

**Integrated Water Resource Management (IWRM) Demonstration Project**

*Integrated freshwater and coastal management on Rarotonga*

**Cook Islands**



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**Country**    **Cook Islands**

**Title:**        **Integrated freshwater and coastal management on Rarotonga**

**A. Executing Agency**

*Ministry of Works*

Overall execution for the project will rest with the Cook Islands Ministry of Works with a steering committee provided by the National Water Safety Council. The policy review section will be overseen by the Office of the Prime Minister with technical input provided by the Ministry of Works, National Environment Service Ministry of Health and the project Steering Committee. The capability training will be run by local NGO's where possible, as well as other regional NGO's such as Live and Learn Environmental Education. The technical information section will be lead by the Ministry of Works with significant input from other relevant Ministries.

**B. Cost of project**

**GEF Funding:    USD 501,163.48**

**Co-Funding:     USD1, 654,432.50**

**C. Linkage to IWRM GEF Project Priority Demonstration**

Within the GEF Operational Strategy for International Waters this project tackles water and environmental problems using an IWRM approach across GEF Strategic Programme III: Balancing overuse and conflicting uses of water resources in transboundary surface and groundwater basins (with a specific focus on SIDS to protect community surface and groundwater supplies while reducing sewage releases).

The geographical nature of SIDS allows IWRM approaches to rapidly demonstrate the multiple benefits of tackling water resource management in an institutionally horizontal manner, whilst applying a ridge to reef approach, tackling technical and socio-economic issues with communities and civil society at large to demonstrate equity, efficiency and environmental sustainability.

The project will also tackle, through IWRM approaches, many of the issues under GEF Strategic Programmes I and II through identifying and understanding multiple stresses on fragile coastal environments and linking these to freshwater and land management, especially upstream practices; IWRM will contribute to improving coastal fishstocks and biodiversity. IWRM approaches will also include methods to reduce economic and ecologic dead-zones of oxygen deficient water as a result of human and animal sewage waste

The overall aim of the project is to improve groundwater, freshwater and lagoon water quality using an integrated water resource management framework. A secondary aim is to gain information on the availability of groundwater for drought relief.

The project attempts to do this through the following components:

1.    Technical assessment of water quality and quantity information measures
2.    Knowledge dissemination to promote community knowledge and understanding

3. Institutional strengthening and human resource capability development measures

**D. Linkage to National Priorities and Programmes**

Cook Islands Commitments to regional and international Multilateral Environmental Agreements (MEA's) include:

<b>Conventions</b>	<b>Date Signed</b>	<b>Focal Dept</b>
Convention for the Protection of Natural Resources and Environment of the South Pacific Region, 1986 Noumea (SPREP Convention)	9 September 1987	National Environment Service
South Pacific Nuclear Free Zone Treaty, Rarotonga 1985	28 October 1985	Ministry of Foreign Affairs
Stockholm Convention on Persistent Organic Pollutants	29 June 2004	National Environment Service
Un Convention on Biological Diversity(CBD) 1992  Biosafety Protocol	20 April 1993  (Signed only 21 may 2001, not ratified yet)	National Environment Service
UN Framework Convention on Climate Changes (UNFCCC) 1992  Kyoto Protocol	20 April 1993  27 August 2001	National Environment Service  National Environment Service
United Convention on the Law of the Sea ,1982	15 February 1995	Ministry of Marine Resources
Vienna Convention for the protection of the Ozone Layer 1985	22 December 2003	National Environment Service
Waigani Convention	30 October 2000	National Environment Service
World Heritage Convention, 1972	Not a Party	

The recently launched National Sustainable Development Plan for the Cook Islands has set as its primary strategic objective: *"to build a sustainable future that meets our economic and social needs without compromising prudent economic management, environmental integrity, social stability and the needs of future generations "* (p10 Te Kaveinga Nui - National Sustainable Development Plan 2007-2010).

Furthermore Goal 4 of the Plan states as a key policy target for 2007 – 2010 that an “Integrated Water Resources Management Policy be developed and implemented by the end of 2008 to increase access to safe drinking water on Rarotonga by 30% by 2010”.

This provides an excellent platform to build IWRM in the Cook Islands and this proposal is compatible with the following International and Regional MEA's:

- Convention for the Protection of Natural Resources and Environment of the South Pacific Region, 1986 Noumea (SPREP Convention)
- Stockholm Convention on Persistent Organic Pollutants
- Un Convention on Biological Diversity(CBD) 1992
- UN Framework Convention on Climate Changes (UNFCCC) 1992
- Kyoto Protocol
- United Convention on the Law of the Sea ,1982
- Vienna Convention for the protection of the Ozone Layer 1985

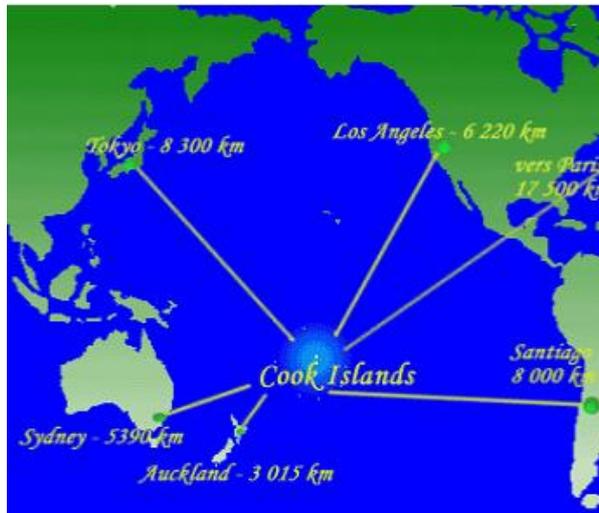
***E. Name and Post of Government Representative endorsing the Demonstration Activity:***

Vaitoti Tupa	Edwin Pittman
Director	Secretary
Environment Service	Ministry of Foreign Affairs and Immigration
PO Box 371	P.O Box 105
Raratonga	Rarotonga
Cook Islands	Cook Islands
GEF Operational Focal Point	GEF Political Focal Point

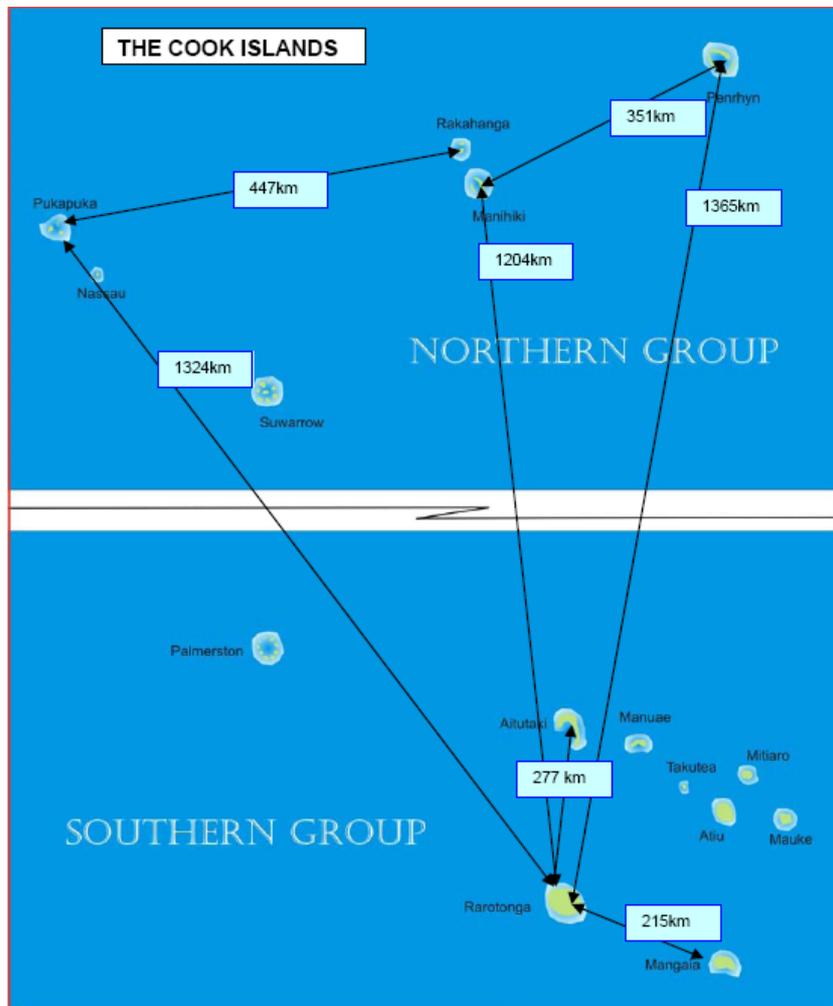
***F. Project Objectives and Activities***

*i) Background and Context*

The Cook Islands are located in the Pacific Ocean between latitudes 14° S and 22° S, and longitudes 159° W and 164° W. They are a Polynesian island group comprising of 15 widely dispersed islands, surrounded by an exclusive economic zone of 1.8 million square kilometres (Figure 1). Like many Pacific Island Countries, water supply issues are dominant in the management of water resources, and attention generally has focused on the areas of greater population, mainly Rarotonga. The islands source potable water 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.



**Figure 1: Location and of Cook Islands.**



**Figure 2: Map of the Cook Islands** (Source: <http://www.cook-island.maps-pacific.com/>)

The IWRM Diagnostic Report (Parakoti & Davie, 2007) highlighted the following key water resource management issues that would benefit from an IWRM approach in the Cook Islands:

- The lack of a **legal and policy framework** for water resource management. Under the present system government departments and other organisations are unsure of each others roles in the area of water resource management and there is possible duplication and/or omission of roles. It also leads to mistrust on the motives behind integration in the management of water resources.
- **Capacity building** in the area of integrated management. This is not a lack of capability among people currently concerned with water management; the majority are tertiary level trained with an excellent understanding of the key water management issues. The issue is that these people are inundated with projects in many different areas related to water and there is not enough staff to take on new initiatives.
- Poor **waste water treatment** in septic tank systems and the subsequent transfer of nutrients in groundwater and through into the lagoon system. Associated with this is the governance of waste water treatment coming under the Ministry of Health so that it is not treated as an environmental issue.
- **Leakage and wastage of reticulated water** are major issues for Rarotonga where water supply is funded directly through government expenditure (i.e. no water charging either by volume or connection). The funding system also makes infrastructure investment vulnerable to change through political and government budgetary constraints.
- Climatic **vulnerability of water supply**, particularly to drought. The simple nature of the reticulation systems on Rarotonga and Mangaia mean they are less likely to be vulnerable to flooding but they are vulnerable to drought. Water demand management can help lessen the demand but there is still a need to hedge supply sources against extremely low flows in the source streams.
- **Land use practices affecting stream water quality**, and indirectly the lagoon. This is particularly a problem for piggeries adjacent to streams and inadequate domestic waste disposal through rudimentary septic tank systems.

Some of these issues are being addressed through current projects (e.g. water reticulation leakage, water demand management, piggery impact on streams) but there are still many issues that would benefit from IWRM. However there is considerable potential for IWRM to be a reality in the Cook Islands. The country has the advantage of being relatively small, with a moderate to high rainfall and without greatly increasing population pressures. The largest requirement is a political and community will for integration between agencies so that IWRM can lead to achieving sustainable growth in harmony with the Cook Islands' culture and environment.

Lagoons surround all of the islands within the Cook Islands. Traditionally the lagoon has been a major food source for Cook Islanders. The crystal-clear waters of Cook Island lagoons are used as major promotional feature for attracting tourists to the country and tourism is the largest export sector in the Cook Islands economy. Restaurants and accommodation, which are essentially tourism industries, account for 16% of the Cook Islands' national income. It is likely that tourists are also major consumers in many other industries (e.g. transport, communication, retail). The primary industries of agriculture and fishing account for only 11% of gross domestic product.

Tourism development and changing land uses have started to threaten the purity of lagoons; this is particularly true for Rarotonga and to a lesser extent, Aitutaki (Figure 2). It is estimated that around 70%

of Cook Islanders are engaged in some type of agricultural activity, much of which is on a subsistence basis (Statistics Office, 2001). It is common for a household to have chickens, goats, cows and/or pigs, and grow crops such as taro or bananas. The population of Rarotonga has grown over the past 20 years from 9,530 in 1981 to 12,188 in 2001. In most years the Cook Islands has positive population growth of around 5% (Statistics Office, 2001). Of particular concern with growing population are the agricultural practices and poor sewage treatment mechanisms, these are largest on Rarotonga due to the higher population and more intensive agriculture.



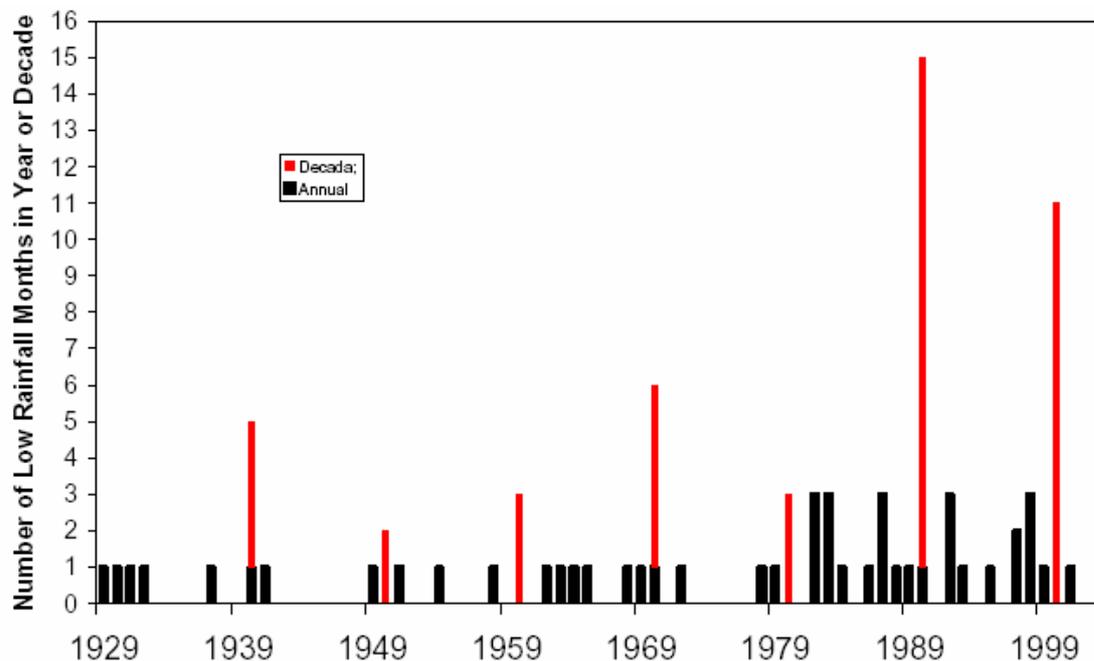
**Figure 3: Aitutaki and lagoon, a major tourist attraction for the Cook Islands.**

A recent economic evaluation of watershed pollution in Rarotonga has estimated avoidable cost from improved watershed management at NZ\$7.4 Million per year (3% of GDP in 2003; Hajkovicz & Okotai 2005). The major costs associated with poor watershed management are through increased healthcare and loss of tourism. On Rarotonga water quality issues from poor watershed management have been linked into significant health concerns, e.g. Takitumu Irritant Syndrome in 2003-04 which is linked to algal blooms in the nutrient rich lagoon waters. A recent study on lagoon water quality in the Titikaveka lagoon showed that at all sites some water quality parameters (nutrients, suspended solids, and chlorophyll *a*) were at higher values than recommended for the healthy growth of coral reefs (Hall et al., 2006). The water quality of streams flowing into the lagoon was highly variable, suggesting that there may be other nutrient rich waters adding to the problem (e.g. groundwater).

IWRM principles highlight the need for working on the land use within the watersheds contributing to the lagoon; the groundwater moving into the lagoon and the lagoon itself. This requires an integrated approach between water management sectors (both governmental and NGO) with the specific aim of improving environmental quality on the land, in the surface freshwater, in groundwater and in the lagoon.

At the same time as increasing pressure on groundwater quality through inadequate household waste disposal there is interest in using groundwater to supplement surface water abstractions during periods of drought. During an El Niño event the southern Cook Islands experience a reduction in rainfall, to as little as 60% of normal, while in the northern Cook Islands rainfall increases to as much as 300% above normal. This can be seen in the number of low rainfall months recorded in a year and decade at Rarotonga airport (figure 3). Most of the low rainfall months are concentrated in the latter part of the period of observation, indicating that the frequency of drought has increased since the 1930s. The years with a high number of months below the five percentile coincide with El Niño events (ADB, 2006). The increasing population and possible increased drought risk through climate change means groundwater needs to be investigated as a possible future water supply.

Of all the islands in the Cook Islands it is Rarotonga that is facing the greatest environmental stress. Rarotonga has 70% of the total population (12,188 in 2004). The population density for Rarotonga is relatively low at 135/km<sup>2</sup>; however well over 90% of the populations live on the coastal plain which has a population density of around 860 persons per km<sup>2</sup>. In addition to the local population, Rarotonga is the main focal point for tourism in the Cook Islands. With the only international airport in the Cook Islands almost all of the 92,000 visitors (2006 figures) are either based in, or spend some time on Rarotonga. Given the issues of increased pollution from septic and agricultural wastes, consequent degradation to the lagoon, surface and groundwater, resultant economic impact of this degradation as well as higher population density than the rest of the Cook Islands, Rarotonga was selected as the project demonstration site for the project.



**Figure 4: Daily Number of low rainfall months at Rarotonga airport (Source: ADB 2006)**

*ii) Objectives and Activities*

The background information and issues highlighted above point to the need for an integrated approach to managing the freshwater and lagoon system on Rarotonga. The starting point for this is to develop capability in the area of integrated resource management and to put in place institutional structures that facilitate integrated management. This needs to be aligned with good technical information on the current state of groundwater quality and quantity to develop an integrated management plan. This information can then be tied together into a GIS tool to demonstrate the principles of an integrated biophysical system that is being managed in an integrated manner.

The project therefore proposes to demonstrate through a process of policy change, capacity building and technical information gathering and management, the delivery of improved water quality in the freshwater and near coastal environments and an improved water resource management structure. The project objective is the demonstration of sustainable water resources assessment and protection in the Cook

Islands and purpose is for an improved understanding of the quality and quantity of surface water and groundwater and their vulnerabilities.

To achieve this, the project consists of 3 components or sub-objectives which include:

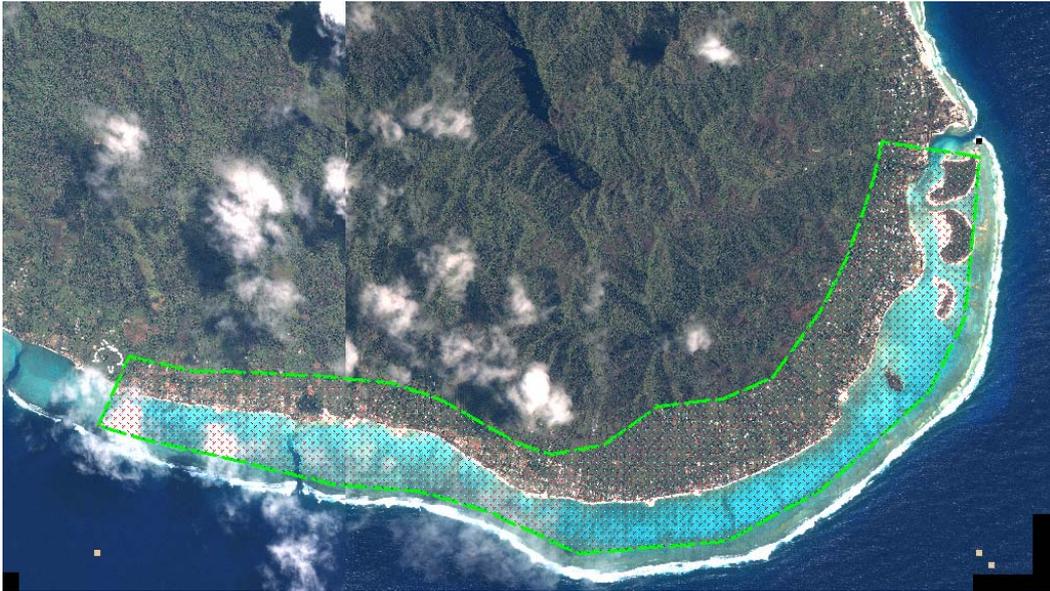
1. Technical assessment of water quality and quantity information measures
2. Knowledge dissemination to promote community knowledge and understanding
3. Institutional strengthening and human resource capability development measures

These are discussed in more detail below.

*Component 1: Assessment of water quality and quantity of freshwater resources and water quality of the marine environment*

As identified in both the diagnostic report and the hot spot analysis freshwater and coastal marine water quality in Rarotonga and the resultant impacts on the human health and the health of the lagoon are a major concern as illustrated through the recent Takitumu Irritant Syndrome in 2003-4 which was linked to algal blooms in the nutrient rich lagoon waters.





**Figure 5 – Site of Takitumu Irritant Syndrome in the district of Takitumu on the south side of Rarotonga**

In order to address the pollution problem of the water going into and in the lagoon, this component of the project refers to a technical study comprising of a package of assessments each contributing to a better understanding of the situation. In addition to these assessments there is also demonstration opportunities provided for some stress reduction measures. These studies will gather time series data over part or the entire period of the project in the following areas:

*Activity 1: Wastewater Treatment Assessment*

In order to gain an understanding of the pollution sources from human waste disposal, the following is proposed to be undertaken in the first two years of the project:

- Using GIS and GPS carry out a mapping exercise of the current waste water disposal systems in use or proposed for Rarotonga.
- Measure the soil and regolith infiltration characteristics in these same areas.
- Coordinate water quality measurements at sites for both freshwater and marine coastal waters which correspond to areas where wastewater treatment systems have been mapped and effluent is being discharged into the freshwater and marine environment.
- It is proposed that at least two sites, suspected of groundwater contamination from onsite wastewater disposal, will be monitored to determine the extent of the contamination, seasonal impacts, and its impact on the lagoon. It is proposed that shallow piezometers be installed in at least two sites and monitored monthly for specific parameters including EC, pH, nitrates, and E Coli. The results after two years sampling would provide data which can be used to help identify the level of contamination, the current buffering capacity of sediments and the provide guidance on the policy for onsite wastewater disposal.

This information will contribute to providing recommendations on the effectiveness of different wastewater treatment systems and nutrient discharge rates into the aquifer and coastal marine environment. The Ministry of Works (MoW) will take the lead coordinating this activity and information gathered. They will also take the lead on the GIS and GPS mapping exercise given their technical comparative advantage and experience in this area however will work closely with the Ministry of Agriculture (MoA) who will carry out soil measurements, the Ministry of Health (MoH) and National Environment Service (NES) and who will carry out the water quality sampling, collection and reporting of the freshwater resources and the Ministry of Marine Resources (MMR) who will address sampling, collection and reporting of the marine environment (see activity 4).

During this effort, it is proposed that the 5 departments will work together coordinating actions for data gathering and reporting to encourage an integrated approach, minimise duplication and maximise the use of resources. This links in to the capacity building in component 3.

#### *Activity 2: Demonstration of Improved Wastewater Treatment Systems*

The recommendations from the wastewater treatment assessment (activity 1) will be taken up in the final 3 years of the demonstration project and at least two waste-water treatment systems are installed. This will provide a demonstration of stress reduction measures on the environment through improved wastewater treatment on Rarotonga. The monitoring in activity 1 will continue to measure the stress reduction achieved. Sites and demonstration systems will be determined from the outcomes of activity 1.

The identification, installation, maintenance and management of the activity will also require a strong need to work closely with local communities and NGO's to deliver the activity in an appropriate and participatory manner. Communication is also a key aspect for this activity in order to translate and transfer the scientific information to the relevant stakeholders appropriately. The IWRM demonstration proposal will build upon the work carried out with Takuvaie Communities during International Waters Programme (IWP) in the Cook Islands on catchment management using lessons from their strong communications work.

It is anticipated that the local stakeholders will be included in the decision making regarding technological designs to be demonstrated in their community as well as capacity and knowledge building on system design, construction and operation and maintenance requirements to name a few. A similar activity was carried out with success in 3 communities in Fiji through the Sanitation Park project. Additionally, this will build on community work carried out through the CIMRIS project, using positive community driven approaches employed with the Takitumu Lagoon Management Plan as well as the IWP Programme in the Cook Islands.

The Cook Islands Association of NGO's (CIANGO) will be the initial point of contact with the local NGO community and will initially coordinate with the project team and the relevant and appropriate local NGO with respect to the community engagement in the process. Once a local NGO has been identified, they will take the lead with the community activities working closely with the Ministry of Works, Health, Agriculture and other relevant technical organisations who will provide the technical input requirement.

#### *Activity 3: Groundwater Assessment*

In 1998, SOPAC carried out a groundwater potential assessment study of the Rarotonga coastal plain which suggested that "due to the high risk of saltwater intrusion coastal groundwater aquifer development should be carried out with care", (Ricci and Scott, 1998). However the report identifies the potential for the use of coastal plain groundwater.

The proposed activity would build on the work of Ricci and Scott (1998) but concentrate on looking at groundwater as a resource to be used as a supplement to surface water taken into the reticulated supply

during times of drought. This activity will assess the potential for utilisation of groundwater resources well away from the coast to act as a supplement for surface water during times of drought. This will be dovetailed with work on water demand management to ensure extraction is reasonable and does not over-exploit the resource.

The use of groundwater during times of drought (expected to increase under climate change scenarios) has the double effect of:

- Ensuring reliability of supply for Rarotonga reticulated potable water – a critical concern for an economy that relies on high tourist numbers;
- Allowing river flows to be maintained for environmental values during droughts – this will help in maintaining water quality in the lagoon environment and healthy streams.

It is essential that the available groundwater is of very high quality to ensure its suitability for potable supply; therefore a study of both groundwater quality and quantity will be carried out.

- It is proposed that boreholes are constructed in at least two of the most prospective locations, and with associated pumping tests and sampling, assess groundwater quality and quantity available on Rarotonga.

A key output from this would be technical information on groundwater resource potential and expected yields and quality in Rarotonga; delineation of water reserves to assist in landuse planning and establishment of long-term monitoring to assist with sustainable development.

These activities will make links with other initiatives being undertaken in the Cook Islands with respect to water including the NZ AID funded Water Quality Management, Water Demand Management and the EU funded Pacific HYCOS. These projects will provide additional training in water quality as well as equipment needed to undertake water quality sampling, and better understanding of the hydrologic budget including impacts of rainfall and river flows as well as usage behaviour.

In order for the water quality programmes of component 1 to be effective, it is proposed that an initial assessment of the current situation with respect to water quality testing be undertaken and a programme developed with recommendations for testing parameters, agencies responsible for sampling, testing etc. frequency of testing and resources available for use. The Water Quality Monitoring Programme can assist with this review process.

It is proposed that the Ministry of Works will coordinate this initiative; working closely with the relevant departments (especially National Environment Service and the Ministry of Marine Resources) are required to undertake the various testing regimes. In terms of the water quality testing regimes themselves, the above-mentioned assessment will have bearing on the future delivery of the testing programme and it is suggested that these recommendations be considered by the Project Steering Committee.

### *Component 2: Knowledge dissemination*

An important component of IWRM is the involvement of communities in decision-making around water resource management. Key to the success of community involvement is the rapid dissemination of knowledge to as wide a group as possible so that people are well-informed in their choices as part of the decision-making. This component will develop a centralised platform for the rapid dissemination of water quality and quantity information (collected in component 1 and elsewhere) to stakeholders and the general public. This “water portal” will operate on two levels: first as a display of water information (spatially and temporally variable); and second as a platform for the sharing of common information between management agencies.

### *Activity 1: Development of water portal*

This activity will link with the Water Demand Management Programme for Pacific Island Countries using information collected through the establishment of the MapInfo Asset Management system, metering of all water intakes and at various points around the distribution system, and metering of industrial customers, in order to assess the quantity of surface water usage currently being used. This will be developed into an internet portal (a “water portal” using technology available through the EU ISM Map Server project (Geospatial Content Management System-GeoCMS) which displays water quantity and quality (collected in this project) at sites throughout Rarotonga. This will be a public access website that allows rapid dissemination of water quality information to interested stakeholders and the general public. The integration of water quality and quantity information into a single system will also allow rapid identification of stress points which may vary with time.

The lead agency for this component will be the Ministry of Works who have the technical and communications infrastructure capability to host this information package system through previous assistance provided through the European Union Reducing Vulnerabilities to Pacific Island Countries. The EU Reducing Vulnerabilities project currently houses software and hardware at the Ministry of Works for the Map-server and the technical decision support package will build upon this initiative. The Ministry of Works will have the responsibility for managing the package and providing ICT support when required.

The “water portal” will be used by the project Steering committee including all stakeholders involved with project delivery, to assist with decision making. Each agency involved in the project will have a direct link to obtain the more detailed data and information that sits behind the water portal information on public display. This will promote the sharing of data between agencies, an important part of IWRM.

### *Activity 2: Replication of water portal beyond Rarotonga*

In the final two years of the project the water portal will be extended to include water quality and quantity data from other islands in the Cook Islands group, starting with Aitutaki and Mangaia (the next two largest population centres). The first challenge for this activity will be in providing rapid acquirement and dissemination of time series data as at present the data collection is frequently on an ad hoc basis. A second challenge to be addressed in this activity is to involve a new group of stakeholders in the information sharing initiative and to train them in decision making based on this information (e.g. tourism operators on Aitutaki being involved in water quality collection and decision making with this information).

### *Component 3: Institutional strengthening and development of human resource capability*

The policy dimension of the project will consider how and IWRM approach to natural resource management in the Cook Islands can deliver further stress reduction measures and how they can best be integrated into existing and new institutional and legislative documents. This component of the project focuses on developing a Water Resources Management policy and legal framework that facilitates integrated management of Cook Islands natural resources. At present the Cook Islands do not have a policy that guides the management of water resources which this activity will address by carrying out the following:

- Policy and legislative review for Cook Islands to develop a water resource management policy to promote IWRM principles.
- On the basis of the review recommendations develop a Water Resources Policy and associated Legislation.

This work will be coordinated by the Office of the Prime Minister with the appropriate technical support provided by the Ministry of Works, National Environmental Service, Ministry of Health and the project Steering Committee.

This work will be co-funded primarily through the European Union funded Pacific SIDS Integrated Water Resources Management Planning Programme, and the Asian Development Project Preparatory Technical Assistance for the Cook Islands for an Infrastructure Development project both of which focus on policy, planning and institutional reform at the national level.

In addition, capacity building training will be conducted with various agencies on IWRM principles and how to achieve integrated water resources management. One aspect of this training could include regular coaching sessions focussing on developing trust between agencies and the benefits of an integrated approach. Initially training will concentrate on data sharing (as demonstrated in component 2) and techniques to improve integrative thinking but will evolve out to the broader activities such as integrated planning in many different areas of natural resource management.

### *iii) End of Project Landscape*

After 5 years of this IWRM demonstration project the Cook Islands will have four areas of environmental improvement that could not have happened without GEF funding:

- Excellent information on the water quality and quantity status of the water resource on Rarotonga, how waste treatment can affect this resource, and how groundwater can be used for future drought-proofing. This information will be used for effective decision-making on future water demand management and waste water treatment facilities.
- Demonstrated examples of modern-efficient waste water treatment systems that have been shown to lead to improved ground and surface water quality on Rarotonga. This will allow householders to see the best options available for effective small-scale waste water treatment and to understand the full cost implications of their installation.
- A means of rapidly disseminating water quality and quantity information to the general public (on Rarotonga and other islands) and a working platform for data information sharing between management agencies. This information will be used by stakeholders for day to day decision-making on using water usage for amenity and core values.
- An improved institutional framework and human resource capability to instigate integrated natural resource management over the next 30 years.

It is expected that during the lifetime of this project there will be a significant stress reduction in the quality of water entering the lagoon environment of Rarotonga (both groundwater and surface water) and the information from this project will be used to continue improvement in water quality through implementation of new waste water treatment technology and rapid identification of environmental stress points using the water portal.

A second major stress reduction following this project will be the ability to drought-proof the reticulated water supply for Rarotonga using groundwater sources. As well as providing surety of supply for future economic development this will also allow the consideration of environmental flows in the surface streams (i.e. setting minimum flows for environmental considerations) during periods of drought.

A third significant stress reduction following this project will be an increased degree of co-operation and integration between governing agencies and local communities in the area of natural resource management

in the Cook Islands. This will allow for implementation of new solutions to the upcoming complex problems facing Pacific SIDS using an integrated framework of stakeholders and governing agencies.

A broad outline for the components and activities described above is shown here. Also included are the lead agencies for each component and activity and the partner organisations involved. A more detailed work plan is provided in the appendices. Therefore at the end of the project the following should have been implemented:

<b>Component</b>	<b>Activity</b>	<b>Priority &amp; Timing</b>	<b>Lead Organisation(s)</b>	<b>Partners</b>
Component 1: Water quality & quantity into lagoon	Activity 1: Wastewater Treatment Assessment	Year 1-5	Ministry of Works	MoA MoH NES MMR
	Activity 2: Demonstration of Wastewater Treatment Systems	Year 4-5	Local NGO	MoW MoA MoH NES MMR
	Activity 3: Groundwater Assessment	Year 1-5	Ministry of Works	MoW MoA MoH NES
Component 2 Knowledge dissemination	Activity 1: Water portal development	Year 3-5	Ministry of Works	Steering Committee
	Activity 2: Water portal replication	Year 4-5	Ministry of Works	Steering committee
Component 3:	Policy	In Parallel with other components and activities	Office of the Prime Minister	MoW MoH MoA NES NGO's Community Representatives

#### ***G. . Project Management Structure and Accountability***

A Project Management Unit (PMU) will be established building on existing capabilities within existing institutions. The PMU will deal with day-to-day management activities, but will also be heavily involved in implementation. The PMU will report to a National Steering Committee as well as to any regional project requirements.

The PMU will require two staff, both working 100% of their time on IWRM Demonstration Project activities for which recruitment of these positions will occur within the first six months of project implementation. The two positions will include a Project Manager who will be responsible for the overall management and delivery of the project and will be assisted in this role by a Technical Project Assistant who will provide technical input to in-country delivery as well provide any administrative support required.

Further technical input to in-country delivery will be provided through short term consultancies using local consultants in the first instance where relevant which helps build and maintain local capacity. Resource persons required from outside of the Cook Islands will be at the discretion of the PMU, with supporting consultation with the Regional PMU based in SOPAC, in Suva.

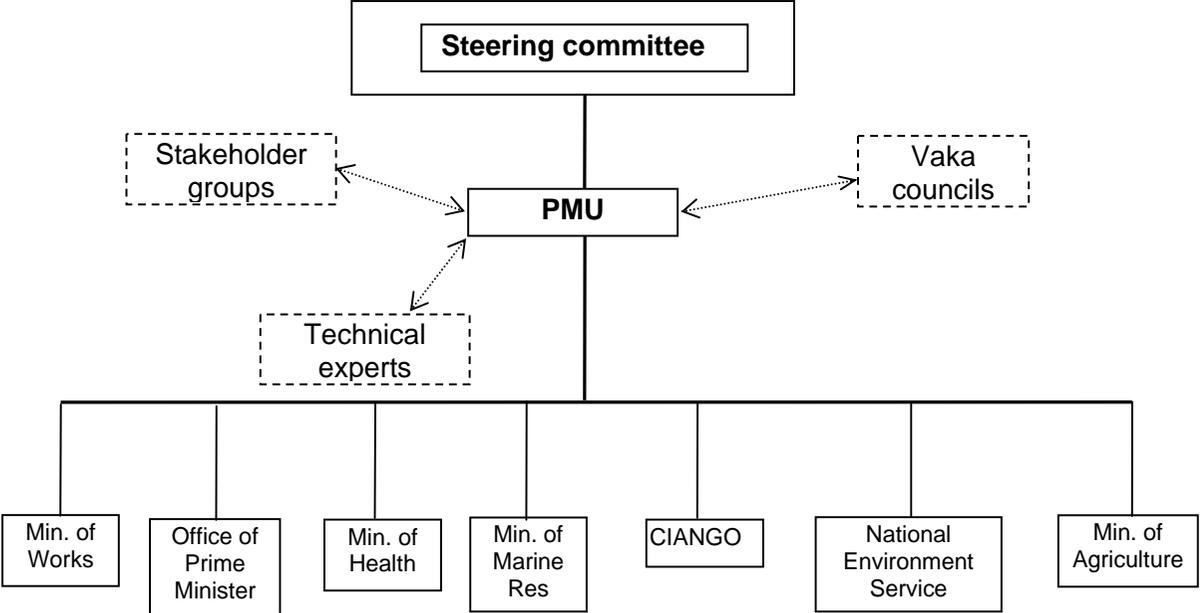
The Steering Committee will be a combination of selected relevant Heads of Department, such as Environment, Tourism, Health, Water, Agriculture, Vaka Councils and chaired by the GEF Political Focal Point/GEF Operational Focal Point or the Hon Ministers for the Implementing Agency. This is an in-country decision making body.

The Project Steering committee (PSC) will also act as the working coordination or de facto IWRM committee. During the working IWRM Project Steering Committee meetings representatives for each department may in fact be represented at the operational level, and report back to their departmental heads. This working IWRM committee is in fact already represented in-country through the current Water Safety Planning Committee which was the first water committee to be established in the Cook Islands. The IWRM Project Steering Committee will continue the linkages and consultations carried out with the WSP committee and will revert back to the WSP when required having representation at the appropriate level.

It is envisioned that the PMU will work together with the Vaka Councils and various stakeholders and report back to the PSC. The PMU will also undertake all correspondence with the regional Executing and Implementing Agencies.

The national Implementing Agency (*i.e.* Works) will be responsible and host the PMU and the project. Each will have a TOR approved by cabinet for its roles.

The Steering Committee will seek advice and guidance from technical experts and particularly from stakeholder groups which will review, monitor and evaluate project strategies as they are being developed and implemented.



### H. Stakeholders and Beneficiaries

Stakeholder	Relevance to IWRM Project	Role in Project	Expected Benefits
Vaka Councils	The Vaka Councils are the local government institutions responsible for development and administration of districts within Cook Islands. They have a mandate for representing their communities and essentially provide a vehicle for taking community issues up to the Government.	Advice and consultation with the Project Management Unit and providing links into communities for implementing agencies	1) Community education and awareness and links into the community will be of great value with respect to the wastewater demonstration activities. 2) Community involvement in IWRM
MoW – Department of Water Works	The Department of Water Works (DWW) is the agency responsible for planning, installation, operation and maintenance of public water systems in Rarotonga and selected outer islands including Atiu, Mangaea, and Aitutaki.	The Division of Water Works is the lead implementing agency for the Cook Islands IWRM Demonstration project. They are also the Secretariat for the Project Steering Committee.	1) Improvements in ability to maintain surety of supply of reticulated water during drought. 2) Water quality improvements through supply & in natural environment. 3) Improved integration with other agencies.
MoH	The Public Health Division of the Ministry of Health is the agency responsible for monitoring and surveillance of the biological quality of public water supply schemes.	Biological Water Quality Monitoring for water resources. The MoH also have awareness programmes for communities on public health issues including water-borne diseases and could play a key role in developing awareness programmes for the IWRM demonstration project.	1) Improved ability to carry out water quality monitoring. 2) Improved network of water quality sampling. 3) Improved integration with other agencies.
NES	The National Environment Service is the agency responsible for environmental issues and concerns including pollution, conservation, waste management, climate change and EIAs. The IWP programme in Cook Islands has developed a Catchment Management Plan for the Takuvaine Catchment.	Water Quality Monitoring of water resources. Potential to build on work already done by IWP previously housed at the NES.	1) Improved ability to carry out water quality monitoring. 2) Improved network of water quality sampling 3) Improved integration with other agencies.

MMR	The Ministry of Marine Resources is responsible for the management of coastal waters around the Cook Islands. They have shown a great deal of interest in addressing lagoon pollution from surface water runoff and sewage runoff from land-based activities including agriculture and tourism.	Water Quality Monitoring of coastal, surface and groundwater with a well-equipped laboratory for chemical and physical analysis.	1) Improved ability to carry out marine water quality monitoring. 2) Improved integration with other agencies.
CIANGO	The Cook Islands Association of NGOs is responsible for community development projects. It is widely recognized by International donors and has secured funding for a number of community projects	CIANGO has a key role in the Cook Islands IWRM Demonstration project due to their relationship with communities and government agencies and will be an initial links with all local NGOs and community based organizations in Cook Islands for project implementation.	1) Community education and awareness and links into the community will be of great value with respect to the wastewater demonstration activities. 2) Community involvement in IWRM 3) Improved integration with government agencies.
MoF	The Ministry of Finance is the agency responsible for preparing the national budget and thus has an impact on capital and recurrent funding for water supply and sanitation projects.	Their involvement in the Cook Islands IWRM Project is vital, to facilitate co-funding opportunities through the PDF B process as well future support to continue projects.	1) Improved integration with other agencies.
CI Meteorological Centre	The Meteorological Office is responsible for issuing weather forecast and monitoring of long-term weather patterns and Climate Change issues.	They have strong technical capacity for monitoring and predicting effects of Climate Change and Variability on water resources in the Cook Islands and will provide this input wrt to the drought proofing through the use of groundwater activity	1) Improved integration with other agencies.
MoA	Agency responsible for land-based activity and therefore issues of agricultural waste, effluent disposal on land and soils testing.	Testing soils parameters for permeability etc, water demand management with farmers, waste disposal from agriculture.	1) Greater efficiency in water use by agriculture. 2) Improved integration with other agencies.
Ministry of Tourism	Agency responsible for tourism infrastructure planning and tourism promotion.	Consultation	1) Improved surety of reticulated water for visitors

			2) Improved lagoon environment.
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**I. Replicability**

This project will support initiatives already underway in the Cook Islands including the CIMRIS project and the IWP Cook Islands project, taking the communications, community participation, water quality assessments whilst introducing other elements determined with project stakeholders. The “water portal” (component 2) will be replicated on other islands within the Cooks group where there is available data. This can also be extended to other Pacific Island States.

The knowledge gained on how groundwater quality changes with improved small-scale waste water treatment can be applied to many Pacific SIDS. This also applies to knowledge on groundwater availability and general quality in states with rugged volcanic interiors and small coastal plains where the majority of people live.

The institutional strengthening in integrated natural resource management principles (component 3) will have benefits throughout the Cook Islands through the development of policies and strategies for integrated water resource management in all islands. The project will report back to the government of the Cook Islands, throughout the project implementation emphasising best practice and lessons learned in the delivery of the components and activities. These successful practices and lessons can be replicated in other outer islands in the Cook Island group as well.

**J. Monitoring and Evaluation Process**

The project will support and strengthen existing initiatives and seeks to determine information on hydrological/hydrogeological and coastal marine water quality and quantity parameters in order to define some initial baselines. This baseline information will be used as a basis for measuring the impact of stress reduction measures (e.g. installation of modern waste water treatment units; use of groundwater in times of drought allowing greater environmental flows in streams) on the environment. The continued monitoring of these parameters (i.e. beyond the baseline period) will be used for evaluation of project effectiveness in year 5.



	1. Project Description	2. Verifiable Indicators	3. Sources of verification	4. Assumptions
Overall objective	The longer term & wider benefits - THE LINK TO THE GEF FOCAL AREA			
Project purpose	Sustainable benefits to the beneficiaries - OUTSIDE DIRECT PROJECT CONTROL			
Results	Services to be delivered to the target group - PROJECT MANAGEMENT ACCOUNTABLE			
Activities	How the services will be developed & delivered			

For this project to be successful it must monitoring change over time against a base line set of evidence. As a result of linkages made with existing on-going initiatives some baseline data is already available. Other data will be captured at the beginning of the project (Year 1).

The lead organisation for each component of work will report quarterly to the PMU who will compile the information for quarterly reporting to the steering committee. Each component of work will consist of as series of projects which will initially develop a verification matrix (e.g. illustrated to left) with clear indicators of progress. These matrices will form the basis

for quarterly reporting.

Project activities will be refined during the first six months of the project in close consultation with stakeholders. One approach is to ensure that the project includes communities and wider stakeholders as part of a participatory monitoring and evaluation plan. Community level approaches and the impacts of this needs to be understood to ensure that the project learns the lessons and shares these up to National level.

Communities will be asked to report (using appropriate mediums) on project process – to ensure ownership of their own actions and understanding of cause and effect. The availability of environmental information through the water portal (component 2) will ensure stakeholders can track progress of environmental stress reductions.

An important part of community engagement will be an annual meeting with key findings presented to the general public. At the meeting communities will be encouraged to present their own findings with respect to environmental stress so that solutions can be suggested using learning from this project.

#### **K. Long-term Sustainability Strategy**

A key element of component 3 will be the encouragement and training of agency staff to continue working in an integrated fashion on issues of natural resource management. As part of this training each agency will develop a 10 year plan for further development of stress reduction measures in Rarotonga and other islands in the Cook Islands.

#### **L. Co-Funding:**

**Table 1: Incremental Costing Result (US\$)**

Project Outputs	Baseline Scenario	Alternative Scenario	Incremental Costing (B-A)	
			GEF	Co-Funding
1	17,851.41	228,005.29	50,116.35	160,037.53
2	237,139.93	259,709.03	0.00	22,569.10
3	16,284.55	490,566.63	238,480.20	235,801.88
4	5,000.00	125,098.08	33,294.69	86,803.39
5	0.00	970,466.64	56,422.76	914,043.88
6	8,000.00	56,587.53	39,559.89	9,027.64
7	3,761.52	313,200.19	83,289.59	226,149.08
<b>Total USD</b>	<b>A 288,037.41</b>	<b>B 2,443,633.39</b>	<b>501,163.48</b>	<b>1,654,432.50</b>

All co-funding projects are detailed below and have been provided from various sources including regional programmes, national budgets and bilateral grants. These co-funding sources are as follows:

#### *Reducing Vulnerabilities in the Pacific ACP states (SOPAC Island System Management)*

The SOPAC ISM project assists in the development of an integrated planning and management system, focussing both eight Pacific States under EDF8 funding, and then a further six Pacific States under EDF9 which includes the Cook Islands.

The programme objective is to strengthen integrated development in Pacific ACP States by concentrating on three key focal areas in the island system: hazard mitigation and risk assessment and aggregates for construction water resources supply and sanitation. The Project addresses problems such as: unavailability of accurate and timely data; weak human resource base; limited resources (money and infrastructure); and lack of appropriate management plans, policies and regulatory frameworks to deal with these three focal areas.

With respect to the issue of data management, a Geospatial Content Management System (GeoCMS) or Mapserver is a web application enabling multiple users to put up content on the website using the web itself. This IWRM demonstration project proposes to utilise this Mapserver as part of knowledge dissemination component, whereby the Mapserver will be a public access website that allows rapid dissemination of water quality information to interested stakeholders and the general public.

#### *Water Demand Management (WDM) Programme for Pacific Island Countries*

Through the support of New Zealand's Aid and Development Agency (NZAID) SOPAC have been able to lead a Water Demand Management Project in the Pacific. The WDM Programme is helping Pacific countries develop urban water management plans, and to repair and maintain reticulation systems over the long-term through a targeted training and capacity building.

The IWRM demonstration proposal will coordinate and link with the WDM programme using the information gathered through its capacity building and training on water metering, usage etc. and include this information as part of the water portal to assist with the integration of water quality and quantity information into a single system.

#### *Pacific Water Safety Planning (WSP) Programme*

The Pacific Water Safety Planning programme is supported by Australian Agency for International Development (AusAID) and implemented under the Partnership Initiative on Sustainable Water Management as contribution to the implementation of the Pacific Regional Action Plan. The aim of the project is to promote a comprehensive risk assessment and risk management approach in the Pacific region that encompasses all steps in the water supply, from catchment to consumer, to ensure the access to safe drinking water.

The WSP Planning programme through its work in the Cook Islands established the first national water and sanitation committee and the IWRM demonstration project will link with this initiative and extend the role of the committee further as the steering committee of the IWRM project to oversee its technical delivery and governance.

#### *The Pacific Hydrological Cycle Observing System (HYCOS)*

The Pacific HYCOS project supported through the European Union is a regional water resources management initiative to improve management and protection of Pacific small island states freshwater resources, through the provision of appropriate water resources management systems to demonstrate sustainable catchment and aquifer management.

The Pacific-HYCOS project, which builds on the NZAID-supported Hydrological Training Programme (2004-2006), aims for each of the participating island nations to:

- attain a common level of ability to assess and monitor the status/trend of their water resources, and to provide the water-related information and hazard warnings needed to support national social and economic development and environmental management;

- have established databases and information archives, maintained to acceptable standards that form the basis for sustained future data capture, information processing and dissemination for informed cross-sectoral decision making;
- improve the capacity to mitigate and plan for climate change and land-use impacts on freshwater resources at the catchment and national level.

The Project focuses on several core activities to be carried out including water resources assessment in major rivers, water resources databases, drought forecasting, groundwater monitoring and assessment and water quality monitoring and assessment. This implementation plan in the Cook Islands focuses on the islands of Rarotonga and Aitutaki as they were identified by stakeholders during consultation as being the islands where the dominant development and increased pressure on existing water resources is expected to occur over the next 5 years.

Having assessed the situation with respect to the areas mentioned above and past work in the Cook Islands, the HYCOS project will provide equipment for surface water measurement with some additional monitoring equipment, usage meters.

The IWRM demonstration proposal will coordinate with these efforts of the HYCOS project in terms of surface and groundwater quality and quantity collection, measurement and data management.

#### *Water Quality Monitoring and Capacity Building Programme for PIC's*

The programme is an important contribution to the implementation of the Pacific Regional Action Plan (2002) and the Pacific Framework for Action on Drinking Water Quality and Health (2005). The objective of the programme is the sustainable national capacity created to maintain safe quality of drinking water, surface, ground and coastal waters.

The IWRM demonstration project will work closely with the water quality monitoring programme to identify the knowledge gaps and resources required and increase the capacity of staff relevant staff to carry out water quality monitoring and data management.

#### *Pacific SIDS Integrated Water Resources Management Planning Programme*

The Pacific SIDS Integrated Water Resources Management Planning Programme is funded through the European Union and is designed to assist 14 Pacific Island Countries (PICs) to improve their water governance through the development of national water partnerships, national IWRM policies and water use efficiency strategies.

The Action will catalyse, promote and enhance the involvement of regional, national and local stakeholder groups in the sustainable management of PICs' water resources, through the introduction of IWRM approaches using: a regional resource centre to develop, disseminate and build capacity in Small Island Developing States (SIDS) partnership and IWRM best practices; strengthen and support national and catchment scale stakeholder partnerships; and help the country water partnerships to develop formal and endorsed IWRM policies and water use efficiency plans (WUE) using multi-stakeholder participatory consultations.

The GEF IWRM Demonstration proposal will be coordinated and linked closely to the EU funded IWRM Planning Programme scaling up the lessons learned through the demonstration project in Rarotonga to feed into the policy and strategy development and also coordinating these efforts with the national efforts for policy development through the Asia Development Bank (ADB) Preparing Infrastructure project.

#### *Asia Development Bank (ADB) Preparing the Infrastructure Development Project*

In 2007, the Government of the Cook Islands (the Government) adopted an Infrastructure Master plan (the Master plan),<sup>1</sup> an integral part of the National Sustainable Development Plan 2007-2010 (NSDP).<sup>2</sup> The Master plan identified demand for infrastructure development for the next 20 years with an investment requirement of \$175 million. The Government requested the Asian Development Bank (ADB) to provide project preparatory technical assistance (PPTA) to the Ministry of Finance and Economic Management (MFEM) to prepare an Infrastructure Development Project (IDP).

ADB approved a concept paper for the PPTA in April 2007 and the PPTA has been proposed for financing by the Japan Special Fund (JSF) in 2007. An ADB Mission visited the Cook Islands from 12-16 March 2007 and reached understandings with the Government on the TA impact, outcome, outputs, implementation arrangements, confirmed cost estimates and financing arrangements, and terms of reference.<sup>3</sup>

The PPTA identified that the ensuing project will introduce reforms in the delivery of water and sanitation services that are likely to include introduction of tariffs. The design and implementation of a Water and Sanitation Authority to replace the Public Works Department will be supported by a piggy back TA which will address issues such as willingness to pay, lifeline tariffs etc. There are already charges for the emptying of septic tanks.

Component 3 of IWRM project and the EU IWRM programme will work very closely with the ADB initiative to ensure that policies and strategies developed as a result of these three programmes are well coordinated.

#### *Government of Cook Islands*

The Ministry of Works (MoW) and the Office of the Minister for Island Administration (OMIA) and the Office of the Prime Minister through their national programmes will be working closely with the IWRM demonstration project providing both in-kind support through office provisions and staffing as well as direct funding through actual on the ground activities on all of the three project component areas.

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<sup>1</sup> MPC Group International. 2006, *Strengthening Disaster Management and Mitigation (Component 2: Preventive Infrastructure Master Plan*. Rarotonga

<sup>2</sup> Government of Cook Islands. 2007. *National Sustainable Development Plan (2007-2010)*: Rarotonga.

<sup>3</sup> The TA first appeared in *ADB Business Opportunities* on 27 April 2007

**Annex 1 – Detailed Budget**

Output	Budget Item	Description of Expenditure	USD	USD	USD			USD
			Baseline	GEF	Co-funding			Alternative
					In-kind	Funds	Donor	
<b>1. Project Management Unit Established</b>	1.1 Staff	Project Manager		36,422.76		20,000.00	EU IWRM	56,422.76
		Assistant		13,693.59		47,018.97	EU IWRM	60,712.56
	1.2 Administration	Energy Costs	10,328.37			51,641.87	Govt	61,970.24
		Communications	7,523.03			37,615.17	Govt	45,138.20
	1.3 In-country project meetings	Inter Agency IWRM Meetings				3,761.52	Govt	3,761.52
<b>2. Equipment</b>	2.1 Vehicles		4,715.78		22,569.10	Govt	27,284.88	
	2.2 Equipment O and M		232,424.15				232,424.15	
<b>3. Assessment and demonstrations package</b>	3.1 Mapping current wastewater disposal systems to measure soil and regolith infiltration characteristics	GIS Mapping - field survey, data capture, download	7,523.03	48,899.72	67,707.31		Govt	124,130.06
	3.2 Demo's of improved wastewater management and agriculture practices	Community Participatory training workshops and wastewater demo's implementation	5,000.00	56,422.76				61,422.76
		Wastewater treatment demo systems materials and labor			12,789.00			12,789.10
	3.3 GW quantity and quality	Drilling borehole transects		120,368.55	36,110.57		Govt	156,479.12

		Programme Set up (Lab assessment, setting up parameters, identifying equipment gaps, knowledge system for current WQ testing.	3,761.52			75,230.00	SOPAC WQM	78,991.52
		GW Pumping and testing				56,754.00	SOPAC HYCOS	56,754.00
<b>4. Knowledge integration and transforming into IWRM</b>	4.1 Assimilation of knowledge into technical decision support package	Build on exiting server to cater for capacity	5,000.00	1,053.22		56,792.99	EDF 9 SOPAC	62,846.21
		Developing computer tool for knowledge transfer between agencies		32,241.47		30,010.40	WDM SOPAC	62,251.87
<b>5. Framework for IWRM in CI</b>	5.1 Policy and legislative review	Resource Support				21,622.58	EU IWRM SOPAC	21,622.58
		Inter-agency Consultation process				21,622.58	EU IWRM SOPAC	21,622.58
		Public consultation				31,622.58	EU IWRM SOPAC	31,622.58
		Mainstreaming policy support			40,624.38	94,790.24	Govt	135,414.62
		Groundwork policy				700,000.00	ADB	700,000.00
	5.2 IWRM Training	Training workshops 1 per year at 15,000 each		56,422.76	3,761.52			Govt

<b>6. Data management</b>	Data Capture - on-monitoring programme	Water Quality and Quantity every 3 months at \$500 = 2000 per year	2,000.00	21,504.61	9,027.64		<b>Govt</b>	<b>32,532.25</b>
	Analysis	Data interpretation support and training	6,000.00	18,055.28				<b>24,055.28</b>
<b>7. Communications</b>	Comms Strategy - awareness etc.	Awareness	3,761.52	37,523.03		18,807.59	<b>Govt</b>	<b>60,092.14</b>
		Strategy Development		45,766.56		207,341.49	<b>WSP SOPAC</b>	<b>253,108.05</b>
<b>Total USD</b>			<b>288,037.41</b>	<b>501,163.48</b>	<b>179,800.52</b>	<b>1,474,631.98</b>		<b>2,443,633.39</b>

**Annex 2 – Delivery**

Component	Activity	Benefits		Notes on delivery
		National	Regional	
1 Water quality & quantity assessment	A Waste water treatment assessment	X		Will provide key information for activity 2A. Delivered by Ministry of Works with GIS information being stored in a shared information pool. Work will require householder interviews and community input.
	B Improved waste water treatment		X	Key stress reduction measure. To be lead by a local NGO with major input from MoH, NES and MoW. Large amount of community interaction and input required.
	C Groundwater assessment	X		Will provide key information for activity 2A. To be delivered by Ministry of Works with sub-contract to technical agency for groundwater quantity study
2 Knowledge dissemination	A. Development of water portal		X	To be delivered by Ministry of Works with inputs from all other agencies (emphasis on data sharing). Some technical pieces delivered with help from outside agency.
	B. Replication of water portal		X	To be delivered by Ministry of Works with assistance of OMIA (particularly for training of data providers and end users in outer islands).
3. Institutional strengthening & capability building	Institutional strengthening & capability building	X		Funded separately from GEF. Builds on initial work through IWP to deliver key strategic document. Office of Prime Minister to lead work (and bring recommendations to Government).

**Annex 3- Workplan**

Objective	Activity	Year 1				Year 2				Year 3				Year 4				Year 5			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1: Water quality & quantity assessment	1A: Waste water assessment	█	█	█	█	█	█	█	█	█	█	█	█	█	█	░	░	░	░	░	░
	1B: Improved waste water treatment	░	░	░	░	░	░	░	░	░	░	░	░	█	█	█	█	█	█	█	█
	1C: Ground-water assessment	█	█	█	█	█	█	█	█	█	█	░	░	░	░	░	░	░	░	░	░
2: Knowledge dissemination	2A: Develop water portal	░	░	░	░	░	░	░	░	█	█	█	█	█	█	█	█	░	░	░	░
	2B: Replicate water portal	░	░	░	░	░	░	░	░	░	░	░	░	█	█	█	█	█	█	█	█
3: Institutional strengthening...	Institutional strengthening ...	█	█	█	█	█	█	█	█	░	░	░	░	░	░	░	░	░	░	░	░

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