastewater and Sanitation Facilities

Sewage Waste Technologies
In the Outer Islands pit and lagoon latrines are still used, and contribute towards the main source of sewage pollution on the islands (Brider, 2009). In the absence of a reticulated water system, many of the Outer Islands have limited access to substantial and reliable access to water, which is needed to move towards more advanced toilet technologies.

Table 8: Toilet technologies in use in the Cook Islands

Toilet Technology	Rarotonga	Southern Group	Northern Group	Cook Islands
Cistern Flush Toilet	97.7%	60.9%	73.9%	87.1%
Pour Flush Toilet	2.3%	15.2%	26.1%	7.2%
Pit Latrine	0.3%	39.7%	0.9%	9.6%
Lagoon Latrine	0%	0%	5.7%	0.4%

Source: 2006 Cook Islands Census

Treatment and Disposal of Sewage Waste
All properties on Rarotonga have some type of on-site wastewater sanitation system. Septic tank systems are widely used throughout Rarotonga and Aitutaki. Septage disposal is the responsibility of each owner, who then pays a private contractor to empty the septic tank. A recent report of septic tanks on Rarotonga has revealed that 90% of these systems are treating sewage inadequately due to poor design, construction and/or lack of maintenance (Evans and Dakers, 2011). The following findings regarding sanitation facilities and maintenance were released:

- Most septic tanks are undersized and with current development densities, soak pits are no longer an acceptable system for applying septic tank effluent to land.
- A large proportion of septic tanks (42%) need urgent repair or replacement.
- Of the accessible tanks, 49% require desludging.
- Of the tanks that were accessible to assess for leaking 50% were leaking.

On Rarotonga, sludge is supposed to be collected and treated in a reticulated leachate pond at the Rarotonga Waste Management Facility which has been operating since 2007. The treatment facility, which is funded by central government and run by MOIP, has the capacity to treat all sewage generate on the island over a 15-year period. Treated effluent from the plant is discharged to a nearby creek, which flows into the lagoon. The effluent is extremely high in nitrogen and can contain other organic and heavy metal pollutants (ADB, 2009).

There are no septage treatment facilities on any of the islands except Rarotonga and Aitutaki. In the Outer Islands, desludging of septic tanks rarely occurs in the absence of waste disposal treatment facilities and machinery needed, and sludge is generally buried near septic tanks.

6.3 Human Health

6.3.1 Water-related Illnesses and Waterborne Diseases

Human health complications from improper sanitation and sewage management include ciguatera fish poisoning, skin sepsis, oral infections and diarrhoea. Links between faecal and other bacterial concentrations in water and gastro intestinal are well established (Hajkowicz, 2005). Table 9 shows the incidences of major water-related illnesses on Cook Islands.

Table 9: Water-related illnesses in Cook Islands

Diseases related to water	2000	2001	2002	2003	2004	2005	2009	2010
Dengue	0	20	2310	0	N/A	N/A	1,335	1
Diarrhoea	396	671	830	835	1100	453	129	131
Fish Poisoning	138	133	183	249	469	421	113	78
Skin Sepsis	914	637	892	1895	1763	1918	1,243	1,256

Source: Cook Islands Statistics Office 2010

Skin sepsis and gastrointestinal illnesses like diarrhoea can be caused by bacteria in drinking and recreational waters. Statistics have indicated that skin sepsis and gastrointestinal illnesses are much higher for Northern Group island residents. More than half of the 2004 cases were from the Northern group, an alarming statistic considering the Northern group consisted of 12% of the national resident population (Hajkowicz, 2005).

Fish poisoning, also known as ciguatera, is caused from a neurotoxin produced by microorganisms that settle on coral algae, where they are grazed by lagoon fish. People who consume contaminated fish can become seriously ill, requiring hospitalization and a long recovery time, or ultimately succumb to the illness. The majority of reported cases occur in the Nikao, Takitumu and Tupapa lagoon areas (Brider, 2009). The Cook Islands Ministry of Health

openly and repeatedly warns people not to eat fish from the lagoon, where algal bacteria contaminants occur in higher concentrations. Research has shown that elevated bacteria levels are associated with nutrient runoff. The persistence of this toxin in the marine environment has forced Cook Islanders to replace their traditional fish-based diets with imported and expensive processed food, contributing to cardiovascular diseases, diabetes and obesity (ADB, 2008).

6.3.2 Awareness

The health sector suffers from poor public and even official awareness of the nature of the health and environmental risks associated with the lack of proper sanitation facilities (ADB, 2009). There is a need for an extensive awareness campaign about impacts of effluents to health and the environment. The level of uptake from the community is critical to change behaviours that affect the lagoon and increase individual commitment to contribute to cleaning up the lagoon and improving public health. There is also a need to educate the public about proper maintenance of a septic tank and land application systems to ensure the technologies are used properly.

7 Climate

7.1 Climate of Cook Islands

The Cook Islands enjoys a sub-tropical to tropical oceanic climate, moderated by trade winds. The average Cook Islands temperature ranges from 21-28°C, with extremes up to 8°C above and below the average range. The country falls within the South Pacific Convergence Zone (SPCZ), a convergence zone of air which usually lies between the Northern and Southern Island Groups (Muliaga, 2008). The movement of the SPCZ between the Northern and Southern Groups large influences weather patterns of the Cook Islands. The SPCA varies monthly, but there are two dominant wet and dry seasons for the country. Between May and October (dry season), the SPCZ is generally to the north of the Cook Islands with dry south-easterly winds prevailing, causing cooler temperatures. From November to April (wet season) the SPCZ may lie over the Group, causing unsettled weather and warmer temperatures with higher humidity and heavy rain.

7.2 Types of Natural Disasters

Natural hazards threaten the Cook Islands in the form of cyclones, storm surge, drought, coastal flooding, river flooding, tsunamis, earthquakes and landslides.

The largest natural disaster risk area is tropical cyclones, which occur during wet season. The occurrence of tropical cyclones tend to be more frequent during the El Niño Southern Oscillation (ENSO) when warmer than usual sea surface temperatures are found between latitudes 10-15°S. During the ENSO, droughts with up to 60% rainfall reduction are more common in the Southern

Cook Islands, while the Northern Cook Islands experience up to 200% rainfall increases. Between 4 February and 8 March 2005, the Cook Islands experienced five damaging cyclones within a period of five weeks, four of which were assigned a severity rating of Category 5.

Drought occurs through the lack of, or very low, rainfall during a rainy season (Dec – April). El Niño linked drought is not a nationwide phenomena, the norm is that at the time of an El Niño event the Southern Group of islands suffers drought while the Northern Group has enhanced rainfall. A La Niña event causes the reverse effect (Parakoti, 2007).

7.3 Climate Change Trends

The Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Report (2007) outlined that for small island states in the Southern Pacific region, the following scenarios could be identified with some confidence:

I. **Rise in sea level**. Sea level rise predictions range from 0.19 to 0.58 m by the 2100.
II. **Increase in surface air temperature**. Air temperature could increase 0.45^{o}C to 0.82^{o}C by 2039
III. **Changes in rainfall**. Rainfall could either rise by 3.4% or fall by about 3.9% from current rates in 2039, leading to more intense floods or droughts.
IV. **Increased frequency of more El-Niño like conditions**. The balance of evidence indicates that El Niño conditions may occur more frequently, leading to higher rainfall in the central Pacific and northern Polynesia.
V. **Increased intensity of cyclones**. Cyclones may become more intense in the future, with wind speeds increasing

7.3.1 Climate Change Impacts for Water and Sanitation

Climate Change Impacts to Water

For the urban population on Rarotonga, predictions of increasing water demand and finite existing water holding capacities will create problems of water shortages in the near future as the economy expands. Pressure on water resources in the outer islands will continue as climate change effects continue to influence local weather patterns. As the Cook Islands' natural water resources come from surface catchments dependant on rainfall, any changes to frequency of rainfall will affect water availability. Sea level rise and increased sea water temperature will accelerate coastal erosion and saline contamination of groundwater lenses, an important water source for Southern Group Islands. Cyclones cause damage to homes and public infrastructure due to high winds, storm surges and sea flooding. Stream and river flooding from heavy rainfall causes increased sediment flows. The filters at the water intakes become blocked, resulting in muddy water entering the reticulated system. Droughts place considerable stress on water resources on Rarotonga, and can even be a life-threatening risk to the people inhabiting the Outer Islands (ADB, 2009), compounded by poor rainwater catchment and storage.

Climate Change Impacts to Sanitation

Dengue transmission is at the greatest risk during annual wet seasons, diarrhoeal disease may increase with higher temperatures and decreasing water availability. Ciguatera fish poisoning is associated with warmer water temperatures (Mimura, 2007). However, the most significant

need is to stop the continued transmission of nutrient levels into the lagoon waters. If nutrient levels continue to increase, higher temperatures will bring more pronounced algal blooms and adverse impacts to public health and tourism (ADB, 2009). Public health programmes and water development projects in the outer islands must be sustained to reduce sanitation related problems currently experienced, especially in the Northern Group.

7.3.2 Response to Climate Change

It is becoming essential that development must be carefully managed and that climate change must be considered if the islands are to improve abilities to adapt to the effects of climate change and survive in the long term. The National Action Plan for Disaster Risk Management (DRM NAP) provides a roadmap of how the Cook Islands will go about implementing the strategy of "establishing a coordinated and effective national disaster risk reduction and disaster management system for all hazards" as articulated under Goal 6 of the NSDP (NDSP, 2007).

The Climate Change Adaptation Fund Programme seeks to strengthen the ability of all Cook Island communities and the public service to make informed decisions and manage anticipated impacts of climate change. The programme will support, at the national, sectoral, and island levels, implementation of the Cook Islands' new Joint National Action Plan (JNAP) on Disaster Risk Management and Climate Change Adaptation.

Through consultations with stakeholders during the National Capacity Self-Assessment, the programme has identified the key gaps and constraints to successful adaptation to climate change in their Adaptation Fund Proposal report, including:

- Comprehensive Vulnerability and Adaptation assessments need to be completed for all Islands, which will improve understanding of the extent of island vulnerability and hazards
- Lack of integration of climate change risk and resilience into island level and sectoral development processes in terms of integration and mainstreaming climate issues into existing governance frameworks
- Enforcement of climate policy and regulations in place to facilitate and promote behavioural adjustments towards risk management practices in the Cook Islands

There is also a lack of information and capacity to assess climate risks and implement climate change adaptation measures and appropriate coastal protection land use and water supply management practices. Reliable, timely information and the ability to understand and respond to the information is necessary to safeguard livelihoods, maintain access to essential services, and protect the quality of life in all islands.

8 Summary of Key Trends and Threats to Water, Health and Climate

This section identifies emerging trends and threats that will impact the Cook Islands' ability to provide safe water and sanitation to the entire population, as identified through stakeholder consultations and workshops in the outlook development process. These issues will be further exacerbated by driving forces of Tourism Development, Change in Demography and Climate Change if they are not immediately addressed.

1. *Lack of coordinated water resource development*

Industry and commercial developments do not align with the development of water resources. Water management policies and legislation practices have not been modified to reflect the changing situation for the past forty years. Without amending the current legislation, water resource security will be threatened by overuse.

2. *Financial Sustainability*

There is no cost recovery in place to provide funding for MOIP to be able to carry out water supply infrastructure projects and improvements to the reticulated system on Rarotonga. There are no provisions in place for developing or expanding commercial water users on Rarotonga to fund their own water needs. Lack of a user-pays system threatens the financial sustainability of the reticulated water system in the long-term.

3. *Water storage capacity*

Rarotonga residents experience water shortages during drought periods, but water storage capacity has increased only slightly relative to the growth in tourism development. All tourist accommodations are dependant on the island's reticulated water supply, and the projected growth for the tourism industry will severely strain the existing water supply infrastructure and finite water resource availability. Increasing water storage capacity on the island will reduce the tourism industry's reliance on the reticulated water supply and provide an alternate water supply source.

4. *El Nino Southern Oscillation (ENSO) fluctuations*

The implications for water resources from increased frequency and intensity of ENSO episodes have both positive and negative consequences. La Nina periods can bring increased precipitation or more severe droughts, both of which can put a strain on water-related infrastructure (ADB, 2009). The heavy rains and high winds from cyclones associated with la Nina periods can damage water intakes, and increased sediment flows from heavy rains can block intakes.

5. *Salinisation of groundwater lenses*

Sea-level variations can contribute to varying salt-water intrusion in the groundwater. Cyclone-induced debris, storm surge and salt spray can overtop, contaminate and degrade aquifers, wells, and storage facilities (ADB 2009).

6. *Algal blooms in lagoons*

Algal blooms are occurring with increasing frequency and appear to be related to the increase in tourism. Higher nutrient levels from increased waste reaching the lagoons stimulates algae growth. The algal blooms could have the potential seriously impact tourism and public health on Rarotonga and Aitutaki.

7. *Land degradation*

There is concern about the increasing risks of land degradation as a result of unchecked development such as landfills. Increasing soil erosion is evident, especially around the foreshore and slopes. In recent years, 31% of developments on Rarotonga have been concentrated around the foreshore and 36% on sloping lands (Island Friends, 2004). Developments of these vulnerable areas will lead to increased sediments entering surrounding streams and groundwater, impacting the quality of reticulated water and lagoon health.

8. *High density land development*

Developments for housing and private sector facilities continue to be concentrated along coastal and foreshore areas. The expansion of housing has resulted into smaller areas of land allocated to individuals (Brider, 2009). A higher density development may result in on-site wastewater treatment moving towards cluster treatments or communal reticulated sewage systems. There will need to be cultural acceptance of communal reticulated sewage and its associated financial expense.

9. *Variation in temperature and rainfall*

Changes in the patterns or frequency of rainfall will significantly affect water availability, as much of the Cook Islands are dependant on water sourced from surface catchments and streams reliant of current precipitation. Temperature variations can cause changes in soil moisture, plant water uptake (evapotranspiration) and infiltration rates (ADB, 2009).

10. *Continued threats from water-related diseases*

Ciguatera fish poisonings will continue to occur if people are not made aware of the problem. The continued high levels of nutrient loads entering the lagoon will likely lead to elevated ciguatera bacteria levels and associated fish poisoning, but the exact links still need to be explored.

9 Next Steps

The following steps are identified as priorities for the immediate improvement of governance, provision of services and infrastructure in water and sanitation for the Cook Islands. These findings were established through collaboration between community groups, civil society and government ministries in workshops and working groups as part of the outlook development process.

1. *Legislation and Policy*
   Conduct a legislative review of various acts and regulations that regulate water resource supply and water quality. Develop and implement policies for water governance as an immediate step towards an overarching policy for integrated water resource management, in collaboration with the IWRM project and Waste Management Initiative. Develop Island specific water resource management plans for all islands in the Cook Islands.

2. *Establish a National Water Committee*
   The Ministry of Infrastructure should take leadership to drive the committee and promote an integrated water resource management approach. The roles and responsibilities, institutional arrangements and coordination mechanisms between relevant ministries, community groups and private sector and other water stakeholders need to be assessed and stated clearly in the Terms of Reference. The Terms of Reference should be endorsed by participating members as well as higher levels of government.

3. *Promote User-Pays*
   Promote the concept of 'user-pays' to the general public, acceptance and implementation of this could reduce the strain on limited financial resources. The public awareness and education campaign should highlight the finite nature of water resources and promote water conservation is preparatory to the introduction of universal metering and user-pay charges.

4. *Sanitation Awareness*
   Develop a consistent sanitation awareness strategy to ensure sustainable sanitation technologies are understood and adopted. Educate the public and provide training on proper maintenance of septic tank and land application systems.

5. *Increase Storage*
   Increase water storage to enhance water supply capacity on Rarotonga and the Outer Islands. Bring existing tanks and reservoirs back into service and provide additional reservoirs on Rarotonga.

6. *Community participation and ownership*
   Involve communities in decision making regarding water resource management including conducting workshops to empower communities to take more ownership and responsibility of their drinking water. Strengthen partnerships between the private sector, NGOs, community groups and government and encourage the participation of members through the general public.

7. *Communication, Information and data management*
   Review current databases to identify opportunities and synergies for networking and information exchange. Establish practical mechanisms or networks to facilitate communications and exchange of water resource information such as an open internet-based system available to stakeholders, planners, policy makers and decision-makers.

10 Conclusion

In the past few years awareness and concern has grown with decreasing water quality of lagoons in Rarotonga and the Outer Islands. Community groups, civil society and government ministries have collaborated in a number of different forums throughout the outlook development process to identify the main issues and possible strategies to address the problems associated with lagoon pollution, climate change and constraints to the providing safe water and sanitation coverage to the entire pollution

The Government of the Cook Island realizes that infrastructure development is fragmented, and that there are many policy gaps that need to be addressed. Additionally, existing legislative frameworks are outdated and regulations need to be reviewed to suit the circumstances. The key message is that the Cook Islands cannot wait for the perfect solution, and infrastructure developments must move forward despite financial and capacity constraints.

The Waste Management Initiative and Muri Demonstration Project are immediate responses that address water and sanitation issues, and provide for an IWRM strategy for the Cook Islands. These projects show how different ministries and community groups are working together to reduce stresses on water resources and improve the quality of fresh and coastal waters. A National Water Committee is necessary for providing a platform for the Ministries of Health, Marine Resources, National Environment Service and key water stakeholders to make high-level, informed decisions regarding the water and sanitation sector.

Many of the current responses to address water and sanitation problems focus on Rarotonga and Aitutaki. There is a clear disparity in access to quality of water and improved sanitation in the Outer Islands, which suffers from higher incidences of water-related diseases and water shortages during drought situations. The geographic dispersion of the Cook Islands makes it difficult to maintain a universal level of water and sanitation access across the country.

Involving NGOs and traditional leaders in decision-making is necessary for achieving long-term solutions for water supply and sanitation in Rarotonga and the Outer Islands, as they provide effective methods for community engagement and uptake of new technologies. Any further developments to infrastructure and service delivery in water and sanitation must take social, economic and cultural considerations into account.

11 References

Asian Development Bank (2008). Volume I, 21–23. Cook Islands 2008 Social and Economic Report - Equity in Development.

ADB (2009) Final Report TA 7022-C00: Preparing the Infrastructure Development Project. Volume 3: Water Supply and Sanitation Sector.

ADB (2010) Mid-Term Report TA 7287: Infrastructure Services Delivery Improvement.

Cook Islands Cross-Cutting Capacity Assessment Report (2007). Prepared for the NCSA Project, National Environment Service, Cook Islands.

Bell, P.R.F. (1992). Eutrophication and coral reefs – some examples in the Great Barrier Reef lagoon. Water Res. Vol. 26, No.5 pp. 553-568

Brider, J. (2009). Improving Wastewater Management in Coastal Cities. Prepared for UNEP-GPA/SOPAC 'Improving Municipal Wastewater Management in Coastal Cities' training course held on Rarotonga, Cook Islands from 28-31 July 2009.

Cook Islands Health Strategy (July 2000). Ministry of Health, Government of Cook Islands.

Evans, J. and Dakers, A. 2011. Audit of Rarotonga.s Domestic Sanitation Systems. Ministry of Health, Rarotonga.

Hajkowicz S. A., & Okotai P. (2005). An Economic Valuation of Watershed Management in Rarotonga, the Cook Islands. A Consultancy Report to the South Pacific Regional Environment Program and Cook Islands Government. CSIRO Sustainable Ecosystems, Canberra, Australia.

Island Friends. (2004). Priority Environmental Problems (PEC) Prepared for the International Waters Project: Cook Islands Report. Island Friends Ltd, Cook Islands.

Muliaga, J. (2008). An Assessment of the Impact of Climate Change on Agriculture and Food Security in the Pacific. Prepared for the Government of Cook Islands.

Mimura, N., L. Nurse, R.F. McLean, J. Agard, L. Briguglio, P. Lefale, R. Payet and G. Sem, 2007: Small islands. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 687-716.

National Millennium Development Goals (MDG) Report 2009. Central Policy and Planning Office, Office of the Prime Minister, Cook Islands.

Office of the Prime Ministe. 2007-2010; Te Kaveinga Nui, National Sustainable Development Plan. Government of the Cook Islands.

Office of the Prime Minister, 2005; Millennium Development Goals National Report, Government of the Cook Islands/UNDP/CIANGO.

Parakoti B., Davie T.J.A. (April 2007). Diagnostic Report for Integrated Water Resource Management in the Cook
Islands. Contract Report for SOPAC.

PICCAP: Cook Islands Coastal Vulnerability Assessments: A Small Pacific Island Experience. 2003.

Ngereteina, G., Teina, T., Tuaine, T., Solomona, D. (2006). Rarotonga Water Quality Annual Report 2006. Ministry of Marine Resources.

Rarotonga Water Quality Report Card 2009, Ministry of Marine Resources.

Solomona, D., Tuatai, T., Turua, T. & George, N. (2007). Rarotonga Water Quality Annual Report 2006. Ministry of Marine Resources, Government of the Cook Islands.

Upoko, T. (2005). National Environment Strategic Action Framework (NESAF) 2005-2009. National Environment Service. Government of the Cook Islands.

WHO. 2001. Bathing Water Quality and Human Health: Protection of the human environment water, sanitation and health. Report WHO/SDE/WSH/01.2. World Health Organisation, Geneva.

WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation, 2008, Progress on Drinking Water and Sanitation: Special Focus on Sanitation. UNICEF, New York and WHO, Geneva.

Appendix 1 Infrastructure Sector Forum Outcomes

1. Water Management Priorities

Priorities	Strategy	Actions	Key Drivers	Delivery
Goal: Securing Our Supply of Water				
Governance of water	Establish the best institutional arrangements to better manage our water resources and infrastructure	Explore and implement the most viable options for managing water resources and infrastructure including remaining as division within MOIP, stand-alone body, or part of a Public Utilities Agency	IC, MOIP	2011
		Develop water legislative and regulatory framework to replace outdated Water Ordinance	MOIP, Crown Law	
A secure and sustainable water supply for all users	Improve the supply of water	Develop the National Water Policy	CPPO, MOIP	2011
		Develop water strategies for each region		
		Complete the upgrading of the distribution mains	MOIP	
		Upgrade the water intakes in Rarotonga and Aitutaki	MOIP	
		Replace the water ring mains in Rarotonga	MOIP	
		Improve reticulation systems in the Outer Islands	Island administrations, MOIP	
	Improve water harvesting	Make water tanks compulsory for new houses and include in the building code	MOIP	
		Work with development partners to provide water storage facilities for the Outer Islands	MOIP, AMD, Island Council, Development Partners	
		Provide incentives to encourage rainwater harvesting	MOIP	2011-2015
	Explore the possibility of utilizing underground water	Conduct underground water testing and studies	MOIP	
	Improve the quality of water	Put into place appropriate treatment systems at all intakes	MOIP	
	Adopt user-pays for the delivery of water from the intake	Explore options for user-pays including rate structures, exceptions, billing systems	MOIP	2011
		Implement user-pays system on an incremental basis	MOIP	2012-2015
	Improve data collection to inform decision-making	Conduct an audit/water inventory for all islands	MOIP, Island Administration	2011-2012
		Install water meters to determine demand and management	MOIP	2011-2015
Protect our cloud forest	Conserve our cloud forest	Establish the policy and regulatory framework to protect our cloud forest	NES	
Water is everybody's	Educate our people to be good managers	Conduct education and awareness programs	MOIP	Ongoing

Priorities	Strategy	Actions	Key Drivers	Delivery
business	of our water resources			
		Develop and conduct a vocational water management training course	MOIP, industry	2011-onwards

2. Waste Management Priorities

Priorities	Strategy	Actions	Key Drivers	Delivery
Goal: A Clean Cook Islands				
Improve the management of solid, liquid and other forms of wastes, to ensure a sustainable environment that will support the livelihoods of our people	Establish the necessary institutional arrangements to better manage waste	Develop National Polices for Waste and Sanitation	IC, MOIP	2011
		Set up MOIP as the regulator for solid and liquid waste	MOIP, MoH	
		Strengthen the Sanitation Board to include MoH, NES, MOIP, an engineer, tourism and industry representatives	MOH	2011
		Transfer the management of the Rarotonga waste management facility to the private sector	MOIP	2011
	Reduce pollution from sewage	Upgrade all septic tanks that do not comply with the sewage regulations	MoH, MOIP, Industry representatives	2011-2015
		Upgrade the Tepuka Community Sewage Plant and put into place a mgmt regime.	MOIP, CIIC, Tepuka Community	2011
		Where cluster systems are adopted clearly define management and maintenance responsibilities	MOIP, communities	2011-2015
		Put into place appropriate sewage systems	MOIP, MoH, communities	2011-2015
		Explore and analyse the costs and benefits of other options for sewage disposal such as ocean outfalls	MOIP, MOH, NES	
	Reduce pollution from animal waste	Review and develop appropriate policies and regulations related to animal waste	MOH, MOA	2011
	Change behaviour of our people in relation to waste management	Implement education and awareness program on waste management	NES	2011-2015

Appendix 2 Profile of Institutions Consulted

Agency	Stakeholders' interests/responsibilities	Level of support for NWC and Outlook	Reasons for inclusion
Government Institutions			
Ministry of Infrastructure and Planning	Agency responsible for overall coordination and monitoring of water management projects in Rarotonga and the Outer Islands, and for coordination of development plans including those affecting the water sector.	Responsible for seeking support and coordinating NWC and Outlook	Main driver for National Water Committee. IWRM falls within jurisdiction of Ministry of Infrastructure and Planning
Ministry of Health – Public Health Division	Agency responsible for monitoring and surveillance of the biological quality of public water supply schemes, managing and approving septic tanks and running awareness programmes for communities on public health issues including water-borne diseases.	Received support for the NWC and Outlook. Has offered several representatives to be on the NWC.	Significant role in: Testing of coastal and drinking water Permitting of septic tank systems Member of the waste management committee
Ministry of Marine Resources	Responsible for the management of coastal waters around the Cook Islands. They are interested in lagoon pollution from surface water runoff and sewage runoff from land-based activities including agriculture and tourism. They also have a well-equipped laboratory for chemical, physical analysis of coastal, surface and groundwater.	Received some level of support for the NWC. Would rather have an operational role than as a driver, due to shortage of capacity and time.	Significant role in water quality monitoring of freshwater and marine resources
National Environment Service (NES)	Responsible for environmental issues and concerns including pollution, conservation, waste management, climate change and Environmental Impact Assessments for development projects	Received support for the NWC and Outlook. HoM will assign Vavia Tangataia (compliance manager) to the committee as a representative	Carries out water quality sampling and monitoring of water resources
Meterological Office (MET)	Responsible for issuing weather forecast and monitoring of long-term weather patterns, providing national climate and weather services to the public	High level of support for the Outlook.	They have strong technical capacity for monitoring and predicting effects of Climate Change on water resources in the Cook Islands.

Agency	Stakeholders' interests/responsibilities	Level of support for NWC and Outlook	Reasons for inclusion
Ministry of Agriculture (MOA)	Responsible for development of agriculture products for export and local markets. -Promoting and encouraging development of organic farming and application of better practices	High level of support for NWC and Outlook	Heavy demands for water, and most water intakes run through agricultural lands. Agriculture impacts on quality and quantity of water for the rest of Rarotonga.
Office of the Prime Minister (OPM)	Responsible for WSSD, MDGs and development of the National Sustainable Development Plan. They are also the National Policy Coordination Unit.	Received support for the NWC and Outlook. The OPM will be the liaison with climate change and disaster risk management.	Findings from Outlook can contribute towards Climate Change Review and National Sustainable Development Plan
Emergency Management Cook Islands (EMCI)	Responsible for carrying out climate change adaption and disaster risk management	Received support for the NWC and Outlook. EMCI already mandated and in position to carry out consultation on NWC and Outlook for OPM.	Can contribute highly relevant information to Outlook – DRM, EM, identifying hazards
Water Safety Committee	Ensures sustainability of water supply for Rarotonga and the Outer Islands (although there is emphasis on Rarotonga). The Committee is structured along IWRM lines with the recognition of the interdependence of land use, water quality, water supply and community liaison. The WSC forms the IWRM Committee used in any GEF project.	Support for NWC and Outlook.	The WSC could form a sub-committee with an operational role. The NWC could be used to drive projects such as WMI forward
House of Ariki	Responsible for representing views of communities on all islands through regular meetings with tribes, villages, churches. Provides supporting role to Ministries and has annual sitting to advise Parliament.	Received support for NWC. Will provide representation for communities and outer islands. Will provide advisory role to support ministries	Facilitate dialogue between government and people regarding land tenure and water project. Incorporates traditional and cultural knowledge on NWC.
Non-Government Organisations (NGOs)			
Climate Change Action Network (CCAN)	Responsible for facilitating numerous community-based environment programs and assisting initiation of Climate Change Action Network. Advocacy on environmental issues and lobbying on climate change policy.	Supports moving towards water as a national priority. Will ensure community views are represented.	Provides voice for communities of Cook Islands free from political association and obligation.

Agency	Stakeholders' interests/responsibilities	Level of support for NWC and Outlook	Reasons for inclusion
Cook Islands Red Cross	Responsible for providing disaster preparedness and emergency capacity building, including training, and post-disaster and emergency relief activities	Received support for developing NWC and Outlook.	Expertise on climate change impacts and emergencies affecting water availability and health on Rarotonga and Outer Islands.
Te Rito Enua (TRE)	Protection of environment in identified priority areas on Rarotonga. Conducts capacity-building through environmental education sessions with communities.	Some support for developing NWC.	Disseminates information from government to the public. Conducts workshops to enhance understanding and capacity of community members.
Te Ipukarea Society (TIS)	Responsible for facilitating community-based environment programs and promoting public awareness in environmental programmes and advocacy for specific environmental issues.	Received support for the NWC and Outlook	Provides assistance in waste management initiatives, small community-based projects. Active in environmental advocacy, education, awareness programs and dissemination of information.