

Hot Spot Analysis for Cook Islands

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In order to identify hotspots in the Cook Islands a meeting of the Cook Islands Water Safety Committee (WSC) was convened on January 26, 2007. As explained in the GEF Diagnostic Report for the Cook Islands (Davie & Parakoti, 2007) it is recommended, in order to minimise duplication of roles, that the WSC forms the IWRM committee used in any GEF project.

The WSC meeting was facilitated by Dr Tim Davie (Landcare Research, NZ) to focus on a hot spot analysis for the Cook Islands. In attendance were members of staff from: the Environment Service (3); Cook Islands Association of Non-Government Organisations (1); Office of the Ministry of Island Administration (1); Ministry of Works (2); Department of Marine Resources (2); the Meteorological Office (1). Minutes of the meeting are attached at the end of this document.

The meeting concentrated on gaining analysing environmental hotspots in the Cook Islands and gaining consensus around possible demonstration projects for a GEF IWRM application. After a brief introduction and background on what IWRM is trying to achieve three steps were used.

- 1- **Issues analysis.** Each member of the committee was asked to think of what would help improve water management in the Cook Islands. This was deliberately kept broad and it was explained that this went beyond potable water supply and included all aspects of water in the environment (including the sea). These were then collated into a broad table of issues (see minutes).
- 2- **Hotspot analysis.** Each member of the committee was asked to describe a geographic area that fits into the criteria of an environmental hotspot (“conditions are such as to adversely affect human health, threaten ecosystem functioning, reduce biodiversity and/or compromise resource and amenities of economic importance”) within the Cook Islands.
- 3- **Combining issues and hotspots.** After discussion amongst the group the issues and hotspots were combined to come up with a list of 7 possible projects that fitted into an IWRM framework and could be developed as demonstration projects for the Cook Islands. These were then ranked by the committee (individually) and the top two were recommended as being put forward for the GEF proposal.

The template supplied for assessing hotspots does not fit particularly well with the form of analysis carried out in the Cook Islands. This is due to the template emphasis being on geographic area ahead of issue whereas it was felt more important to do this the other way around. Many of the issues of IWRM concern in the Cook Islands (see Diagnostic report) are generic and therefore there are many geographic locations where they can be investigated further. By emphasising geographic location ahead of issue there is a likelihood of some issues not being adequately covered.

The following section attempts to fit the Cook Islands’ hot spot analysis into the given template.

Environmental Hotspot 1

1. Title: Rarotonga lagoon degradation

2. Location: Rarotonga

3. Context of the site:

Lagoons surround all of the islands within the Cook Islands. Traditionally the lagoon has been a major food source for Cook Islanders. In recent times the crystal-clear waters of Cook Island lagoons have been used as major promotional feature for attracting tourists. At the same time tourism development and changing land uses has started to threaten the purity of these receiving waters. This is particularly true for Rarotonga and to a slightly lesser extent, Aitutaki. Of particular concern are the agricultural practices and poor sewage treatment mechanisms, these are largest on Rarotonga due to the higher population and more intensive agriculture.

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; see diagnostic report for more details). 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 believed to be from algal blooms in the nutrient rich lagoon waters.

Although emphasis has been placed on the Takitumu lagoon area, due to the health problems associated with Takitumu Irritant Syndrome, there are concerns over all of the Rarotonga lagoons (essentially one large lagoon surrounding the island). In preparing the information here the whole of Rarotonga is considered as it all contributes to the lagoon system.

3a. Main human activity(ies) related to the site:

Residential housing, catchment water supply, domestic and industrial waste disposal, industry (e.g. fish processing), international airport, agriculture, fishing (non-commercial), recreation, tourism.

3b. Natural conditions/phenomenon related to the site:

Interior of Rarotonga is essentially pristine tropical rainforest. Rivers draining inland area are largely clean and unpolluted until close to the populated coastal fringe. Biodiversity of inland areas is high and one protection area is in place for protection for a rare species (Kakerori - Rarotogan fly catcher).

4. Nature of threats and extent of threats (human and natural):

Sewage disposal:

Almost all sewage disposal on Rarotonga is through septic tanks. The septic tanks are in varying states of repair and sophistication. The leaching of nutrient rich septic waste into the groundwater under the coastal plain is likely to be a major source of nutrients to the lagoon. Excessive nutrients are a cause of eutrophication, loss of fish habitat and have been linked to human health concerns.

Agricultural runoff:

A major problem arises due to pigs, goats and poultry (but particularly pigs) being kept immediately adjacent to rivers and their excreted waste washing into streams during rainfall. This causes a eutrophication problem for the receiving lagoon and potential health risks for lagoon users.

Rivers and streams for waste disposal:

Many rivers and streams on Rarotonga are used as informal waste disposal areas. It is common to see rubbish (organic and inorganic) dumped on stream banks.

6. If heavy incidence of pollution, list the type of source (point, non point, diffuse) and pre-identify the exact source(s):

See threats listed above.

Septic tanks – diffuse and point

Agricultural runoff – predominantly point source

Waste disposal in streams – diffuse and point

Value of the site:	Local	National	Regional/global
Environmental significance	Very high	Very high (main island of country)	Moderate
Socio-economic significance	Extremely high	Very high	Moderate

List any data available in report form:

See issues and data highlighted in Diagnostic Report (Parakoti & Davie, 2007)

Environmental Hotspot 2

1. Title: Water supply for Northern Cook Islands

2. Location: Northern Cook islands

3. Context of the site:

In the Northern Group of the Cook Islands there is an almost total reliance on rainfall for domestic water supply (i.e. drinking, washing etc.). Drought is a natural phenomena normally associated with the ENSO (La Niña events). Predictions for increases in drought severity, through global warming make surety of supply a major issue for these islands.

3a. Main human activity(ies) related to the site:

Residential housing, domestic waste disposal, airports, small-scale agriculture, recreation, and tourism.

3b. Natural conditions/phenomenon related to the site:

N/A to this issue

4. Nature of threats and extent of threats (human and natural):

Drought leading to lack of water for drinking and washing.

Cyclone damage leading to lack of drinking and washing water.

5. If heavy incidence of pollution, list the type of source (point, non point, diffuse) and pre-identify the exact source(s):

N/A to this issue

Value of the site:	Local	National	Regional/global
Environmental significance	Very high	Very high	Moderate
Socio-economic significance	Extremely high	High	Moderate

List any data available in report form:

See issues and data highlighted in Diagnostic Report (Parakoti & Davie, 2007)

Environmental Hotspot 3

1. Title: Wetland protection

2. Location: Localised sites within Rarotonga

3. Context of the site:

The coastal plain around Rarotonga is predominantly used for businesses, domestic housing and agriculture. Prior to human settlement, and probably up to colonial times, there would have been numerous wetlands immediately adjacent to the lagoon. Wetlands are important sites for biodiversity sites, particularly for migratory birds and some fish spawning. Now there are only two, very small wetlands on Rarotonga (Matavera district and adjacent to the airport). Protection and enhancement of these wetlands will lead to the restoration of natural ecosystems on Rarotonga.

3a. Main human activity(ies) related to the site:

Residential housing, domestic waste disposal, airport, agriculture, recreation, and tourism.

3b. Natural conditions/phenomenon related to the site:

Wetland plant communities; bird populations.

4. Nature of threats and extent of threats (human and natural):

Use of land for agriculture, tourism and domestic housing.

Infilling for perceived mosquito control.

5. If heavy incidence of pollution, list the type of source (point, non point, diffuse) and pre-identify the exact source(s):

Pollution is less of an issue than removal

Value of the site:	Local	National	Regional/global
Environmental significance	High	Moderate	Low
Socio-economic significance	Low	Very low	Very low

List any data available in report form:

See issues and data highlighted in Diagnostic Report (Parakoti & Davie, 2007)

Sensitive area 1

1. Title: Cook Islands policy direction

2. Location: all of Cook Islands

3. Context of the site:

This is not a site as such, it concerns the general policy within the Cook Island Government. It is more of an issue than site but has been included here because it is a definite hot spot.

A major barrier for IWRM in the Cook Islands is the lack of an overarching legal framework and strategy for water resource management. The lack of this framework restricts the ability of different agencies to partake in integrated water resource management.

3a. *Main human activity(ies) related to the site:*

N/A

3b. *Natural conditions/phenomenon related to the site:*

N/A

4. Nature of threats and extent of threats (human and natural):

N/A

5. If heavy incidence of pollution, list the type of source (point, non point, diffuse) and pre-identify the exact source(s):

N/A

Value of the site:	Local	National	Regional/global
Environmental significance			
Socio-economic significance			

List any data available in report form:

See issues and data highlighted in Diagnostic Report (Parakoti & Davie, 2007)

Sensitive area 2

1. Title: Water supply catchment protection

2. Location: Rarotonga and beyond

4. Context of the site:

Part of the International Waters Project (IWP) for the Cook Islands was a catchment protection study in the Takuvaine catchment on Rarotonga. This involved considerable stakeholder dialogue and relationship building to develop a catchment management plan for one of the Rarotonga water supply catchments. There are 11 other water supply catchments on Rarotonga and more on Mangaia and Mauke that would benefit from a similar approach. The system of land use and land ownership in the Cook Islands requires multi-stakeholder management for catchment protection.

3a. *Main human activity(ies) related to the site:*

Agriculture, tourism, limited domestic housing.

3b. *Natural conditions/phenomenon related to the site:*

Predominantly pristine rain forest with good water quality.

5. Nature of threats and extent of threats (human and natural):

Agriculture near the top of valleys is frequently above water intakes. The most common agricultural practice is growing taro in artificial wetlands (i.e. part of the stream is diverted into a small taro field) but it also includes growing cassava on steep hillsides. Both of these can lead to increased sediment into the streams. Housing animals (predominantly pigs) near to water courses may lead to faecal contamination of water supply.

Tourism is through walking tracks into the interior of the islands. This is a popular recreation that can lead to contamination through bathing/washing in streams and inappropriate disposal of faecal waste.

Domestic housing is rarely above water supply intakes but if allowed to develop in these areas these is a threat from sewage disposal and general waste management.

6. If heavy incidence of pollution, list the type of source (point, non point, diffuse) and pre-identify the exact source(s):

See threats listed above.

Agricultural runoff – predominantly point source

Tourism – diffuse

Domestic waste management –point source

Value of the site:	Local	National	Regional/global
Environmental significance	High	High	High
Socio-economic significance	Extremely high	High	Low

List any data available in report form:

See issues and data highlighted in Diagnostic Report (Parakoti & Davie, 2007)

AGGREGATED SCORING TABLE FOR HOT-SPOT AREAS

	<i>criteria</i>	<i>hot-spot</i>	1	2	3
1	Size of affected area		2	2	1
2	Affected population		6	6	3
3	Extent to which the natural watershed and any associated coastal and marine resources support the livelihood of local communities (for instance, in the case of tourism, fisheries, etc)		20	16	8
4	Extent to which the natural watershed, and any associated coastal and marine resources support the national development (for instance, in the case of tourism, fisheries, etc)		8	6	4
5	Extent to which the site is a government priority (refer to NEAP or other strategic environmental action programme)		12	12	3
6	Extent to which the site is of regional and/or global significance and priority (see WWF ecoregions, IUCN categories, etc.).		8	4	4
7	Degree of Degradation at the site (e.g. type of degradation))		9	3	15
8	Extent of degradation on watershed and any associated coastal and marine resources and systems		6	2	4
	TOTAL SCORE (actual score with multiplications for weighting)		71	51	42
	NORMALISED SCORE (i.e. as a percentage of a possible top score of 100)		71	51	42

Key issues relevant to the hot-spots:	1-Lagoon degradation from land use activity 2-Surety of supply of drinking water 3-Loss of wetland ecosystem
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Aggregated Scoring Table for Sensitive Areas

	Criteria area	sensitive	1	2	3
1	Size of area at risk		6	6	
2	Population at risk (please define the population)		9	9	
3	Extent to which the natural watershed and any associated coastal and marine resources support the livelihood of local communities (for instance, in the case of tourism, fisheries, etc)		20	16	
4	Extent to which the natural watershed, and any associated coastal and marine resources support the national development (for instance, in the case of tourism, fisheries, etc)		20	16	
5	Extent to which the site is a government priority (refer to NEAP or other strategic environmental action programme)		9	6	
6	Extent to which the site is of regional and/or global significance and priority (see WWF ecoregions, IUCN categories, etc.).		2	2	
7	Biodiversity value of the site		9	12	
8	Cultural value of the site		10	6	
9	Extent of involvement of communities in local management		6	6	
	TOTAL SCORE (actual score with multiplications for weighting)		82	79	
	NORMALISED SCORE (i.e. as a percentage of a possible top score of 125)		82	79	

Key issues relevant to the sensitive area	<p>1- Lack of national policy direction and legislation for IWRM</p> <p>2-Land use management to ensure high water quality in potable supply</p>
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Summary Table of Prioritized Hot-Spots and Sensitive Areas

Country: Cook Islands

Total population: 18,027

Major Integrated Water Resource and Wastewater Management Issues:

[List Hot-Spots and Sensitive Areas from 1-3 \(highest scores first\)](#)

Selected Hot-Spots			
	Title	Score	Priority Issue
Hot-Spot 1	Rarotonga lagoon degradation	71	Lagoon degradation from land use activity
Hot-Spot 2	Water supply for Northern Cook Islands	51	Surety of supply of drinking water
Hot-Spot 3	Wetland protection	42	Loss of wetland ecosystem
Selected Sensitive Areas			
	Title	Score	Priority Issue
Sensitive Area 1	Cook Islands policy direction	82	Lack of national policy direction and legislation for IWRM
Sensitive Area 2	Water supply catchment protection	79	Land use management to ensure high water quality in potable supply

The stakeholder group (Cook Islands National Water Safety Committee) selected hot spot 1 and sensitive area 2 as the two areas for consideration as demonstration concepts.

1 Water Safety Committee Meeting

Venue:	Ministry of Works	Date:	Friday 26 th January 2007
Present:	<i>Environment</i> – Tauariki, Joseph, Pasha <i>CIANGO</i> – David <i>OMIA</i> – Darrel <i>MOW</i> – Ben, Chow, Paul <i>Landcare Research</i> – Tim Davie <i>Marine</i> – Dorothy, Teina <i>Met. Office</i> - Arona		

TOPIC: Integrated Water Resource Management (IWRM)

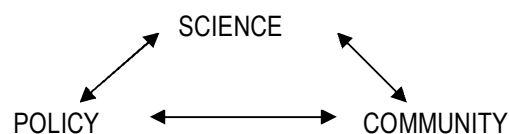
Tim Davie from Landcare Research (NZ) has been asked by Ministry of Works under the Department of Waterworks to represent the Cook Islands in bidding for extra funding to run various water related projects.

Tim Davie

- There isn't a need to create another committee; we should use this Water Safety committee as the IWRM Committee.
- SOPAC requires 3 documents from a total of 14 countries; Ben is the contact for the IWRM projects.
 - Diagnostics Report
 - Hotspot Analysis
 - Demonstration Concept
- The International Waters Project (IWP) focused on fresh water where others focused on marine. The IWP is similar to the proposed IWRM projects.

Where to start?

- Recognition interdependence (land use, stream, lagoon), trying to promote integration.
 - Integration of science policy / management, fit together hand in hand.
 - Integration between community, science and policy.
 - Integration between science disciplines, working with geologist, ecologist etc.



- Interdependence – Cumulative effect; what happens on land, in the streams and out to sea (marine).
- The project aims to promote integration; the project involves putting together document for funding allocation, 60% to demonstration projects or \$600,000 for 5 years.
- Fundamentally to improve the Environment, a potential if the project has 'practical' steps, rather than a large project with long consultations.
- Reference to the GEF, we need to, get together and determine some of the critical issues, the broader issues that would help improve water (not necessarily water supply).
- The GEF would not fund the same project in different countries, with regards to the 'bidding' process, it would be wise to have other Demonstration Projects just in case some other countries have the same request, avoid duplication.

(Group Discussion)

2 WHAT WOULD HELP IMPROVE OUR WATER?

- Tauariki - Education in schools, testing of water, water quality.
- Paul - Public awareness.
- Darrell - Outer Islands consultation and education.
- Ben - Need more data to determine effects and causes contamination.
- Chow - Monitoring drinking water, water quality and science.
- Joe - Retrofit old septic tanks
Piggery waste management
Cloud forest protection
Sediment control guidelines
Report on wetland values (island specifics)
Good practice guidelines riparian – along stream beaches etc..
- David - Further investigation into waste data on septic tanks (no test done).
- Arona - residential water storage (rainwater) put less stress on network.
- Dorothy - National Plan for IWRM: Assessment; Identify gaps and plan for it; Gap analysis for IWRM
- Teina - Public awareness
- Pasha - Rainwater Harvesting
Policy to have water tanks compulsory
Infrastructure Master Plan e.g. Airport construction incorporate water collection and storage Harbour
incorporate Groundwater recharge
Mapping data collection, catchments etc
Institutional support, data from met. Office

COLLATED LIST OF ITEMS TO IMPROVE OUR WATER

Education and Water Quality	Report on wetland values (island specific)
Groundwater Flow	Good practice guidelines - riparian
Public Awareness	Data on septic tanks
Outer Island Consultations	Residential water storage
Monitoring drinking water & science	National Plan for IWRM
Retrofit old septic tanks	Gap analysis for IWRM
Piggery Waste Management	Ground water recharge (ASR) airports
Cloud Forest Protection	Institutional support, data e.g. met. Office
Sediment Control Guidelines	Legislation – Water Resource
Takuvaine Project – take to rest of the country	Demand Management, Private/Public partnership

(Group Discussion)

“HOTSPOT ANALYSIS”

Geographically where are the areas of degradation (Environmental, the critical areas).

- Pasha - The outer islands both in the northern and the southern Cook Islands.
Rainwater Harvesting
IWP program for Avana, Muri Catchment's
- Dorothy - Takitumu Area (results, discharge into lagoon)
- Arona - Look at high elevation residential areas
- David - Other Catchments to use Takuvaine concept
Health should be responsible for some issues e.g. piggery waste etc
- Joe - Degradation in Avana wetland estuary and Avatiu swamp
- Chow - Monitoring and Water Quality in Rarotonga water intakes and Outer islands galleries + boreholes.
- Darrell - Mangaia Catchment Protection – degraded and more
- Ben - Rarotonga & Outer Islands ground water flow, to relieve demand during drought
- Tauariki - Catchment protection for Mangaia and Mauke
All wetlands on Rarotonga

2.1 “How would we prioritize and where should it be carried out?”

Determine the area first then pull out the issue, similar to GEF process.
(What would make the biggest difference or impact?)

<i>Items</i>	Ben	Joe	Dorothy	Pasha	Paul	Tau	David	Darrel	Teina
Lagoon degradation & Catchment Management/Watershed (Takitumu Area including Groundwater flow)	1	1	1	1	2	1	1		1
Catchment Protection – For Rarotonga reserve and/or Takuvaive continuation	3		3		3	2	3		
Wetland / Estuary Importance, Protection and Education – for Avana/Avatiu		2	2			3	2		
Rainwater Harvesting – Outer Islands	5			2				2	2
Water Demand Management (including rainwater harvesting) – for Rarotonga									
Catchment Protection – for Mangaia, Mauke	4							1	
Legislation / Policy - National	2	3		3	1	4	4	3	3

Note: Ranked 1 to 5, high to low

2.2 Summary:

Therefore the two proposals the Cook Islands will put through to the IWRM program is:

1. Lagoon Degradation, Catchment Management/Watershed, Groundwater Flow
2. Legislation/Policy (National)