

Cook Islands priority environmental problems (PEC) report: a review and assessment of the priority environmental concerns

By Island Friends Ltd.

IWP-Pacific Technical Report (International Waters Programme) no. 11



Global
Environment
Facility



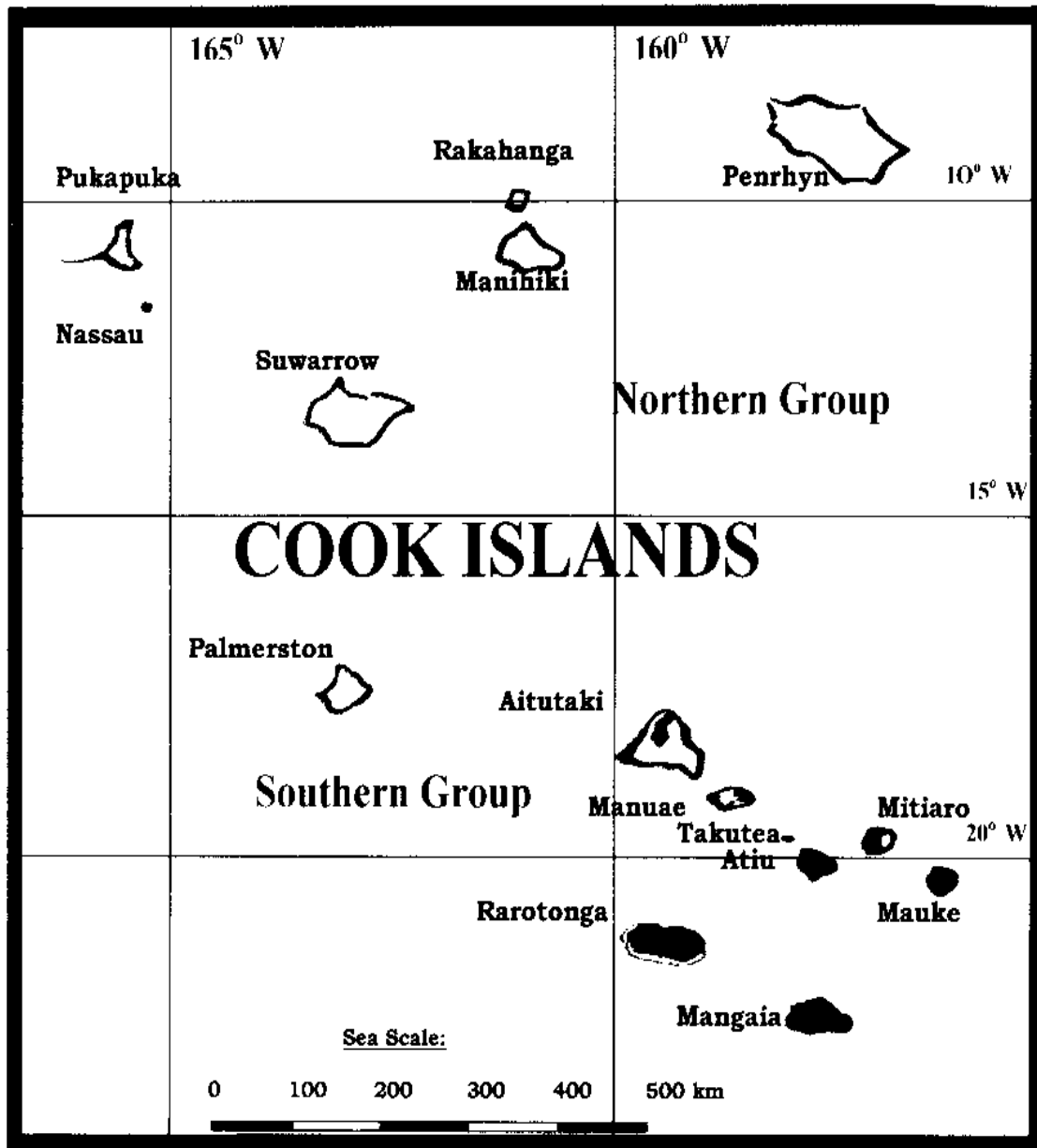
United Nations
Development
Programme



Pacific Regional
Environment
Programme

Map of the Cook Islands

8° SOUTH



23° SOUTH

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Abbreviations and Acronyms

ADB	Asian Development Bank
AIMS	Australian Institute of Marine Science
CBD	Convention on Biodiversity
CDI	Capacity Development Initiative
CISAP	Cook Islands Strategic Action Program
CITIES	Convention on International Trade in Endangered Species of wild fauna and flora (animals and plants)
CHARM	Comprehensive Hazard and Risk Management
CM	Cabinet Minute
DMU	Disaster Management Unit
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ENSO	El Nino Southern Oscillation
ES	Environment Service
FAO	Food and Agriculture Organization
GEF	Global Environment Facility
IWP	International Waters Program
JPs	Justice of the Peace
LWMP	Liquid Waste Management Policy
MMR	Ministry of Marine Resources
MOW	Ministry of Works
NBSAP	National Biodiversity Strategy Action Plan
NDMO	National Disaster Management Organization
NEMS	National Environment Management Strategy
NZD	New Zealand Dollar
NZODA	New Zealand Overseas Development Assistance Program
PICCAP	Pacific Island Climate Change Assistance Program
PIREP	Pacific Island Renewable Energy Project
REAP	Rarotonga Environmental Awareness Program
SIDS	Small Island Development States
SIS	Small Island States
SOI	Southern Oscillation Index
SPBCP	South Pacific Biodiversity and Conservation area Program
SPCZ	South Pacific Convergence Zone
SPREP	South Pacific Regional Environment Program
SWMP	Solid Waste Management Policy
TCA	Takitumu Conservation Area
TEM	Traditional Environment Management
TIS	Taporoporoanga Ipukarea Society
tkp	traditional knowledge and practices
TTT	Taau Taku Tita (Maori connotation to express recycle and re-use)
TVET	Technical, Vocational and Training
UNCCD	United Nations Convention for Combating Desertification
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
WMU	Waste Management Unit
WSSD	World Strategy for Sustainable Development
WWF	World Fund for Nature

Glossary

arāpō	The nights of each lunar month. In the old ways of the Cook Islands people time was worked out by counting the nights as the moon ages during each lunar month cycle.
Aronga Mana	The chiefs of an island.
foreshore	All that area between the mean high water mark (MHWM), an imaginary definition line landward measured at a right angle to a distance of 30 meters or else to the edge from the MHWM line, of the natural vegetation growth, whichever shall be the greater distance. This also includes every estuary and the area extending landward and measured at right angles from the mean high water mark in that estuary.
pa's	The Maori word for an elevated mound or platform of soil. It is a place where taro is planted and is usually rectangular in shape. The pa's is common in the wetland areas of Atiu, Mauke, Rarotonga, Manihiki, Rakahanga and Mitiaro.
rā'ui	Resource management practice whereby a resource or resources are left to recover or replenish itself.
sloping land	Any land having a natural gradient in excess of 1:10 including mountains and hills, and the tops of such hills and mountains.
Tu'anga Taporoporo	The body established by section 5 of the Rarotonga Environment Act 1994-95 to provide for the conservation and management of the island of Rarotonga in a sustainable manner.
uruātete	The raised makatea platform on the foreshore side of the island facing the reef or the ocean.
uri-pa'i	The turning over of the ground or soil using a sharp shovel to form a pa's.
wetland	Areas of marsh, swamp or water, whether natural or artificial; permanent, seasonally flooded or temporary; with water that is static or flowing; fresh or brackish or salt and includes water storage reservoirs, taro swamps and fish ponds.

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Executive Summary

The Cook Islands consist of 15 islands scattered over an area of 1.8 million square kilometers of the Southwest Pacific Ocean. Located between Tonga and Samoa in the west and French Polynesia in the east, the islands extending from latitudes 8° and 23° south and longitudes 157° and 66° west.

Rarotonga is the capital island of the Cook Islands and where the seat of Government is located. The Cook Islands extends to Penryhn in the north, at 1,365 km from Rarotonga, and to the southern island of Mangaia, which is also the island closest to Rarotonga, at 204 km.

The 15 islands of the Cook Islands are divided into the Northern Group with six low-lying islands north of Palmerston, and the Southern Group, with nine islands south of Suvarrow.

The total land area of the Cook Islands is only 240 square kilometers or only 0.013% of its total area. Of this small area, 89% of the land is situated in the Southern Group. With the exception of Manuae, Suvarrow and Takutea, all islands are inhabited.

International waters (IW) include oceans, large marine ecosystems, enclosed or semi-enclosed seas and estuaries as well as rivers, lakes, groundwater systems, and wetlands with trans-boundary drainage basins or common borders involving two or more countries. IW extend far inland and far out to sea. This is because the global hydrological cycle links watersheds, air sheds, estuaries, and coastal and marine waters through trans-boundary movement of water, pollutants and living resources.

The International Waters Project (IWP) has two main components:

- The oceanic component (focusing on the management and conservation of tuna stocks in the western central Pacific); and
- The coastal component (focusing on integrated coastal watershed management). It involves the implementation of 14 pilot projects that address sustainable resource management and conservation issues in the coastal zone (referred to as the coastal component).

As a coastal state the Cook Islands IWP will focus on the coastal component and the **development of a pilot project** to address either the most important environmental problem facing the Cook Islands that influences its coastal waters, or a mechanism that will see the effective management of that environmental problem.

The main objective of the coastal component is to “address root causes of the degradation of international waters in coastal regions through a program focused on improved integrated coastal and watershed management”. This means action at the community level to address priority environmental concerns within the Cook Islands.

This document is therefore the first step towards identifying the priority environmental concerns (PEC) by providing a review and an assessment of the environmental concerns in the Cook Islands. The review and assessment will provide the basis for the determination of the pilot project for implementation under the IWP-Cook Islands.

The environmental concerns identified, reviewed and assessed in this report are:

1. Solid waste management.
2. Liquid waste management.
3. Land management – Money system and the land.
4. Land management – Inadequate land.

5. Land management – Land use practice.
6. Land management – Land rehabilitation.
7. Degradation of coastal resources through property development – Rarotonga.
8. Degradation of coastal resources – Outer islands.
9. Degradation of coastal resources – fishing and recreational activities.
10. Degradation of the wetland areas – Rarotonga.
11. Degradation of the wetland areas – Outer islands.
12. Degradation of the sloping lands – Rarotonga.
13. Degradation of the sloping lands – Outer islands.
14. Protected areas development – land.
15. Protected areas development – marine.
16. Lack of awareness – Government Agents.
17. Lack of awareness – NGO's.
18. Climatic variations.
19. Lack of environmental monitoring.
20. Ignoring or superficial use of traditional knowledge and practices.
21. Invasive species.

From the list above, the issue of climatic variations perhaps is the only issue for which the cause is not local but has an influence in one way or another on each of the concerns raised.

1 Introduction

1.1 Background

The IW is one of the four focal areas of the Global Environment Facility (GEF). The GEF was created in 1994 to provide funding for programs and projects to achieve global environment benefits in four focal areas: biodiversity, climate change, international waters, and ozone layer depletion, as well as land degradation as it relates to these focal areas.

International waters include oceans, large marine ecosystems, enclosed or semi-enclosed seas and estuaries as well as rivers, lakes, groundwater systems, and wetlands with trans-boundary drainage basins or common borders involving two or more countries. It extends far inland and far out to sea. This is because the global hydrological cycle links watersheds, air sheds, estuaries, and coastal and marine waters through trans-boundary movement of water, pollutants and living resources.

The IWP is a five-year program for 14 participating Pacific island countries. It is funded by the GEF. The Cook Islands is one of the participating countries of the IWP in the South Pacific region. The other participating countries are: Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

The IWP has two main components:

- the oceanic component (focusing on the management and conservation of tuna stocks in the western central Pacific); and
- the coastal component (focusing on integrated coastal watershed management). It involves the implementation of 14 pilot projects that address sustainable resource management and conservation issues in the coastal zone (referred to as the coastal component).

1.2 IWP in the Cook Islands

IWP in the Cook Islands will focus on the coastal component and the **development of a pilot project** to address either the most important environmental problem facing the Cook Islands,

or a mechanism that will see the effective management of environmental problems facing the Cook Islands.

The Coastal Component

The main objective of the coastal component is to “address root causes of the degradation of international waters in coastal regions through a program focused on improved integrated coastal and watershed management”. This means action at the community level to address priority environmental concerns (PEC) within the Cook Islands relating to:

- Marine and freshwater quality;
- Habitat and community modification and degradation; and
- Unsustainable use of living marine resources.

To achieve this, IWP will support the establishment of one pilot project in the Cook Islands. The project will seek to strengthen capacity and provide lessons for best practice and appropriate methodologies for sustainable resource management and conservation in four focal areas relating to:

- Marine protected areas;
- Sustainable Coastal Fisheries;
- The protection of fresh water resources; and
- Community-based waste reduction.

This report is prepared in accordance to the terms of reference (ToR). Its objective is to provide a review and assess PEC in the Cook Islands. The review and assessment will provide the basis for the determination of a pilot project for implementation under the IWP.

2 Discussion of issues regarding environmental concerns facing the Cook Islands

It is expressed here that the Taskforce for the IWP may review the issues provided and prioritize the problems described as they see fit, based on the issues discussed in the National Environment Management Strategy (NEMS), Cooks Islands Strategic Action Program (CISAP) and United nations Convention for Combating Desertification (UNCCD), and the future initiatives provided at the National World Strategy for Sustainable Development (WSSD) Conference in April and contained in the Report “Draft Workshop Report”.

This report discusses the environmental problems of waste management, land management, degradation of coastal resources, degradation of wetland areas, degradation of sloping lands, protected areas development, lack of awareness, the effect of climatic variations, lack of environmental monitoring, the ignoring of traditional knowledge and practices, and invasive species as major issues.

For each problem identified, this report will discuss the situation, the effects on the environment, past and present actions if any, and future actions required to deal with the issues. This report outlines the national as well as local environmental issues.

2.1 Waste management

2.1.1 Solid waste

The situation

Solid waste is defined and categorised as, rubbish that goes into the dumpsites or landfills including hazardous waste such as batteries, fertilizers and unwanted or expired hospital chemicals to name a few (Rea, 2002). Under the Rarotonga Environment Act, solid waste

falls under the category of litter which is defined as “any refuse, rubbish, animal remains, glass, metal, garbage, debris, dirt, filth, rubble, ballast, stones, earth, or waste matter, or any other thing of a like nature.”

Currently all twelve inhabited islands of the Cook Islands are without a proper solid waste disposal system. Characterized by large number of imports the Cook Islands have been, for over ten years, trying to address the problems of disposing of solid waste. It has been a common thinking that any marginal land that is undesirable for agriculture or residential use is a potential solid waste disposal site.

For the *makatea* islands of Mauke, Mitiaro, Atiu and Mangaia, the rugged terrain or deep natural limestone pits, which are accessible and still away from the main settlement areas, have become sites for disposal of solid waste. On the atolls of the Northern Group, the use of the wetlands on the lagoon sides or pits and holes on the foreshore have become areas where solid wastes are disposed.

On Penryhn, the lagoon side wetland areas (salt marshes) have become an area for the disposal of solid waste. The normal practice was that placing household rubbish (mostly organic) on the lagoon side causes sand to be trapped thereby providing a buffer to protect the already established vegetation. This practice also recognizes the fact that such a buffer area is temporary but does always provide protection for the established vegetation.

For Rarotonga and Aitutaki where most of the population of the Cook Islands are located and where tourism activities occur more extensively, the use of environmentally sensitive areas, such as the wetland areas and to a lesser extent the foreshore areas, has become a feature.

The collection of solid waste for disposal in the outer islands is a function of the Island Council, which is also responsible for ensuring the proper disposal of all solid waste on the island. On Rarotonga, this service is contracted to private operators.

Effects

- The Penryhn experience - With the change to mostly imported foodstuff resulting in change to household waste composition, other health issues have arisen. Improper management of disposal sites has resulted in plastic waste (e.g. disposable diapers) and tins and glassware being scattered around the vicinity of the disposal site and this has become a marked feature of these disposal sites.
- In terms of flies from dumpsites, the hot climate of the Northern Group makes the tins and cans breakdown fast. However, they have become effective breeding grounds for mosquitoes. With the North of the Cook Islands experiencing La Nina climatic conditions the situation is made worse.
- For Rarotonga, this solid waste disposal method has caused extensive drainage problems in the Panama, Avatiu and Atupa wetlands where the old dump used to be. Other areas such as Tikioki and Aqua wetland areas have been affected the same way. The effect of waste on the water quality has not been measured but past experience, suggests strongly that this situation have an adverse effect on the water quality of the wetland areas, streams and inshore waters.
- Waste audits for Rarotonga for 1994, 2001 and 2002 show a reduction in organic waste inferring that people are now either burning them or are dealing with them at home (Raea, 2002).
- For the makatea islands, the problem is not as noticeable.

Past and Present Actions

Rarotonga and Aitutaki

- Waste audits for Rarotonga in 1994 gave Government its first impression of waste components and the 2001 and 2002 audits gave an update for comparison purposes.
- Ta’au Taku Tita (TTT) was an environmental awareness education and training program initiated in 1994 to help reduce waste going to the dumpsites. It was a program funded by Canada Fund

- Appointment of Litter Wardens in 1997 under the Rarotonga Environment Act 1994-95.
- Feasibility study for the new landfill and the Waste Study of 2000.
- The ignoring of the importance of the environment during the 1996 Cook Island's Government and Asian Development Bank (ADB) funded economic reform resulted in the axing of the TTT program, Canada Funded Marine Education program and the Environment Services' resource monitoring program (Water quality monitoring, stream monitoring, foreshore monitoring, coral monitoring).
- Under an Asian development Bank (ADB) soft loan, an engineered landfill is in the process of being designed for construction for the islands of Aitutaki and Rarotonga. Together with the landfill, a recycling center is being established on Rarotonga and one is yet to be established on Aitutaki. The idea of the recycling center is to promote waste minimization and to ensure the designed life for the engineered landfills are achieved or maximized.
- Establishment of the Waste Management Unit (WMU) within MoW. The major activities of the Unit are: implementation of the ADB funded Waste Management Project, Recycling Centre and education and awareness including public consultation.
- Waste Management Project to provide improved rubbish collections.
- The establishment of a Recycling Centre at Ngatangiia in April 2001 has improved collections of recyclable.
- The Recycling Centre has started exporting crushed glass and other recyclable overseas, employed and trained staff improve waste reduction and recycling, and government has supported the purchase of equipment and materials for the Recycling Centre through NZODA.
- WMU Education and awareness programmes have been established using print media, television, radio, schools and public meetings.
- WMU also identified areas to be improved and developed such as: further waste reduction at source, hazardous waste and treatment facilities, green waste recycling, landfill maintenance and the monitoring of on-going public education coordination of all areas of Waste Management implementation.

Other Outer Islands

- Island Council Waste Collection system is in use.

Actions Required

For all the islands

- Prepare a solid waste management policy (SWMP) identifying regulations, standards and guidelines to be firmly incorporated into the new Cook Islands Environment Act 2002 (now on hold). In the case of the outer Islands the action needed is to incorporate the policy standards and guidelines into their by-laws.
- The SWMP is to define the roles of line ministries (with regulatory functions) on waste issues.
- The SWMP is also to include sound management practices for hazardous and bulky wastes.
- Establishment of pollution waste monitoring (through regular auditing) infrastructure under the Environment Service (which is the overall environmental quality-monitoring arm of Government).
- Review the Government policy on imports with the view to consider a waste management tax to assist recycling centres.
- Capacity building in the area of compliance to carry out waste management activities.
- Improve and build upon the TTT Education and awareness program.
- All islands to have a proper solid waste disposal site and a waste management program.

Specifically for Rarotonga and Aitutaki

- Government to ensure the Landfill projects for Rarotonga and Aitutaki are commissioned and operational by January 2004 (as stated at the WSSD Conference in 2002).
- A user pay system established to fund the repayment of the loan – ADB loan of 4.6 million.

2.1.2 Liquid waste

The Situation

Liquid waste is defined as washing wastewater and septic waste or sludge/sewage.

As with the solid waste issue, all islands of the Cook Islands are without a proper liquid waste disposal system. For Rarotonga, when a septic tank is full the content is pumped out by a private contractor and disposed of on private land. However, most septic tanks are not being emptied because they never get full.

A study conducted by the Onu Group Consultants (a private local company) in August 1999 shows that “basic understanding of the treatment process was not common knowledge to the local community, apart from a selected few”. As a result, water-tight structures are not always constructed and therefore, as found by the Onu group, the water levels in the tanks surveyed were found to be less than 50%, with minimal sludge and an absence of solids.

According to a reliable plumber on the island, he has come across builders who claimed that presently they construct septic tanks the ‘right way’ because they ‘have always done it that way over the years’. Also builders do not make sure that testing properly seals the tank.

According to Environment Service data, stench from septic tanks is a major issue, on Rarotonga’s low-lying areas, during flooding.

For the island of Aitutaki, if a septic tank is full, another hole is dug up next to it and the content of the full tank is emptied into the hole. For the other outer islands, with the exception of Nassau and Pukapuka, the flush toilet is being pushed as a way to improve the health standards. However the disposal of the sludge from septic tanks has not been addressed. For Manihiki, Rakahanga and Penryhn, there has been no known de-sludging of any septic tank. It is the understanding of the Consultant; the same applies to the islands of Mauke, Atiu, Mitiaro and Mangaia.

Effects

- The ignoring of the importance of the environment during the 1996 Cook Islands’ Government and ADB funded economic reform resulted in the axing of the Environment Services’ environmental monitoring program. The reform also resulted in the axing of budget and staff for the Health and Agriculture department, which caused the Health Department to not have the capacity to cope with the increase in developmental activities, especially for Rarotonga.
- There is a lack of data for the monitoring of effects on the environment of all the islands.

Past and Present Actions

- Downsizing of the Public Sector in 1996 resulted in the axing of the Environment Service’s resource monitoring program. Doing this also axed the Health and Building Inspectors capacity to cope with the increase in developmental activities, especially for Rarotonga.
- The establishment of the WMU implementation of the waste management project as well as education and awareness including public consultation.
- The Waste Management Project will at present focus on the provision of an engineered landfill for Rarotonga and Aitutaki as well as improved septic tank sludge treatment and collections program.
- WMU describes a septage pond as a place to store sludge from de-sludge septic tanks for treatment with drainage, lining and a place for the collection of leachate. This is planned for Rarotonga and Aitutaki.

Actions Required

For all islands

- Prepare a liquid waste management policy (LWMP) identifying regulations, standards and guidelines to be firmly incorporated into the new Cook Islands Environment Act 2002 (now on hold). In the case of the outer Islands the action needed is to incorporate the policy standards and guidelines into their by laws.
- The establishment of a pollution monitoring infrastructure under the Environment Service (which is the overall environmental quality monitoring arm of Government).
- Review Government policy on increasing tourism development with a view to determining the holding capacity for Aitutaki and Rarotonga.
- Monitoring the effectiveness of domestic septic tanks as well as septic tanks and treatment systems of tourism premises.
- Capacity building in the area of compliance to carry out regulatory functions pertaining to septic tank and waste treatment regulations.
- Reviving of the Pesticide Board with the view to include the monitoring of the effects of pesticides on the users, consumers and 'people-in-the-area' while chemicals are being applied.
- Improved and ongoing education and awareness programs for both formal and informal education needs.
- All islands must have a proper liquid waste disposal site and a liquid waste management programmed.

Specifically for Rarotonga and Aitutaki

- Government to ensure the septage ponds for Aitutaki and Rarotonga are commissioned and operational by January 2004.
- User pay system established to fund the repayment of the loan – ADB loan of 4.6 million.

2.2 Land Management

2.2.1 Money system and the land

The situation

The changing life style of Cook Islanders as a result of the money system has caused pressure on environmentally sensitive lands on the island of Rarotonga. A lifestyle which formerly focused on being able to sustain the natural supply of used resources has now changed into an introduced system where resources, such as land, are valued in terms of money value and have become tradable assets. As such, land has become the backbone of the money system. To develop land for conservation purpose or commercial or residential purpose land has to be given a money value. This has caused land to be developed in order to raise its value resulting in the alteration of natural drainage systems of the wetland areas or, the alteration of sloping lands, to allow pineapples to be grown (for example) or the development of foreshore areas for the tourist dollar. These types of developments have caused major environmental problems on islands like Rarotonga, Aitutaki, Mangaia and Atiu.

The effect of the money system is also reflected in the recommendation by the National Biodiversity Strategy Action Plan (NBSAP) action plan and the proposal supported by environmental Non Governmental Organisations (NGOs) to have the Suvarrow Atoll National Park under the control of an independent authority that will be responsible for revenue generating activities.

The protection of the highly valued foreshore lands on Rarotonga and Aitutaki has resulted in damage and degradation of residential and locally owned properties. This is mainly attributed to the construction of coastal protection structures to protect properties that have been leased, and also includes structures that have been poorly designed and hastily constructed.

As tradable assets, land of any type is currently used by landowners to enable themselves to afford more of the commodities that the money system continues to offer. Consequently, more and more lands located on environmentally sensitive areas of Rarotonga are ending up on the market. During the year 2000, for Rarotonga alone, over 18 acres of land was advertised by various banks for mortgage lease sales. This figure continues to increase.

Effects

- Increased development and the use of land as a tradable asset is amplified by Government's continued open and relaxed policy towards foreign investments.
- Improper development of environmentally sensitive lands such as the wetland areas, sloping lands and the foreshore lands.
- Some owners of lands, especially the foreign owners who have invested a lot of money in tourism ventures, have the attitude that because they have invested a lot of money, they should not be made to comply with local environmental laws.
- Developmental technologies applied are inappropriate and local engineers still try to satisfy their clients by exploring those technologies and applying them.
- In most cases, because of the lack of capacity within Government's agencies to enforce laws that protect the lands, environmentally sensitive lands are being developed without following the Environment Service (ES) conditions of approval.

Past and Present Actions

Rarotonga Environment Act

The Rarotonga Environment Act of 1994-95 under the project application provision requires from applicants an Environment Impact Assessment (EIA) report; prior consent has and is given for activities in the sloping land areas, wetland areas and foreshore areas. As a matter of policy (to be regulated); a copy of the land map from the survey department and a site plan of where the Applicant intends to carry out the proposed activity is required.

The purpose of this policy is to allow the ES Officers to have knowledge before site inspection, of the legal status of land ownership and how the applicant intends to mitigate effects that may impact surrounding properties. This process, therefore, allows for the clear identification of ownership and for the prevention and mitigating of environmental problems causing land degradation. The process includes the investigation of technologies that are appropriate for mitigating adverse impacts with regard to neighbouring and other landowners.

Building Code

The MoW's Building Inspectors have an in-house policy that for any building to be constructed that falls under their jurisdiction, the applicant is required to fill in the ES Form. The form allows the Building Inspectors to know whether or not the proposed building is in an environmentally sensitive area. If it is, the Building Inspector will refer the applicant to the ES. However, MoW data shows that between 1997 and 2001 almost 30% of those who applied for a building permit did not bother to fill in the ES form and 65% filled in the form without consulting the ES. The form is required to be filled in the presence of an ES Officer, or a qualified and recognized environmentalist.

Septic Tank Regulation

The table below provides the Policy of the Department of Health's septic tank regulations.

Policy:	Details:
Permit to construct.	<ol style="list-style-type: none"> 1. A septic tank should not be constructed or altered without the permission of the Public Health Authority. 2. No person shall erect, establish, extend or alter any drain, septic tank, and disposal system or other sanitary appliance without first obtaining approval from the Public Health Department.
Submission of Plans.	<ol style="list-style-type: none"> 3. Any person who proposes to construct a septic tank shall, before commencing the work, apply in writing to the Public Health department for permission to do so, such application shall be accompanied by:

	<ol style="list-style-type: none"> a. Complete plans and specifications of the propose work; a block plan, to scale of the premises and of the adjoining premises, public ways or places in which the proposed position of the septic tank and all drains are accurately shown. b. A statement of the way it is proposed to dispose of the effluent from the septic tanks. c. A statement of the number of persons residing, or probable number of persons likely to reside on the premises or the number of persons likely to use the sanitary fittings connected to the septic tanks. <ol style="list-style-type: none"> 4. The information required by (a), (b) and (c) of above shall be furnished in 4 copies and I copy shall be restrained by the Public Health Department. 5. The Public Health department may grant or withhold permission for construction of any septic tank.
Construction.	<ol style="list-style-type: none"> 6. All new septic tanks shall be constructed in accordance with a model plan to be from time to time approved and issued by the Public Health Department. 7. No person shall construct any septic tank, which does not conform in any respect with the plans and specifications approved by the Public Health Department. 8. No septic tank and disposal system of any septic tank shall be installed within 3 meters of any building or within 2 meters of any boundary of any premises, or in any place where it is likely to create a nuisance, or under any building. 9. The effluent shall be conducted from septic tank by approved means.
Penalties.	<ol style="list-style-type: none"> 10. Every person who neglects to comply with these requirements shall be liable to a fine.

Table 2. Public Health Policies (septic tank regulation), adapted from WSSD report, April 2002.

Actions Required

- The Tu'anga Taporoporo must have a clear and easy goal to enforce compliance policy on environmentally sensitive areas.
- A review of Government's open investment policy with a view to know when to say "stop" to large foreign investment activities and to large local development activities. A carrying capacity line is needed.
- The Public Health Department must have a clear and easy goal to enforce compliance policy on environmentally sensitive areas associated with the septic tank regulations.
- The Ministry of Works must have a clear and easy goal to enforce compliance policy on environmentally sensitive areas associated with the Building Code.
- To explore and reach consensus finding the balance between the extremes of customary ways and western materialism in order to recognise when carrying capacity has been reached.
- Establish an accessible and affordable valuation system in the country.
- Education and awareness of legal implications where information must be written in the vernacular language to ensure complete understanding.

2.2.2. Inadequate land

The Situation

The total land area of the Cook Islands is 240 sq km or 59,280 acres. Of these 15,536.3 acres or 26.2% is *makatea* land, and only 2,542.7 acres or 4.3% may be used for agricultural purposes. The other 41,201 acres or 70% are mostly referred to in this report as marginal land. On marginal land areas there are landforms such as, sloping lands, wetlands of Rarotonga and atoll lands left for coconut trees to grow on in the Northern Group. A small percentage of this category also includes commercial land and land used, or usable, for public purposes.

Over 70% of the land in the Cook Islands is land not used for agriculture, and consists mainly of sloping lands of the interior, *makatea*, unused wetlands and coconut lands of the Northern Group. These marginal lands with their native biodiversity however play a very significant part in ground water retention and the hydrological cycle¹.

Island:	Land Area (acres):	Makatea area (acres):	Area used for agriculture (acres):	Others*(acres):
Rarotonga	16,598.4	0	1,143.00	15,455.4
Mangaia	12,794.6	4,322.5	373.3	8,098.8
Atiu	6,644.3	3,334.5	152.6	3,157.2
Mitiaro	5,508.1	4,396.6	52.5	1,059.0
Mauke	4,544.8	3,428.7	271.8	790.30
Aitutaki	4,470.7	0	458	4,012.7
Manuae	1,704.3	0	0	1,704.3
Palmerston	494	0	0	494.0
Takutea	296.4	0	0	296.4
Penryhn	2,420.6	0	0	2,420.6
Manihiki	1,333.8	0	18	1,315.8
Pukapuka	1,062.1	0	56.9	1,005.2
Rakahanga	1,012.7	0	12.7	1,000.0
Nassau	296.4	0	3.9	292.5
Suwarrow	98.8	0	0	98.8
Total	59,280.00	15,536.3	2,542.7	41,201.0

Table 3. Land availability (* Include land used for residential, commercial use and marginal lands such as sloping lands and wetlands.).

Development of Rarotonga

On Rarotonga almost all of the development is taking place on the foreshore area. This area is 617.5 acres in size or, 3.7% of the total land area of Rarotonga. It is also observed that there is an increase in developmental projects on the sloping lands through the construction of more residential housing.

It is obvious that land available for development and public use is very limited. For this reason, the potential for land degradation is high as more lands unsuitable for development become developed regardless.

It is expressed here that the problem is not to create more land to be available but to address land management issues to get the best use out of what land area and types this country has.

Normally, land identified as significant for any public purpose is preferably acquired by warrant or by lease. During the colonial era and the early years of self-government, small areas of land were acquired by the Crown for public purposes by warrant under the Cook Islands Act of 1915. Crown lands have been used for public purposes other than conservation.

Suwarrow atoll is the only island declared for conservation at the national level in the Cook Islands. Takutea Reserve, for the protection of a seabird sanctuary, is under the control of the people of Atiu. To date the Takitumu Conservation Area, identified to protect the endangered Rarotonga Flycatcher, has yet to be formally declared as a reserve or national park.

It is very difficult to protect lands that are environmentally sensitive such as, water catchment areas, forests and sloping lands, erosion prone areas, areas of archaeological, historical value, areas of recreational value and areas for the proper disposal of waste. There is a need to acquire adequate land suitable for the disposal of waste. The sites for the Rarotonga and Aitutaki landfill and septage pond took many years to establish.

In the last ten years the Cook Islands Government and private landowners engaged in using solid waste to fill low lying wetlands. Most of these wetland areas are used for taro crops.

¹ Ben Parakoti, Director of water works at the WSSD workshop.

Wetland areas play an important role in the natural drainage of the sloping lands of Rarotonga, Mangaia, Atiu, Mauke and Aitutaki.

For Rarotonga the increased population especially foreigners through the Government's investment policy, has placed the foreshore areas, wetland areas and sloping land areas under a lot of stress.

Effects

- Common problems affecting the land tenure system which also hinder sustainable development are:
 1. multiple ownership;
 2. absentee owners; and
 3. fragmentation of interests.

- Impact of policies, legislations and the complexity of procedural requirements within the public and private sector created power imbalances between the landowners and their tenants or lessees – investors, developers, etc. Power imbalances include:
 1. policies not fully understandable especially to land owners in the rural areas or from the outer islands;
 2. legislations that are out of date or do not provide adequate protection for or safeguard landowners;
 3. legal procedures are complex and costly;
 4. lack of accessible valuation; and
 5. competing interest in maintaining cultural heritage and sustainable development as well as the lack of or insufficient information and data available for those dealing with land issues, and more particularly, for those in the outer islands.

- Large areas of environmentally sensitive lands including makatea lands are becoming affected by developmental activities.

Past and Present Actions

Land Commission Report and its implementation

- A land commission was set up in 1995 with the objective to look at land tenure and land use policy involving commercial interests in land and the administration of land matters.

- At the WSSD Conference, the Registrar of the Court clearly outlined some of the solutions that could be put in place which support the land commission outcomes, however, he cautioned that there is great difficulty in trying to find the balance between customary ways and western materialism, and this is made worse because of legal language jargon and more so again with the monopolizing of the English language in the Land Court.

- Localisation of Land Court Judges has commenced with JPs presiding over undisputed land cases on Rarotonga.

Rarotonga Environment Act 1994-95

- The Rarotonga Environment Act of 1994-95 under the project application provision requires from applicants an EIA report; prior consent for activities in the sloping land areas, wetland areas and foreshore areas as a matter of policy (to be regulated); a copy of the land map from the survey department and a site plan of where he/she intends to carry out the proposed activity is also required.

- The purpose of this policy is to allow the ES Officers to have knowledge, before site inspection, of the legal status of the land ownership and how the applicant intends to mitigate effects that may impact surrounding properties. This process, therefore, allows for the prevention and mitigating of land degradation as described in some detail in Section 3.2 and 3.3. The process includes the investigation of technologies that are

appropriate for mitigating the adverse impacts with regard to other landowners because of the situation and effects described above.

- The only part of the Land Commission report that was implemented is where it recommended that local Justices of the Peace should preside over land Court cases to determine land titles on Rarotonga, that are not disputed. This has further increased the availability of land to people for development. Prior to this, the High Court Judge presided over all land title determinations and the process would often take up to four months. Now Land Court sessions are scheduled every month.

Actions Required

- Explore and reach a decision on how to overcome the difficulties of multiple ownership, absentee ownership and fragmentation of land interest.
- Capacity building to ensure that the Compliance Units of the Ministries that hold regulatory functions are at maximum levels.

2.2.3 Land use practice

The Situation

Land use practices refers to the way land is being developed whether by using traditional knowledge or by using imported technologies and methods.

Traditional land use practice

Traditional practices are normally in the form of resource management and the way that people plant their crops. 'Ra'ui', a form of resource use management, is still being practiced in the Northern Group on coconut lands. In the case of Pukapuka and Nassau, there is a ra'ui placed on most resources of the land. On Manihiki and Rakahanga, the ra'ui is less strict but still observed. As the population of those two islands is heavily dependent on imported foods, and local resources supplement these, the pressure on the ra'ui lands is less. *Pulaka* (similar to taro) is a land crop that used to be managed under the ra'ui system but this is no longer the case because not many people eat *pulaka* now.



Photograph 1. Taro patches in a wetland area.

For Nassau and Pukapuka the use of the green leaves of trees, except for coconut fronds, to sustain soil fertility in the uwi lands is a very important practice. The belief is that green leaves have more nutrients in them and therefore are much valued as a soil nutrient enhancement. Leaves are also placed on ra'ui. It is common to see selected *puka* trees all stripped of their leaves.

In the planting of swampland taro, the construction of the taro patch is a practice whereby the planting area for taro is turned and the level is raised using a spade. Raising the normal water

table allows growers to plant certain varieties of taro. The taro patch also allows the grower to sustain the nutrient level for each patch by burying any litter or vegetation in the patch each time the patch is turned over. This is commonly referred to as '*uri-pa'i*'. This is a common practice in Rarotonga, Atiu, Mauke, Mitiaro, Mangaia, Pukapuka, Manihiki, Rakahanga and Nassau. See photographs 1 and 7. This practice also helps the water to flow properly, thereby maintaining the natural role of the wetland as a drainage system. Wetland taro is common in Mangaia and in the Valley's of Rarotonga.

There may have been more land use practices but these were not passed down to us and are no longer practiced or known. Section 2.10 on traditional knowledge and practices says that land development prior to Missionary contact were site specific. Water wells were developed where there was water; banana and taro crops were planted where they naturally grew. Houses were constructed on elevated areas and away from areas where flooding and sea surge inundation took place.

Land use with machinery and imported technologies

Soil erosion as a result of major excavations on sloping lands is a major problem on Rarotonga and the Makatea Islands of the Southern Group. Due to occupation right and leasehold land arrangements, some parcels of land are being extensively cultivated often using inappropriate techniques, resulting in erosion.

As discussed in other parts of this report, soil erosion does not only result from poor cultivation and agricultural practices. The preparation of land for house sites or the development of roads to higher land sections and agricultural areas is a major contributor to erosion. The lack of skilled machinery operators and qualified or experienced supervisors, or field managers, has also contributed to this problem. Many of the examples are discussed in Sections 2.3, 2.4 and 2.5.

Mining for coral sand, gravel and cobbles has become an important land use activity on the foreshore of all the islands. Because of the adverse effects on the foreshore of Rarotonga (land loss, damage to properties as a result of reduced shoreline) mining on the foreshore is prohibited. This has led to pit mining inland from the foreshore.

Effects

- Continued use of the taro patch method as well as the terracing of wetlands has maintained the role of the wetlands as a natural drainage area. However, the use of machineries to reclaim wetlands (described in Section 2.4) as a result of more land being required has placed these natural drainage areas under pressure.
- The heavy use of machinery to excavate sloping lands and mine foreshores has also caused major problems on these environmentally sensitive areas.

Past and Present Actions

- Conservation Act 1987/88 provided for the protection of the coastal zone area covering streams and the foreshore. Activities in these areas are not allowed unless the Conservation Council is of the opinion that the activity will improve the natural configuration of the area. This Act applied to Aitutaki and Rarotonga with a special application clause to allow the other islands to become part of or to come under some provisions of the Act, which are appropriate. This Act was repealed.
- Rarotonga Environment Act 1994-95 provided for the protection of environmentally sensitive areas such as the foreshore, sloping lands and wetlands, as well as any other lands through the EIA process. The Act's provisions would require the applicant to provide ways to mitigate or minimize the effects of their activity on the specific environment involved. It expanded on the provisions of the Conservation Act 1987/88. This Act applies only to the island of Rarotonga with no application clause for the other islands.

Actions Required

- Government to support in full any measures on capacity building to make sure that the Ministries of Government regulate that sound or reasonable land use activities are being performed and optimum level is being achieved.
- Appropriate environmental guidelines must be applied to the other islands of the Cook Islands.
- The maintaining of good traditional practices on land use must be encouraged.
- The application of the Rarotonga Environment Council's policy for the Foreshore areas, sloping lands, and wetland areas as well as the EIA provision of the Rarotonga Environment Act 1994-95.
- Application of the EIA provision of the Rarotonga Environment Act 1994-95 to all the islands of the Cook Islands.
- Support should be given for the proposed National Environment Act as well as to have the appropriate parts of it applied to the outer islands.

2.2.4 Land rehabilitation

The situation

Land rehabilitation is a major problem in the Cook Islands. This is mainly due to a lack of commitment on the part of those who caused the land degradation problems in the first instance.

In the case of Government, there is difficulty mainly with accepting responsibility that results in lot of money needed to fix the problems that it has caused or been involved in causing. A common excuse given is budgetary constraints and priority shifts. Recognition of local experience is also a problem in Government. Private individuals continue to see the Minister to have the Environment Service change assessments and conditions or decisions on projects and this is a continuing problem also.

On Rarotonga, huge sand pits opened up for coral sand mining near roadsides and backyards along the coastal ridge or near wetland areas have become a feature especially after mining from the foreshore became prohibited. These pits, on privately owned lands, have been either been filled with solid waste or red soil. There has been no consideration for the effect of these excavation activities to the underground hydrological cycle and the quality of coastal waters. In some cases whole hillsides have been removed without proper rehabilitation work. Most of these have now been covered up without any known future consideration given to them in case of safety hazards, legality of the practice, health consequences and so on. There is very little control over these types of activities and their rehabilitation.

On Mangaia and Atiu, the erosion prone sloping lands used for the pineapple plantations in the 1970s were left to erode causing siltation of the wetland taro planting areas without any land rehabilitation measures until the late 1980s. These lands were excavated, terraced and ploughed, in other words, completely transformed. Photographs 7 and 8 show the extent of the damage caused during the pineapple-planting era. The forestry trials saw the planting of *pinus carreabea* and *accacia mangium* on the sloping lands of the two islands.

As recent as February of this year, an Island Councilor for the Tamarua Village of Mangaia voiced his disappointment with the *accacia mangium* as it has become a pest on the island. The species grows wild and spreads very quickly. The problem lies with the removing of the tree species from arable land and it requires major excavation that is not only costly but needs heavy machinery to do the work. This type of machinery is not available on the island, and as a result landowners are discouraged from using the land. On the issue of forestry, it is also speculated by the people of Mangaia that the *pinus carreabea*-covered hills have caused the wetlands and water catchment areas to be dried up. This, in their opinion, has never happened before. The Pacific Island Climate Change Assistance Program (PICCAP) team through their research also found justification for this speculation with data from a research carried out on the effect of pine forest on the water catchment of an area in Fiji (as reported in Nambiar, S.E.K & Brown, A.G 1997).

Foreshore development, especially the poorly designed and poorly supervised foreshore protection units (or coastal protection units) constructed with the purpose of rehabilitating and protecting premises damaged by waves have, instead, caused damage to other residential properties. This is further described in Section 2.3. In the late 1980s NZODA funded a pilot foreshore protection project (coastal protection units or CPU) at the Rarotongan Hotel's southern beach section. The beach had been a site suffering from extensive erosion damage with the Hotel losing beach sand threatening to undermine the Hotel's southern guestrooms. Almost ten years later, the foreshore protection project has caused to be formed almost 50 meters of sandy beach away from the guestrooms. The principal concept of the project is that while in suspension during high seas sand is trapped behind the coastal protection units as the waves energy is dissipated by the structure. After the success of this project, having been monitored by the University of Canterbury's Geology division, the knowledge gained from this project has not been applied anywhere else.

For the Northern group islands land rehabilitation takes the form of improvements of harbors or passages on the reefs blasted under the NZODA programs. The passages for Rakahanga, Manihiki and Nassau had all been blasted in the late 70s and have created problems for the inhabitants of those islands. Government, in its attempts to improve the infrastructure of the outer islands, and assisted by NZODA, is in the process of improving those passages. For each of the harbor improvement projects an EIA was carried out to assist with the planning and implementation of the projects. However, because of the lack of legislation on those islands, the project planners do not feel obligated to follow the recommendations of the EIA report.

Coastal erosion is a problem in the northern group but this is attributed more to natural causes. However with the recent work of the PICCAP program and with more information available on the risks to low-lying atolls as a result of changes in the climatic patterns resulting from global warming, rehabilitation work in the low-lying islands are considerations worth looking into.

Effects

- Ill advised Politicians in Government give Government Officials an irresponsible image and thereby do not help with the work of regulatory authorities within Government.
- There has been inadequate research and lack of networking of regional information on forestry aided with the failure of the forestry programs of Atiu and Mangaia.
- There has been extensive interference with the natural cycles (e.g. underground water system, coastal waters) through the placement of inappropriate fill as well as a lack of properly qualified supervision for those activities.
- Lack of communication between Government engineers, engineering consultants, the CPU consultant, and private contractors has caused the construction of structures that have not been locally tested causing further degradation of the foreshore areas and damage to other private properties.
- The lack of EIA laws in the outer islands is seen as a problem with the harbor improvement projects. As the project is not obligated to follow the EIA report, and has not done so, it is perceived that the projects will yet again complete another cycle of badly implemented projects that had "good intentions".

Past and Present Actions

- Conservation Act 1987/88 and the Coastal Zone provision which prohibits the undertaking of any activity unless it will improve the natural configuration of the foreshore. This Act only applied to Aitutaki and Rarotonga before it was repealed in 1995.
- Rarotonga Environment Act 1994-95 contained provision for the protection of the wetlands, sloping lands, foreshore and also included the EIA provision.

Actions Required

- The application of the Rarotonga Environment Council's policy for the Foreshore, sloping lands, wetlands as Part of the EIA provision.

- Application of the EIA provision to all the islands of the Cook Islands.
- Support for the new National Environment Act and to have the appropriate parts of it applied to the outer islands.

2.3 Degradation of coastal resources through property development

2.3.1 Coastal development on Rarotonga

The situation



Photograph 2. *Rock revetments in the background have resulted in the degradation of adjacent properties.*

Tourism development has focused on the development of the foreshore, 63.8% of the foreshore's problems are to do with the construction of tourist facilities and the protection of properties which include tourist facilities. Because coastal construction processes are dynamic, they do substantial damage to the land, affecting coastal roads along with other public infrastructure and private properties along the Rarotonga foreshore area. This accounts for 13% of the erosive damage to residential properties adjacent to a tourist-developed area or a tourist-related property.

Three issues associated with tourism development that are contributing greatly to growing land degradation problems on Rarotonga include the following:

- building too close to the sea;
- completely clearing natural vegetation and the replacing it with ornamental species not well suited to the environment; and
- disposal of liquid waste

This is supported by data collected by the ES and data showing the growing trend of increasing development through the building permits issued by the MoW.

According to MoW records, from 1997 to 2001, 24.85 acres of foreshore land was developed for the construction of buildings. Over this period, despite the fragile nature of this area, 71.6% of the buildings constructed have concrete foundations and concrete floors. The increase is attributed mainly to an increase in the number of visitors for budget type accommodations as well as for existing resorts expanding their premises. The significance of concrete floored buildings is that it does not allow water to flow through or beneath the building. Instead, it obstructs the flow of water surges during periods of high seas by not allowing the surge to dissipate its energy resulting in more erosion. Subsequently, property owners eventually end up building a coastal protection structure.

All the known accommodations on the island are either on the foreshore or have direct access to the foreshore. Statistics to illustrate this point are that there are 45 known tourism accommodation places around the coastal rim of the island. Of these 84% are located on the foreshore (and extend to the legal land boundary of the mean high water mark) and the other 16% have direct access to the foreshore.

There are also the non-accommodation Tourist commercial activities that have access to this area such as the diving businesses, sailing club and tour operators for both land and sea tours.

Effects

- Despite the fragile nature of this area, landowners have made major alterations to the area to meet their needs causing the problems mentioned above. Photograph 3.0 below is an example of an altered foreshore.
- Damage to other properties usually those of landowners who are unable to construct a proper coastal protection structure.
- As tourism places have spent a lot of money on these alterations to their premises, they often block access to the beach to provide security for their investments from thefts and vandalism. Although this is not openly said, private property signs that have popped up along the foreshore support this trend.
- There is increased pressure on the foreshore environment.



Photograph 3. *Land preparation on the foreshore area.*

Past Actions

Land Use Act/Zoning

Land use zoning that is used overseas is not applicable in the Cook Islands because of the land size and land tenure system, despite various past attempts at zoning. The not-applied Land Use Act of 1978 was an example of such an effort. This Act was only used once to declare a portion of the beach in the Puaikura Vaka (district) on Rarotonga to be a public Reserve. The order made under this Act for the Public Reserve was cancelled five years later.

Legislative Review and the Conservation Act

The enactment of the Conservation Act 1997-98 and the current Rarotonga Environment Act of 1994-95 is an attempt to mitigate coastal problems on Rarotonga, and to a lesser extent, Aitutaki.

The Conservation Act 1987-88, was an effort from the local business community to protect the beaches and it introduced the concept of coastal area management. It recognized the importance of this area both economically as well as to protect the lands behind the coastal

area from further degradation. Consequently Government, under an FAO soil rehabilitation project in 1992 saw a review of the 1987-88 Act; the preparation of environmental Plans for Mauke and Aitutaki, and the concept of EIA being introduced into legislation.

For reasons that are unclear, Government in 1995, decided to repeal the Conservation Act of 1987-88 and replace it with the Rarotonga Environment Act 1994-95.

It is widely believed that Government support for these efforts was not continued because of lack of funds as well as the inability by decision-makers of the time to comprehend the basic principles involved.

Actions Required

- Implement the Environment Council policy for the foreshore area. See Appendix I.
- Reactivate the ES monitoring programs.
- Government should make a commitment, and provide support, to the Tu'anga Taporoporo Budget to enable the Environment Service to maintain a high level of performance in its Compliance Division and to build up its capability to undertake monitoring activities on the foreshore.

2.3.2 Coastal development in the outer islands

The situation

The foreshore area in the outer islands is different from that of Rarotonga and Aitutaki. As described earlier in this report, it is the sometimes vastly different geological make up of the outer islands that make that difference.

For Aitutaki, the issues have not been clearly defined because of a lack of data, but a coral survey carried out in 1993 showed Aitutaki's lagoon to be comprised of 15% live coral coverage. There were a number of speculations as to the cause of the low live coral coverage but these needed to be verified by proper and regular water quality monitoring. With the upgrade of the Aitutaki Black Pearl Resort, the opening of the Aitutaki Pacific Resort and the completion of the in-the-pipe-line Captain Cook Resort, there is potential for more development in the Aitutaki foreshore area. As with Rarotonga all tourism places in Aitutaki are directly placed on or accessible to, the foreshore. The mining of sand and gravel on the eastern side of the Airport runway on Aitutaki continues.

In the outer islands, the Northern Group and the makatea islands, mining of the beaches still continues for private and public purposes.

The *makatea* islands are surrounded by the *uruatete*, therefore, foreshore in the sense of land degradation focuses on the problem of the loss of sand and gravel due to sea level changes (i.e. rising sea-level) that may result in coastal erosion and loss of land.

As the people of the outer islands change, in terms of their life style, a shift from the coconut frond and pandanus thatch roof housing (using also local timber) to western style concrete and imported timber, the mining of coastal resources becomes increasingly important. With the exception of the islands of Mitiaro and Nassau, all of the other islands no longer use the old styles of housing. On Mitiaro and Nassau, the old style of housing is still in use, but this is now decreasing.

Effects

- There is no control on tourism development on the island of Aitutaki. Like Rarotonga the number of rooms the island's environment can hold (carrying capacity) cannot be determined. Unlike Rarotonga, however, the enforcement of the building code and health regulations on septic tanks is absent and there is no environmental legislation or by-law in place to control or manage the coastal resources being exploited.
- For the *makatea* islands and the low-lying islands of the Northern Group, a change in the sea level and increasing frequency of cyclones will affect this very important resource (sand and gravel).

- The mining of coastal resources becomes increasingly important with the use of imported housing materials that use concrete. Photograph 4 is an example of a sandpit in the outer islands.



Photograph 4. *A typical sand pit in the outer islands.*

- Because of the change in the composition of solid waste in the outer islands, in Penryhn for example, people have been reclaiming the shallow lagoon area using their household rubbish. This gives protection to the more established lands where the coconut and *fano* trees grow. The geology of these atolls makes them susceptible to major climate changes that will in turn change the sea-level.
- The issues are therefore how to adapt to the effects of climate change, or of course, to somehow halt the sea-level rise.

Past Actions

Legislative Review and the Conservation Act

The enactment of the Conservation Act 1997-98 is an attempt to mitigate land degradation challenges on Rarotonga, Aitutaki and the Outer Islands. For the outer islands, this was supposed to take place after Rarotonga and Aitutaki were fully covered or as each outer island requests.

The Conservation Act 1987-88, which was an effort from the local business community to protect the beaches, introduced the concept of coastal zone management. It recognized the importance of this area both economically as well as for the protection of the lands immediately behind it from further degradation. Consequently Government, under an FAO soil rehabilitation project in 1992 saw a review of the 1987-88 Act; the preparation of environmental Plans for Mauke and Aitutaki; and the concept of environmental impact assessment, introduced into legislation.

- Despite Government's move to axe the outer islands from having an environmental legislation it supported the SPREP/UNDP funded capacity building Coastal Zone Management (CZM) project which saw the preparation and completion of island environmental management plans, policy instructions and it also proposed Resource Management By-laws for the islands of Aitutaki, Mangaia, Rakahanga and Mauke. Penryhn Island, also part of this project, did not want the by-law options completed. Rakahanga on the other hand is the only island that enacted its environmental by-law as "Rakahanga 2000". This project also introduced the concept of EIA to the outer islands.
- The island environmental plans for Mauke and Mangaia identified the issues of improper land use development and recognized the efforts of the Forestry programs to combat soil erosion and reduced soil values.

Actions Required

- Prepare a CZM policy for each island taking into account the following information sources: the UNDP/SPREP funded CZM project; traditional knowledge of the people of each island; and the Rarotonga Environment Council foreshore policy.
- Where appropriate to make by-laws on some of the policies prepared from the above.
- Support the proposed National Environment Act and to have the appropriate parts of it applied to each island.
- Government to make commitment and provide support to Island Council Budget to enable the Island Administration to build up its capability to undertake monitoring activities on the coastal zone (or the foreshore area of each island).

2.3.3 Fishing & recreational practices

The Situation

As a result of ciguatera fish poisoning on the island of Rarotonga together with the Aronga Mana's Ra'ui project, the problem with over-fishing has not featured as an issue. The issues of the use of scuba diving gear for fishing purposes and the extensive use of undersized gill net fishing have all not featured since the NEMS document was prepared. At the time of the NEMS there were activities focused on those issues from the Ministry of Marine Resources as well as the Tu'anga Taporoporo.

There is however an increase in the use of scuba gear for recreational diving. With an increase in tourism revenue, in nominal terms, NZD20 million in 1997 to NZD81 million in 2000, tourism has now reached an average of 60,000 visitors per year. Scuba diving is one of the much-favored recreational activities for the young tourist both in Rarotonga and Aitutaki.

The effect of this activity on the environment of Rarotonga and Aitutaki has not been looked into and monitored. There is suspicion that the damage to corals from anchors may have increased, but these are just speculations. Ornamental fishing for the overseas market is still in progress; this also has not been monitored. Owners of the business claimed that they plant corals once they are broken. This has not been monitored since the mid 1990s.

Effects

- There is a positive effect on the marine environment of Rarotonga from the Ra'ui project. The Ministry of Marine Resources monitoring survey using invertebrates has shown positive signs. See Section 2.6.2.
- The Ra'ui project has also created a negative effect on the coastal environment by causing an increase in pressure on the resources or the foreshore. See Section 2.6.2.
- With increasing tourism, the threat to the outer reef coral system from regular and increasing diving ventures could cause damage to the corals.
- Ornamental fishing uses two methods to get the fish out. The use of force where the coral is broken and the fish delicately removed, or the use of chemicals to chase the fish out. There is a need to monitor this activity.

Past and Present Actions

- Coral and fish monitoring program of the ES. A project funded by Canada Fund, Foreign Secretariat and assisted by THE Australian Institute of Marine Studies (AIMS). The Canada Fund provided funds for the purchase of diving equipment, the Foreign Secretariat the purchasing of a boat and outboard motors and the AIMS program, which is the training of from Marine Resources Ministry and Tu'anga Taporoporo staff in coral and fish monitoring survey techniques. This whole program was axed by Government in 1996.
- Marine Education Program of the Tu'anga Taporoporo funded by Canada Fund. This project was closed due to a disagreement between the donors and the Tu'anga Taporoporo. The Tu'anga Taporoporo wanted changes to the project to make it more appropriate, Canada Fund wanted the project to be identical to their Marine Education Programs in other countries.

- Downsizing of the Public sector to bring public servants numbers to a cost effective size resulted in all the people trained in this area (described above) losing their jobs.

Actions Required

- Re-introduce the coral and fish monitoring surveys of the Tu'anga Taporoporo together with the water quality surveys and stream monitoring programs.
- Re-introduce the marine education program to give the Marine Resources and Tu'anga Taporoporo the avenue to filter information into the schools as well as the general public.
- Specific monitoring programs on the field operations of diving business through regular checking of all the sites used.
- Specific monitoring program on the ornamental fishing business through checking out of all the sites used by the operators.
- Government to find ways to attract back those trained personnel formerly employed by the Tu'anga Taporoporo or those who were trained overseas to take up the planned monitoring programs.

2.4 Degradation of the wetland areas

2.4.1 Rarotonga

For a small island like Rarotonga where land is scarce and the wetlands has the special function of providing a medium for filtering contaminated water, the increasing need to reclaim land either to build on or because wetlands are seen as a nuisance, there is less and less land that will be available to perform this natural function.



Photograph 5. *Floodwaters may remain for days after a flood.*

The situation

Flooding occurs during the wet season (November through to April) of each year. This is a natural occurrence and the debris discharged onto the wetland areas from the sloping lands has caused the natural drainage systems to be blocked and ineffective 61% of the problems on the wetlands are caused through the inability of the drainage systems to cope with the siltation and debris. This affects the settled areas and places where tourism has become a feature. The

presence of large volumes of stagnant water (Photograph 5.0) increases breeding areas for mosquitoes and as the water remains stagnant it becomes unhealthy and smelly until it subsides.

Rarotonga ES data shows that there is the risk of sewage contamination while residential areas are partially under water.

Effects

- Wetlands are perceived as a nuisance and there is a tendency to have them filled up either for construction or just to get rid of the smell. See photograph 6.0;
- There is an increase in the numbers of buildings built on this area in the five years from 1997 to 2001. It is significant to note that wetlands have continued to be altered through the construction of more buildings.
- As with the foreshore areas, a large number of the homes built (87.5%) on the wetlands have concrete floors. This means foundation of structures was either raised above flood water levels or properties were filled. This action caused the streams and drainage to be blocked causing inundation of low-lying areas (as shown in Photograph 5).



Photograph 6. Reclaiming and filling in of a wetland area on Rarotonga.

Past and Present Actions

Land Use Act/Zoning

Land use zoning used overseas is not applicable in the Cook Islands because of the land tenure system, despite various past attempts. The non-applied Land Use Act of 1978 was an example of such an effort. This Act was repealed and its short falls are mentioned in Section 2.3.

Legislative Review and the Conservation Act

The enactment of the Conservation Act 1997-98 and the current Rarotonga Environment Act of 1994-95 is an attempt to mitigate land degradation challenges on Rarotonga, Aitutaki and the Outer Islands.

The Conservation Act 1987-88, which was an effort from the local business community to protect the beaches. It introduced the concept of coastal zone management. It recognized the importance of the wetlands under the definition of “streams” in the Act. Consequently Government, under a FAO soil rehabilitation project in 1992, saw a review of the 1987-88 Act, here also the concept of environmental impact assessment was introduced into the legislation.

For reasons that are, unclear, Government also in 1995 decided to repeal the Conservation Act 1987-88 and replaced it with the Rarotonga Environment Act 1994-95.

Also, Government support to these efforts was not continued because of lack of funds and ability by decision-makers of the time to comprehend the basic environmental principles involved.

Actions Required

- Implement the Environment Council policy for the wetland area. See Appendix III.
- Reactivate the Environment service monitoring programs, which include stream monitoring.
- Improve the environmental education program of the line Ministries to include basic training and awareness programs for politicians.

2.4.2 Outer Islands

The situation

The outer islands of Mangaia, Atiu, Mauke, Rakahanga, Manihiki, Pukapuka and Nassau all have the problem of flooding of the wetlands, however unlike Rarotonga, the most affected lands are those that only have taro plantations on them. On the islands mentioned, other than Rarotonga, there are no housing developments in the wetland areas. The effect is mainly the loss of taro crops. A recent landslide in one of Mangaia's major taro planting valleys has totally destroyed the taro plantations of that village.

The extensive cultivation of the sloping lands, during the pineapple era in Mangaia and Atiu and, in the case of Mauke, during the planting of ginger along with constant burning of fern land escarpments much of the silt that was eroded by surface water runoff blocked the underground water outlets that lead through to the *makatea*. Consequently, the land became harder to cultivate as clay silt made the soil harder to cultivate. Where possible, as with Mangaia, the silt is piled up manually to form the banks of wetland land taro terraces. On Mauke and Atiu, taro patches replace the wetland taro, a way also to improve the soil and drainage and flow of water during times of flooding.

As with Mangaia, Atiu, Mauke and Rarotonga, the Aitutaki wetland areas are also used for the planting of taro. As land development has been mainly banana and root crop planting, the wetland areas have not been affected. However, one of the major developments about to take place on the island, the landfill project, is in the vicinity of the Tautu wetland area. It is understood that during the banana era, Aitutaki growers used to clean their equipment, used for spraying the plantations, in the wetlands and the stream outlet at Nikaupara.

For the Northern Group, the wetland areas of Nassau, Rakahanga, Pukapuka and Manihiki are important for the growing of Taro. Flooding of low-lying islands is through occasional inundation during high seas and the frequent occurrence of cyclones that almost always floods their wetland areas. For Manihiki, the wetlands of Porea and Te Puka are important milkfish breeding areas as well.

Effects

- For the islands of Atiu, Mangaia and Mauke, the extensive cultivation of the sloping lands and burning of fern land escarpments has resulted in much of the silt, that was eroded by surface water runoff, blocking the underground water outlets going through the *makatea*. Photographs 8 below and 9 show a typical pineapple plantation and a classic erosion feature respectively.
- Consequently, the land has become harder to cultivate. Where possible in Mangaia, the silt is being piled up manually to form the banks of wetland taro terraces. On Mauke and Atiu, dry land taro patches replace the wetland taro and this is also a way to improve the soil (refer to Photographs 1 and 7 below).



Photograph 7. Wetland on Atiu with taro plantations.

- Continuing decrease in the population of the outer islands is making it harder to carry out remedial work on the silted up wetland areas used for taro planting. This may have caused the hardship that people are now experiencing with sustaining their staple food, taro.
- It is understood that, during the banana era, Aitutaki growers used to clean their equipment, used for spraying the plantations, in the wetlands and at the stream outlet at Nikaupara.
- For the Northern group islands, like the *makatea* islands, the loss is the taro crops from inundation during high seas and times of flooding.

Past and Present Actions

- The Conservation Act 1987-88, which was effort from the local business community to protect the beaches. This introduced the concept of coastal zone management. It recognized the importance of this area, both economically as well as a buffer area to protect the lands behind it from further degradation. Consequently Government, under a FAO soil rehabilitation project in 1992, saw a review of the 1987-88 Act; the preparation of environmental Plans for Mauke and Aitutaki; and the concept of environmental impact assessment introduced into legislation.
- For reasons that are unclear, Government also in 1995 decided to repeal the Conservation Act 1987-88 and replace it with the Rarotonga Environment Act 1994-95.
- Despite this move, Government still supported the SPREP/UNDP funded capacity building CZM project which saw the preparation and completion of environmental management plans; policy instructions; and proposed Resource Management By-laws for the islands of Aitutaki, Mangaia and Mauke. Penryhn Island, also part of this project, did not want the by-law options completed. This project also introduced the concept of EIA to the outer islands.
- The island environmental plans for Mauke and Mangaia identified the issues of improper land use development and recognized the efforts of the Forestry programs to try to combat soil erosion and reduce soil values.
- However, Government support for these efforts did not continue because of lack of funds and ability by decision-makers of the time to comprehend the basic environmental principles involved.

Actions Required

- Government to look at its social and economic policy with a view to keeping its people in the Cook Islands and in particular the outer islands. Any such move should assist with the maintenance of the wetland areas and sustaining the natural role of the wetlands.

- Enactment of the new national Environment Bill and to apply the appropriate parts to the outer islands.
- In applying the new Act to the outer island, Government must support a full capacity building program for it and not a name only “government attempt”.
- Continuing support by Government of the PICCAP program and vigorous negotiations and lobbying at the international level on Climate change issues.
- Increase and continuing support of the DMU’s CHARM program in respect of the wetland areas of the outer islands.

2.5 Degradation of the sloping lands

2.5.1 Rarotonga

The situation

The increasing pressure on the sloping lands of Rarotonga caused by more developments has resulted in the altering of streams; the increasing need for maintenance of roads and the construction of new roads; the clearing of vegetation; the building of residential houses and septic tanks to dispose and treat human waste and these have all become features of the sloping lands of Rarotonga. The activities described below are the main problem features of these sloping lands.

Water Intake development

Water intake development is the maintenance of access ways; gravel filter system repairs; and the collection of data such as those from rain gauge and water flow meters. These are required to monitor and predict water level or supply changes. Access roads built are also used by tourist operators and the general public causing them to require regular maintenance. However, these maintenance works are not supervised properly.

At times, replacement of filter components is required. This is a normal occurrence where big discharges occur during times of flash floods.

Tourism

With the increasing number of visitors, especially the back-packers type, the cross-island track which goes through the centre of the island; the Takitumu Conservation Area; and Pa’s trekking tours through the various inland tracks provide a busy usage of the sloping lands of Rarotonga.

The most significant of this type of tourist operator is the Raro Mountain Safari Tours. This operation uses vehicles to access the interior of the island, fern lands (forested by the Forestry Program) near the hospital, the eastern heights of the Muri area and the water intakes of Wigmore falls as the outstandingly used sites. The tracks used by the Raro Mountain Safari Tours are heavily eroded and have exposed erosion prone soils. Unsupervised maintenance work has been done which has caused more erosion especially from surface water runoff.

Agriculture

The use by local people of this area is mostly limited to planting in the lower foothills. As a result of the development of water intakes a large part of the wetland taro area has been abandoned in the valleys of Rarotonga where streambeds have dried up.

Along the foothills agricultural activities are very common and cover a wide range of cropping from shallow root cropping of *taro*, *tarua*, and *maniota* to fruit cropping of bananas and, coconut as well as other fruit trees such as oranges, lime, *nono* and mangoes. At places, and very regularly, short-term crops such as vegetables are planted.

Clearing of land for agricultural purposes involves the use of tractors to cut and slash and then plough to obtain the right soil texture for planting. Normally this is carried out down slope and is not done by contour ploughing. However, by observation, more lands are being prepared in the above mentioned way on the lower foothills for *nono* planting.

In the development of properties on the slope lands, especially on the lower foothills, many access ways had to be put in place for the electrical power supply, water and telephone networks so that they could reach homes and other properties.

Also, Government, during the development of its water intakes, has put in roads that have to be regularly maintained to allow the regular servicing of those intakes.

Transportation services

Landowners have privately developed much of the transportation network other than those parts that were developed by Government to access water intakes. Government has assisted in the improvement of roads to privately owned properties where at least ten requests were received or else after an area had been developed. Once at least ten landowners have applied for transportation services, Government will develop and maintain those services. This is a common policy for both the electrical and telecom services. For telephone services trenching is usually carried out privately with cables provided by telecom Cook Islands.

During the repair work by Water works much unearthing is carried out to allow water supply pipes to be installed. Normally the trench is dug at approximately one meter deep and 0.6 meters wide. For each trench, 0.1 meter of sand is used to buffer the cable from gravel that may damage the cable and pipes when covered. Because of the scarcity of coral sand other alternatives to sand have been investigated, but so far the options have been found to be too expensive to use.

Property development

Although expensive to develop, and besides the foreshore lands which are considered the prime land, sloping lands have proven to be one of the most attractive areas on the island of Rarotonga. The scenic views, whether ocean or forested peaks or valleys, have attracted people to live on the sloping lands.

Over the past five years, 21 acres of sloping lands have been subjected to some kind of development. Despite the difficulty in accessing and building in this area, Building Controller's figures show that 57% of buildings constructed have concrete foundations and floor. The other 43% were constructed with wooden floors on poles. Over the last five years however there has been an increase in the number of houses built with wooden floors².

Overall building Permits granted from 1997 to 2001 show 14.1% were given for the construction of buildings on the sloping lands. This is a very significant figure for an environmentally sensitive area. There has been an increase in the number of constructions, between 1997 and the year ending 2001, for commercial purposes.

During this interval also there has been an increase in the number of buildings constructed. This has picked up in 1999. There is speculation that this trend is mainly due to mortgage sales of properties to foreigners who have bought homes and have invested in business ventures, particularly in the tourism industry.

It is worth mentioning here that for each new house, and most extensions in the sloping lands area, a septic tank was also constructed. The Public Health Department now recommends the three-chamber septic tank.

Effects

- There is an increasing need for maintenance of roads and the construction of new roads, more clearing of vegetation, the building of residential houses and septic tanks to dispose and treat human waste as well as more erosion through surface runoff.
- There is increased siltation of the wetland areas causing the problems mentioned above.

² Building Inspector Files.

Past and Present Actions

Land Use Act/Zoning

- Land use zoning in the sense used overseas is not applicable in the Cook Islands, despite various past attempts, because of the land tenure system. The non-applied Land Use Act of 1978 was an example of such an effort. This Act was mentioned in section 2.3.

Legislative Review and the Conservation Act

- The enactment of the Conservation Act 1997-98 and the current Rarotonga Environment Act of 1994-95 is an attempt to mitigate land degradation problems on the sloping lands of Rarotonga.
- Tu'anga Taporoporo's Compliance Division, supported by its Education and awareness program, have caused most of the landowners on the sloping lands to address the problems of developing sloping land through the use of engineers and ensuring that activities are done according to approved plans. This has become a major feature for developers in the slope land areas. Data from the Environment Service shows about 60% of the engineering reports, prepared between 1997 and 2001, were required to address the issues of construction of roads and access-ways; retaining walls; construction of buildings; the clearing of drainage systems; and the clearing of vegetation.
- Property development activities have become a major feature on the north and eastern side of Rarotonga. Most development taking place in these areas are subjected to, either a requirement for a project permit, or consent from the Environment Council. In both cases, a project permit could be required with an EIA, or an engineering report, being submitted to the Council.
- MoW has provided local services, and also machinery, to clear debris from blocked streams especially during flash flood times.
- MoW has also provided their machinery, and experienced field managers, for the implementation of road and stream maintenance programs required by the Vaka Councils.
- The Public Health Department, on the issue of sloping lands, apart from enforcing its septic tank policy, does very little else.
- In the case of the Ministry of Agriculture, problems resulting from agricultural practices and trimming of vegetation have not been dealt with much. Despite the fact that these activities do impact on the environment in a collective manner, landowners are pretty much left to do what they want.
- In the case of herbicides the safety precautions, especially in regards to people spraying crops and weeds, are totally ignored. The general public is not even considered at all by users. The spraying often takes place while children or older people are still in the area on public roads. The attitude at present is that the chemicals must be completely safe because they have not been made illegal and have been sold and used for many years. No one seems to be interested in checking!
- The Ministry of Education does not focus on the sloping areas of the Cook Islands but instead the areas of the environment generally in the Social Studies, Science and Maori curriculum programs. It covers the basic principles of soil formation, erosion and other areas but not specifically the sloping lands area. In the social studies curriculum, students are often required to do projects about how the local people use their lands.
- In regard to Environmental NGOs, the Takitumu Conservation Area (TCA) is the only organisation that is involved directly in the area of sloping lands issues. Being responsible for the management of the Kakerori reserve, TCA has promoted the protection of sloping lands, especially the water catchment area and the interior of the island, through the implementation of proper trekking methods and track maintenance. In the construction of its park buildings all of the processes of approval were followed.
- Although not an environmental NGO, the Aronga Mana has expressed, through the House of Ariki and the Koutu Nui, their concerns on land issues.
- Also Island Friends, a private company registered with the Environment Service, have published children's books, colouring books and cards in an effort to promote appreciation of the local environment.

Actions Required

- To implement the Environment Council policy for the sloping lands area. See Appendix iii.
- To reactivate the Environment service monitoring programs, which includes stream monitoring.
- To re-investigate the status of the forestry program with a view to determining its impact on the sloping lands planted, the future of the forests and how best to utilize that resource.

2.5.2 Outer Islands

The situation

For the islands of Atiu and Mangaia, soil erosion began during the pineapple planting time of the early 70s.

Extensive erosion of the sloping lands has a drastic effect on the wetland taro planting areas of Mangaia and Atiu. This is made worse with the frequent burning of the fernlands in these islands. Siltation is a major problem as more and more sloping lands are opened up by fire.

For Aitutaki, the bulldozing of topsoil is one of the outcomes of heavy machinery use, which has also become a feature of those other outer islands closer to Rarotonga. There is no proper training for operators except to get the work done and have all the vegetation cleared so that planting can begin.

Consequently, growers have used a lot of fertilizers to assist the speedy growth of their crops and to be ready for the forecasted harvest times.

Effects

Through the extensive cultivation of the sloping lands, during the pineapple era for Mangaia and Atiu, and for Mauke during the planting of ginger with the constant burning of fern land escarpments has resulted in, much silt being eroded by surface water runoff which has blocked the underground water outlets through the makatea. Photographs 8 below and 9 shows a typical pineapple plantation and a classic erosion feature respectively.



Photograph 8. *A typical pineapple land on the interior of the makatea islands of Atiu and Mangaia.*



Photograph 9. *Now a typical feature on Atiu and Mangaia.*

Past and Present Actions

The Conservation Act 1987-88, which was an effort from the local business community to protect the beaches, introduced the concept of coastal zone management. It recognizes the importance of this area both economically as well as to protect the lands behind it from further degradation. Consequently Government, under a FAO soil rehabilitation project in 1992, saw a review of the 1987-88 Act; the preparation of environmental Plans for Mauke and Aitutaki; and the concept of environmental impact assessment being introduced into legislation.

For reasons that are, unclear, Government also in 1995 decided to repeal the Conservation Act 1987-88 and replaced it with the Rarotonga Environment Act 1994-95. Despite this move, Government still supported the SPREP/UNDP funded capacity building Coastal Zone Management project which saw the preparation and completion of environmental management plans; policy instructions; and proposed Resource Management By-laws for the islands of Aitutaki, Mangaia and Mauke. Penryhn Island, also part of this project, did not want the by-law options completed. This project also introduced the concept of EIA to the outer islands.

The island environmental plans for Mauke and Mangaia identified the issues of improper land use development and recognized the efforts of the Forestry programs to combat soil erosion and reduced soil values.

However, Government support for these efforts was not continued because of lack of funds and ability by decision-makers of the time to comprehend the basic environmental principles involved.

Forestry program

The purpose and goals of the planted forest plantations were to: counter soil erosion resulting from the pineapple production days in Mangaia and Atiu; protect critical island watersheds; and to establish forest resources on existing low value coastal forest areas.

Species grown were *pinus caribaea* and *accacia mangium*. The Mangaia plantations are approximately 1000 hectares while Atiu and Mauke have 300 and 18 hectares of plantation areas respectively³.

Following the downsizing of the public sector in 1996, forestry maintenance (after their establishment in the early 90s) suffered through the lack of funds for further project development, training, minimal capacity of local specialists and also the lack of research capacity.

³ Helen Wong's draft WSSD report

To add to the above, there are continued unacceptable practices still on going, such as the burning of *makatea* areas and plantation forests, as well as inappropriate land preparation methods.

The purpose and goals of the use of natural resources is to establish forest plantations to counter soil erosion resulting from pineapple production days in Mangaia and Atiu. Another purpose is to protect critical island watersheds as well as to establish forest resources on existing low value coastal forest areas.

Evidence of soil erosion and land degradation is found in both Mangaia and Atiu following failed forestry initiatives but particularly through the lack of funds for further project development, training, and the minimal capacity of local specialists. The research capacity is also not available.

To add to the above, there are continued unacceptable practices still on going such as the burning of *makatea* areas and plantation forests and inappropriate land preparation methods being carried out.

Required Action

- To re-investigate the status of the forestry program with a view to determining impact on the sloping lands planted, the water catchment involved, the future of the forests and how best to utilize that resource.
- Where problems have arisen, such as the experience of Mangaia, mitigating measures must be put in place with the assistance of donor agencies or countries involved in the establishment of those forests.
- The enactment of the new national Environment Bill and to apply its appropriate parts to the outer islands.
- To consider the application of appropriate parts of the Rarotonga Environment Council Policy on sloping lands of the outer islands.

2.6 Protected areas development

2.6.1 Land Protected Areas

The situation

On the national scale Suvarrow Atoll, is the only national park of the Cook Islands, established initially to prevent the introduction of pests into the Cook Islands and now it is recognized bird sanctuary. Various Government and private proposals have been heard through Government, especially the Prime Minister's Office, for the development of the National Park. Takutea, Manuae, Pukapuka and Nassau are the other three protected areas under customary land laws.

Effects

- Government's focus on a possible money source system as opposed to recognizing the natural value of the Suvarrow National Park has created a situation of negative feeling from the people of the Cook Islands. Consequently various proposals from the Community came forward and one of the most common is the proposal for the Park to be managed by an independent authority. This report's Consultant understands from Crown Law that the legal status of Suvarrow remains as from before the repealing of the 1987/88 Conservation Act unless an Act of Parliament revokes that position. In the absence of an Act revoking that status the Park remains under the Rarotonga Environment Council which shall manage the Park according to the management goal and policies approved by Cabinet (CM (5910) 1978) and these form the basis from which the Park has been administered and managed.

- The establishment of protected areas on land for conservation purposes has not been a feature of the Cook Islands for at least the past twenty years. For Rarotonga, the land tenure system and the small areas of land available seem to be the reason. Despite the need to protect the water catchment areas, there is instead, an increase in the use of the interior or water catchment areas to cater to tourism activities. Tour operators are now expanding their tour routes assisted by Government. In the current financial year, the Government provided around \$50,000.00 of the Environmental Protection Fund to improve the inland roads and tracks of the island of Rarotonga, primarily for tourism purpose. This allows vehicle tours to access the interior and hilltops to get at the highly valued scenic areas of the island by vehicle rather than on foot. No EIA was carried out on this project.
- On Rarotonga, the Kakerori Reserve has not been established as a legal reserve despite the extensive work by the ES to establish the research and promotion of the reserve. Assistance under the South Pacific Biodiversity and Conservation Area Program (SPBCP) allowed commercial activities to take place under the management of the Landowners themselves. The Takitumu Conservation Area as it is known, has not progressed into the next stage of being self-sustaining. Currently, there are moves to ask for Government assistance. In its endeavors, the TCA has re-located a number of the Rarotonga Flycatcher to the island of Atiu.
- With the reduced population and commercial activities in the outer islands which has meant that the resources on the environmentally sensitive areas such as the *makatea* land, the fern lands (now under pine forest), the foreshore, wetland areas, sloping land areas and the water catchment areas are not under threat. For the islands of Manihiki, Rakahanga and Penryhn the ra'ui lands (coconut lands) reinforced during the copra era continue to be recognized but its rules not strictly complied with. Other resources such as timber, coconut crabs and birds are harvested by some people.
- Pukapuka and Nassau on the other hand have always remained active in their traditional resource management system of ra'ui on the land. The whole island is referred to as a protected area. Plant and edible animal resources are protected and managed according to the rules of the ra'ui.

Past Actions

Suvarrow Atoll National Park

Establishment of the Suvarrow Atoll National Park in 1978 and the preparation of a management plan in 1991.

Public opposition to private and foreign development proposals for Suvarrow Atoll's marine resources during public meetings on Rarotonga that took place in the year 2000. Also there was a proposal by environmental NGOs to have the Park managed by an independent Authority. The construction of a cyclone Micro-shelter on Suvarrow for the caretaker is a move to creating an opportunity to have more permanent resident periods for the caretaker.

Rarotonga

There has been no progress in this area despite the need to protect the water catchment area, the Kakerori Reserve as well as the inland sloping lands from degradation.

Past work of the Environment Service (Rarotonga Environment Act), Public Health Department (Septic Tank Regulation) and the MoW (Building Code) includes ensuring that the effects of developmental projects, that might hinder potential protected areas, are managed.

Other Islands

Nil.

Actions Required

- For Government to retain management of the Suvarrow National Park under the administration and management of the Tu'anga Taporoporo.

- A management group must be set up to assist the Tu'anga Taporoporo in the management of the National Park. Membership should include a representative each of the environmental NGOs, the Northern Group people and the Southern Group people.
- To declare and manage the water catchment area of Rarotonga as a Water Catchment Reserve.
- To re-evaluate the Kakerori Reserve (now TCA) for the further consolidation of its status as well as to ensure its sustainable nature.
- To develop a program for selecting areas to establish a national system of community-based protected areas to protect important terrestrial ecosystems.
- Recognition must be given to Pukapuka and Nassau environmental resource conservation practices with a view to have the practice applied to the rest of the Cook Islands.
- Capacity building (to allow for the protection of environmentally sensitive areas) for the Tu'anga Taporoporo, Department of Health and MoW's compliance divisions and their counterparts in the outer islands.

2.6.2 Marine Protected Areas (MPA)

The situation

MPA have been a feature of the islands of Rarotonga and Aitutaki since 1998. In 1998 the Aronga Mana established five marine *ra'ui* areas on Rarotonga. By the year 2000 two more were established. Marine baseline studies were carried out by MMR prior to the *ra'ui* areas being established. Ministry of Marine Resources (MMR) also established a two yearly monitoring program for the areas.

No information was available to the Consultant of this report on the newer marine protected areas on Aitutaki. The Ootu Reserve continues to be abused by the Island Council through dredging of the marshlands for road works. Recently, the Aitutaki Airport extension project, which did not have an EIA of the project carried out has completely felled all the vegetation around the reserve without any proposal or approved guidelines in regards to the future of the reserve.

MPA are not a feature of the islands of the northern Group as there has been no need for it. For the islands of Atiu and Mangaia there were proposals to *ra'ui* sections of the reef to allow paua stocks to improve. On Mauke, the paua is on a *ra'ui* system where harvesting is carried out every three years. The trochus, a commercial stock, on Aitutaki is another species protected under the *ra'ui* system.

Effects

- For Rarotonga and Aitutaki the *ra'ui* areas established have become an attraction and an added advantage for the tourist industry. For Rarotonga, this has also enhanced the value of the already popular (with investors) eastern and southern coastal properties of Rarotonga. In another way, however, the *ra'ui* areas have placed this part of the island under extreme pressure. More and more buildings are now being constructed in this area and most tourists is attracted to the beaches on this side of the island.
- Controlled harvesting of trochus and paua allows respective islands to sustain supplies and to benefit from this type of management practice.
- The lack of recognition by the current Island Council of Aitutaki of the work of previous Island Councils on Ootu is a cause for concern.

Past Actions

- Declaration and the establishment of the Ootu Reserve on Aitutaki in 1988.
- A *ra'ui* area on the Rarotonga, Mauke and Aitutaki designed to help trochus stock replenishment.

Actions Required

- To develop a program for selecting areas to establish a national system of community-based protected areas to protect important reef and lagoon ecosystems.

- More awareness raising is required, through the schools, on the importance of ra'ui and the current efforts by the Rarotonga Aronga Mana and the people of Aitutaki.

2.7 Lack of Awareness

2.7.1 Government Agents

The situation

The preparing of educational materials for schools and the communicating of messages to the general public is an expensive process. Despite the need for people to fully understand the laws for protecting environmentally sensitive areas such as the *makatea*; fern lands (now under pine forest); foreshore; sloping lands and the wetlands, budgetary allocations from Government agents have been inadequate. This was the message from the Ministries of Education and Public Health as well as the ES during the WSSD workshop held in April 2002.

In the formal education system, it is not enough to slot a large amount of information into the top-level classes for their curriculum materials on local environment. This has to be developed in a way that starts when young children start to go to school and the information is absorbed gradually until they reach the end of the secondary school level.

In response, Ministries like the Public Health have used other means, such as increasing staff, and involving staff from other areas, to “preach” the importance of following guidelines and laws on environmental health.

The ES on the other hand has started to re-develop its former link with the Ministry of Education in the year 2000 in an attempt to re-start and continue the development of curriculum materials for schools. However this has been re-directed to other areas such as the media due to environmental NGO outcry on matters such as the Draft Environment Act.

It is observed that, in regards to most issues, awareness has been more of a response to complaints rather than a planned activity to ensure that information is passed on in an organised manner thereby developing a proper transfer of knowledge, rather than emotions, caused by media or personal gossip.

Public awareness and education has been a focus for the Tu'anga Taporoporo since its inception in 1987. Focus has been on the media using radio and television spots, documentaries and news articles.

It has been expressed by MoW Head⁴ as well as Building Inspectors, that awareness-creating activities are very important so that people are aware for them, of their requirements of the Building Code. However, since MoW is always known to build infrastructure and have the image of road gangs and machinery, a process of communicating these guidelines and laws has become almost non-existent. Builders and Engineers are the only people that make it their business to know about the appropriate laws and guidelines and even they themselves have some problems with working with the laws.

The experience with the waste management program consultation process has been an excellent opportunity according to MoW Head to show the public that there is a need for the Officers of the Department to explain why things are done the way that they are. Again, like with the other Government Agents, budgetary allocation to establish an information-clearing house was not a priority.

The Ministry of Education policy does not specifically focus on environmentally sensitive areas but covers a broad area of the environment in its Social Studies, Science and Maori curriculum programs.

⁴ Mr. Atatoa Herman

The Public Health Department covers a wide range of areas in its education and public awareness program. Much of this education is carried through the Public Health Tutaka program, school visits, three-page information handouts on septic tanks regulation, and the approval process for the construction of septic tanks

The Ministry of Agriculture provides advice on crop production and land preparation through their research facilities at Totokoitu as well as through field visits.

Effects

- Environmental degradation in the key areas mentioned in this report still continues. The public still goes and sees the Minister for Environment or Works to have their ventures bypass the Department's guidelines. The Tutaka program continues despite a number of years without being updated. People still repeat the same often damaging practices and will probably continue.

Past and Present Actions

- The issues discussed above (the situation) are based on past actions.

Actions Required

Government Policy

- The realignment of Government Budget Policy reflecting the need to support Ministries that have a statutory function to protect the environment.
- For Ministers and Members of Parliament to be made to understand the importance of educating the general public on environmental laws and how that action, i.e. promoting laws, can benefit the country and achieve sustainable development.
- Capacity building within Ministries, to up-skill or develop a team of educators, aimed at ensuring people that do understand the laws and prescribed guidelines of those Ministries.

Formal Education

- Improved information-communications technology for better networking and access to research and specialist information.
- The development of distance learning programmes for senior secondary students, especially in the outer islands.
- To develop curricula for appropriate and specific environment fields such as: marine studies, sanitary health, landforms and land uses.

Human Resources development

- To strengthen technical, vocational education and training (TVET) in the Cook Islands.
- To facilitate discussions and identify mechanisms for the pooling of resources as well as working together in partnerships to strengthen and enhance skills training in protected areas management and environmental law enforcement on each island.
- To encourage, between Ministries with a regulatory function aimed at improving the environment, cost sharing initiatives and cost sharing measures where necessary.

2.7.2 Environmental Non Governmental Organizations

The situation

Since 1992 four environmental NGOs have formed and six private environmental consultants or consulting firms have formed.

Where it is required, private consultants do undertake public awareness activities through public meetings required under the EIA process. However, this is more a requirement and not a voluntary part of their functions. With the exception of Island Friends Ltd, the other five private consulting firms are involved only with consultancy work for Government and private clients and they do not tend to get involved with raising environmental awareness or with

environmental education. Island Friends has published environmental education messages information in the form of children's books, colouring books and colouring cards set specifically in the Cook Islands.

Environmental NGOs on the other hand are mainly involved with awareness raising and assisting Government or other organisations in their work programs. Environmental NGOs also act as watchdogs to ensure that Government is in line with its policies for protecting the environment. The four Environmental NGOs in the Cook Islands are, the Takitumu Conservation Area Program (TCA), Rarotonga Environmental Awareness Program (REAP), Taporoporonga Ipukarea Society (TIS) and the World Wide Fund for Nature (WWF).

Effects

- REAP, behind the free 'Viewpoint' Newspaper, have used the media extensively however, through their lack of background and expertise they have caused 'mob-thinking' amongst people rather than assisting with the issues of the environment. This action roped in the Aronga Mana of Rarotonga, lawyers, mayors and foreigners. This is illustrated effectively with their interference with the current National Environment Bill where they were unable to give coherent reasons in the media, as well as in the Parliamentary Select Committee Hearing, for their objections.
- TCA has opened its gates to school groups and other people, from uniformed organisations to individuals, who are interested in nature appreciation. However, as with most efforts of this kind, to measure their effectiveness is very difficult.
- TIS have continued with their efforts to promote the concepts of the TTT project, which is to re-use and to recycle. This project has complemented the work of the ES and the newly established Rarotonga Recycling Centre.
- WWF has continued its role to facilitate community projects by encouraging community groups to undertake conservation projects. Their efforts assisted in the marine ra'ui areas around Rarotonga and the publishing of the arapo calendar for the Koutu Nui. Their recent undertaking saw the Mitiaro people carry out conservation work on their coconut crabs.

Past Actions

- The Aronga Mana, in the form of the House of Ariki and Koutu Nui, have made public statements on issues but no attempt as yet has been made to measure the effectiveness of responses.
- With the exception of the TCA, REAP is the only other Environmental NGO that has negotiated extensively with private businesses and AID organisations to finance itself and the production of informational materials that are used by schools and the public.
- WWF has expanded its partnership work program to Mitiaro to encourage the people to protect their coconut crabs. Previously the WWF program had published a calendar promoting the efforts of the Rarotonga Aronga Mana in establishing the marine ra'ui around Rarotonga.
- TIS has focused its efforts in the past on waste management issues in an attempt to promote waste reduction.

Actions Required

The tripartite partnership between Government, Business and environmental NGOs be strengthened through:

- Sharing of information;
- Equal and active participation in decision-making;
- Equal recognition without political biases and disparities;
- Stakeholders should work together in cooperation for the greater good of the community;
- Training and education of stakeholders; and
- Environmental NGO administrators must be trained in basic environmental principles and practices appropriate to the Cook Islands to minimise their lack of

understanding of basic environmental principals that they need to understand especially when communicating messages and making project evaluations.

2.8 Climate variations

2.8.1 The situation

The Cook Islands is characterised by small islands scattered in a large ocean and most of the islands are low lying. The weather in the Cook Islands is very dependent on the SPCZ that is in turn very influenced by regional and global weather patterns. An abnormal SPCZ situation results in the hydrological cycle being affected.

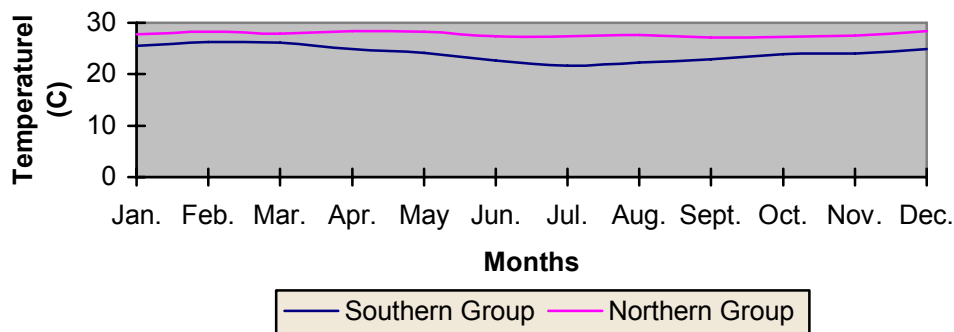
The climate of the Cook Islands is typical of a tropical maritime climate. Despite the high average relative humidity, around 84%, the climate is pleasant and warm. Temperature ranges for the Northern Group is fairly uniform (Figure 1). For the Southern Group however, there is some variation in temperatures and rainfall patterns.

The SPCZ

The South Pacific Convergence Zone (SPCZ) and its movement between the Northern and Southern Groups is an important phenomena for influencing the weather patterns of the Cook Islands⁵. The SPCZ is a convergence zone of air between the equatorial easterly winds and the southeasterly trade winds. The SPCZ varies from month to month, and the weather in the Southern Group is largely dependent on its position and intensity.

Usually the SPCZ lies over the Southern Group during the months November to April. It brings high humidity and heavy rains. At this time the Northern Group will experience dry, hot weather. From May to October the SPCZ moves to lie over the Northern Group taking the unsettled rainy weather to the Northern Group meanwhile the Southern Group will be experiencing its dry season. See Figure 2 below.

Figure 1.0: Monthly average temperature for the Cook Islands (Source: Thompson Report)



Tropical Cyclones

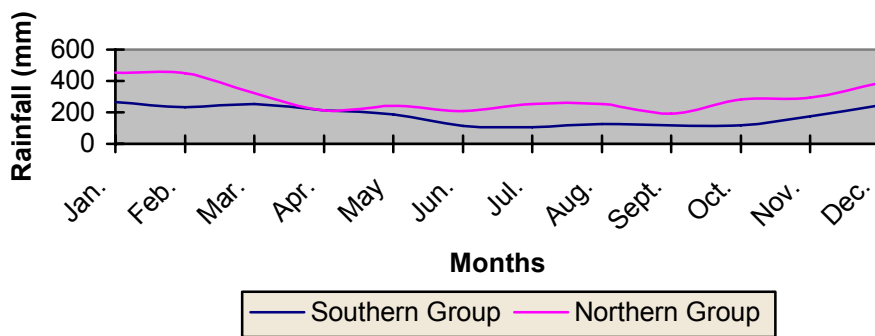
The formation of tropical cyclones during the wet season is a major climatic feature of the Southern Group. These tropical cyclones develop in low-pressure troughs on the SPCZ during the warmer months of the year. Tropical cyclones are a major climatic feature of the tropics, however they seldom affect the Northern Cook Islands. Between 1940 and 1997 there were 13 reported cases of tropical cyclones in the area and only four of these resulted in damage to the atolls⁶.

Cyclone “Martin”, of November 1997, however, affected Manihiki and directly caused the death of 11 people. The last major cyclone before “Martin” was “Sally” in 1987, which affected and caused damage to the Southern Group islands.

⁵ Thompson, C.S (1986).

⁶ Including the 11 stated by Thompson, C.S. (1986).

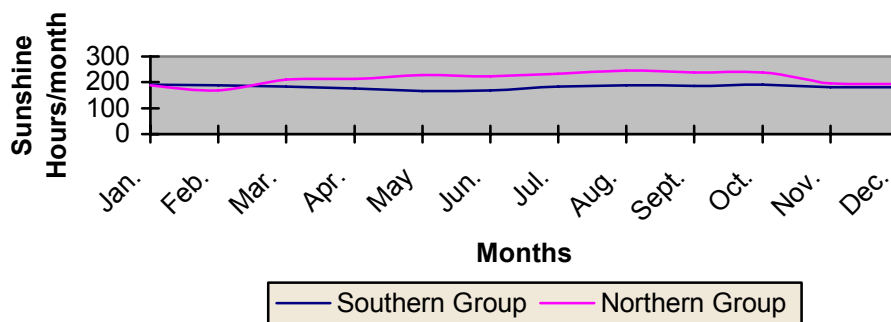
Figure 2.0: Monthly average rainfall for the Cook Islands (Source: Thompson Report)



The movement of the SPCZ causes variation in the number of sunshine hours experienced by both the Northern and Southern Groups. See Figure 3.

Sunshine hours are highlighted in the Southern Groups during the hurricane season (October to April). For the Northern Group sunshine hours are highest during their dry season (April to October) months.

Figure 3.0: Monthly average sunshine hours for the Cook Islands (Source: Thompson Report)



El Nino and the SOI

El Nino (unusually low rainfall) and la Nina (unusually high rainfall) are significant weather events to the Cook Islands. Long El Nino spells were recorded in the 1982/83, 1986/87, 1991/1995 and the 1997/98 dry seasons. Currently a weak El Nino is forecasted for the Southern Group till the end of February 2003.

This very important occurrence is measured and identified using the Southern Oscillation Index (SOI). The SOI is the difference between the atmospheric pressure of two points, Darwin in the east and Tahiti in the west. For each season the SOI fluctuates between a plus or minus on a scale of 10. If during a season the SOI remains in the negative, we can expect to experience dry spells. And if the SOI remains positive, we can expect to experience wet weather, particularly in the Southern Group.

The cause of this fluctuation in the SOI is unknown but is suspected to be associated with the global change in climate.

Effects

Physical and living environment

The protection and preservation of the Cook Islands environment (physical environment and biodiversity) is vital to the existence of the people of the Cook Islands. The linkages in the physical and living environment that compliments their existence must be preserved.

Although more than 70% of the lands of the Cook Islands are currently unaffected by human activities within the Cook Islands, the preservation of this portion of lands is vital in sustaining linkages.

For example, crabs (some species) live in the *makatea* under the cover of the *makatea* vegetation; when it is *mārangī*, they migrate to the coast to spawn. The lagoon and reef fishes come closer to feed on the millions of young crab hatchlings. People catch the fish for their families or sell them and contribute to the money system.

Another example of this linkage is a coastal feature of some of the Northern Group atolls, the beach rock. The beach rock provides protection for the underground waters reservoirs that sustain the existence of people on those islands. Increased erosion due to climate change will be accelerated beyond a rate that the beach rock forming processes will be able to cope with. A catastrophic event could cause this linkage to be affected.

Another example is that, there is so much not known about the flora and fauna of the Cook Islands other than their physical appearance. These are species that have developed in the tropical environment and have remained this way for a long time. A change in the weather pattern which results in the La Nina effect in the Northern Group will certainly affect the flora and fauna on those islands. Not enough is known about these species to enable us to know about changes to them. On Nassau Island, the people have expressed that they have to weed now more than any living person can remember.

The increasing number of dengue fever cases from a particular species of mosquitoes or the decreasing cases of ringworm or tinea are other examples of the challenges caused by climatic variations.

Recent monitoring results by the Ministry of Marine Resources on the ra'ui areas of Rarotonga using invertebrate show an increase in the various sea cucumber species. As benthic dwellers, feeding on sandy bottom lagoons, there is implication that the lagoon area covered with sand has increased.

Past and Present Actions

- Certain activities have been taken on, during the last five years, which are aimed at data collection to improve weather forecasting to enable people to be more prepared. Such activities include tidal station upgrade, traditional knowledge collection and the making available of data that was already collected.
- There are also the specific programs that were established to address the effects of Climate Change and to prepare the people in the case of catastrophic events. These are the PICCAP and the DMU's CHARM programmes.

PICCAP

The Pacific Islands Climate Change Assistance Program (PICCAP) is a regional project managed by SPREP, and responds to the commitments made by Parties to the United Nations Framework Convention for Climate Change (UNFCCC). The project ended in June 2002 and efforts are being made for Add-on activities such as the two-year Adaptation project for Aitutaki, and the Capacity Development Initiative (CDI).

The Cook Islands is a member of the Alliance of Small Island States that recognise the special situation of Small Island Developing States (SIDS). The Cook Islands also signed the United Nations Framework Convention 1992 and has also ratified the Kyoto Protocol in the year 2001.

The implementation of the PICCAP Project marked the start of climate change information dissemination activities in the Cook Islands initiated by the creation of a multi-disciplinary group to be part of the Climate Change Country Team. Other activities under the project were the implementation of national vulnerability assessments and national greenhouse gas inventory as well as the drafting of the 1st national report to the UNFCCC. Priority areas identified were:

- Institutional arrangements so that the project can proceed in its implementation,
- The need for assessment to identify training needs, and
- Skills development and policy development.

Island specific vulnerability assessments are targeted for Mangaia, Penryhn and Aitutaki. A community-based adaptation project will be starting in Aitutaki in the year 2003.

Further actions required include the implementation of the adaptation initiative to be integrated across all sectors such as the environment sector; marine resources (coral bleaching); agriculture (drought resistant crops); water (water storage) and biodiversity (habitat loss); social sector under health (dengue fever) as well as education (capacity building); and/or the economic sector, specifically energy and tourism (coastal infrastructure). Greenhouse gas (GHG) inventories include the 1st national GHG inventory submitted to UNFCCC 1999; the Pacific Islands Renewable Energy Project (PIREP); and the GEF which are all medium size projects. Further actions required would include GHG inventories to become institutionalised in the statistics office, energy office, as well as the transport, and agriculture Ministries. In addition to the above, the use of renewable energy as a tool for sustainable development should also be institutionalised.

Island Vulnerability Risk Management

The Disaster Management Unit (DMU) is adapting a comprehensive hazard and risk management (CHARM) tool or process within the context of an integrated national development planning process in the Cook Islands. A SOPAC regional adaptation initiative is based on recognized standards and provides a consistent approach to risk management across the region.

This system recognizes the isolation factor of the Outer islands being scattered around an ocean space of around 1.8 million square kilometers where transportation limitations are just some of the factors highlighting the small island's vulnerability to disaster risk.

The approach to disaster management has shifted focus from recovery and response to preparedness and risk reduction.

The attributes of CHARM are the following:

- It is linked to national development planning (social, economic, and infrastructure);
- It assists in establishing and prioritising development activities;
- It targets the management of both current and future risks;
- It creates an environment for enhanced collaboration at a national and regional level; and
- It creates a program for environmental management that maximises the use of available resources and minimises duplication.

Actions Required

Island's Vulnerability and Risk Management

- Gaining commitment by national government to strengthen disaster reduction and risk management capabilities.
- Linking disaster reduction and risk management activities to national development planning.
- Recognition that the initial cost of prevention is an investment towards medium to long-term economic savings.
- Improving current disaster management planning arrangements.
- Strengthening the current National Disaster Management Organisation (NDMO) capabilities through the allocation of increased resources.
- Improving existing or introducing new legislation.
- Locating the NDMO in an appropriate Ministry.

- Building a case for donors' support to implement national risk reduction strategies.

PICCAP

- The institutionalisation of climate change as part of the Government Process.
- Institutionalisation of a Climate Change Country Team as part of the National Environment /Sustainable Development Task Force.
- The development of a Climate Change policy, a National Implementation Strategy and capacity building initiative.
- To increase community awareness.
- Begin data collection and analysis for vulnerability assessments.
- Implement capacity building.

Climate Change issues to be recognized and, where possible, addressed

- The Cook Islands are small islands with large oceans barely 5 metres above the mean sea-level; issues in this area includes Hydrological cycle; variability of rainfall; El Nino/Southern Oscillation Cycle; Severe weather phenomenon; traditional knowledge and data availability.
- Identified need to document traditional knowledge in the local language that is unique or specific to each island as well as observable phenomenon to be used to foretell changes in weather conditions.
- Issues identified: monitoring; early warning; international property rights; action plans for disaster reduction; sustainable technology; database for economic development; and efficiency.
- Capacity Building: summarise existing capacity i.e. professional staff; restricted skills; technology i.e. communications; prediction models; too modernised for SIS initiatives: standardisation required.
- Education and Awareness: integration with other government departments; incorporate into the education system; media coverage if available private sector contribution; document historical events; community participation; government support.
- Attention Areas: the present monopolistic approach; budgetary constraints; non-core service of a ministry; to cover land, ocean and atmosphere; public awareness; language constraints.

2.9 Lack of Environmental Monitoring

2.9.1 The situation

There is no regular monitoring of natural environmental indicators in the Cook Islands. There is also no monitoring of the effect of socio-economic activities on the natural environment of the Cook Islands. Tourism, the number one industry of the Cook Islands, has grown in nominal terms from \$20million in 1997 to over \$81million in 2000, causing an annual visitor numbers average of 60,000 visitors a year.

The pearl industry of the Northern Group, the second most important industry of the Cook Islands contributed NZ\$14.5million in exports representing 90% of total value of exports for the year 2001.

Unlike the tourism and pearl industries, agricultural production on the other hand has declined in the last ten years. There are three main export products from the Cook Islands with the *nono* (*Morianda citrifolia*) being the latest income crop trend and having expanded to being harvested also from the outer island's naturally grown stocks. Papaw exports in 2000 brought in NZD350, 000 compared to a peak of NZD1.5 million in 1993. *Maire* (*Alyxia elliptica*) exports to Hawaii continue though production has dropped to less than NZD50, 000.00 in 2000 compared to NZD200, 000.00 in 1994. *Maire* export has expanded from Mauke to include Mangaia and Mitiaro.

Approximately NZD20million worth of fresh and processed foodstuff is imported into the Cook Islands annually. Also, about 2 tons of fruit and vegetables are imported from New Zealand on a weekly basis⁷.

With the current revenues earned from Tourism and Pearl development, there is no environmental monitoring in place to ensure the sustainable development of the two industries. Government's efforts are focused on how much money is earned and how much more these industries can earn. Public Health staff for monitoring the performances of septic tank regulations in the Cook Islands is missing. Building control inspectors and their support capabilities have been reduced. The Water Supply Division has a limited portable laboratory capability and a maintenance budget for the Cook Islands of NZD20, 000.00 for the current financial year. The ES has no environmental indicator-monitoring budget with only two staff in the Compliance Division and no staff at all in the outer islands. The Ministry of Marine Resources monitoring capabilities in the Northern Group's pearl producing islands has been lacking, especially after the establishment of the marine lab in Penryhn in the early 1990s and the ADB funded lagoon water quality monitoring project for Manihiki in the mid 1990s.

The Ministry of Agriculture on the other hand had been downsized and restricted to providing advisory services to growers as well as producing the ten yearly update of the Agriculture and Fisheries Census Report.

Laws

There are a number of laws relating to the environment that directly affect management of the environment and these are the: Health regulations concerning septic tanks, the building code, the Pesticide Act and the Environment Act.

The Health regulation does not have a monitoring program to go with the septic tanks regulations except statistics showing trends of the number of septic tanks and the number of chambers used by builders. The Muri Lagoon monitoring of 2001 was sparked of by the media with concerns that the lagoon might be receiving raw sewage from the residents and tourism accommodations in the area.

As with Health regulations, the building code, which is concerned with the safe and proper construction of buildings, also only provides information about the trends of the building industry based on the number of building permits given as well as the type of permits.

The Pesticide Act administered by the Ministry of Agriculture has not been in action since the early 1990s. This Act deals only with the registration and de-registration of imported pesticides according to whether or not they have been accepted on the world market.

The Environment Act, which only applies to the island of Rarotonga, has recently organized statistics on the issuing of permits for activities on the foreshore, sloping lands and wetlands. As with the other Ministries, these only provide trends. Outside of its jurisdiction, the ES also provides permits for the taking of shells and seafood meat out of the country. This is a requirement of CITIES.

All of the above mentioned indicate how much of our resources are being exploited but does not tell us what is happening to our environment that supports these resources.

Statistical information collected each Census year provides the only basis from which some indicators may be justified and these are illustrated in the use of resources, the behavior of the economy and the movement of people into and out of the country or from one island to another.

Effects

- The inability of Government to name the carrying capacity of the islands to cater for certain resource development activities is a major problem. Tourism is booming but there

⁷ Helen Wong's draft WSSD reports.

is no evidence to provide an indication on how much this environment can support. The resident population on the other hand has also increased by three fold and this increase is continuing.

- A peace-meal approach to addressing problems has been employed by the various Government administrations over the last twenty years at least. The example above of the Muri lagoon testing is a classic example of this.
- There is currently no monitoring work in the Manihiki and Penryhn lagoons to ensure that conditions to continue farming are at optimum level or at least a safe operating level.

Past and Present Actions

- In the early 1990s, the ES, having realized through the NEMS process, of the importance of environmental monitoring established a coral and marine monitoring program. It also established a beach profiling and stream-monitoring program. Associated with these programs were a water quality testing component and manpower training programs. Budgetary constraints axed all these programs despite the fact that a boat and diving equipment and transport system were purchased and officers to use and operate these facilities were being identified and trained. By the time the people chosen completed training they did not have a job. The ES currently employs only one of the five now fully trained Cook Islanders in this area.
- The Water Supply Division of the MoW is the only Government agency that is organized and keeps a record of the quality of drinking water on Rarotonga. Having been able to secure a portable lab and to train a staff member to do the testing is probably the “sneakiest” public servant effort to not be completely annihilated by poor Government policy and short sighted budget planning and allocation by the Budget Committee.
- The Marine resources have been good in this area having completed the Baseline monitoring of the Rarotonga Ra’ui areas. This has clearly provided evidence of the performance of this effort supported by the Aronga Mana.
- Statistics from the Ministry of Agriculture also provide data about trends on land use for agricultural purposes, produce development and export. Again these are useful data for trend illustration.

Actions Required

- Stream and Foreshore monitoring program.
- Coral and water quality monitoring program.
- Water quality and conditions monitoring program for the Manihiki and Penryhn lagoons.
- Water quality monitoring for the waste treatment and sanitation system performances program including residual indicators from the use of pesticides.
- Improve the environmental education program.
- Capacity building for the following regulatory Ministries:
 - Environment Service;
 - Public Health Department;
 - Ministry of Works Building Controllers Office;
 - Water Works Division;
 - Ministry of Agriculture; and
 - Ministry of Marine Resources.

2.10 Ignoring of traditional knowledge and practices (tkp)

2.10.1 The situation

Traditional knowledge and practices have given way to faster, short-term modern machinery and imported technology. Traditionally, crops are planted where particular species grew naturally. Prior to Missionary contact land development was site specific. Water wells were developed where there was water; banana and taro crops were planted where they naturally grew. Houses were constructed on elevated areas and away from areas where flooding and sea surge inundation take place.

The use of the traditional moon calendar, '*arapo*', is a practice and knowledge that is not now widely used, except by growers who plant kumara as well as other root crops. The *arapo*, depending on the season, also indicates to the grower or fisherman those nights, of moon phases, which are suitable for certain other planting and fishing activities. For example, when preparing land for planting, this should take place prior to the full moon or the new moon. For a grower, his taro or vegetable or root crop has to be in the ground before the new moon. By the time the rain of the new moon or the full moon arrives, it helps the crop to grow. Whereas if it is planted at the time of the full moon and the new moon, crops could be flooded.

This practice is used in conjunction with the seasons. For example in the dry season, the rains of the new moon and full moon will be light. Major land clearing activities are carried out during the dry season as opposed to the wet season.

There is also the knowledge about certain types of lands. In the old ways, the ancestors who lived on the land came to know about the land they were living on. Therefore they also knew how to use the land. If it is a land that is frequently flooded, they knew how to live on it and to make their life still convenient instead of changing the land.

Old knowledge about types of land is sometimes heard in the chants of families, but they are just chants that most often are designed now only to signify humor, any other purpose has been lost.

It is expressed here that traditional knowledge is not recorded in Maori but instead in English. The danger, in this is that the recorder does not understand the diverse base from which the knowledge being recorded came from. Hence, it is common to read about tkp written in English or translated back into Maori where it lacks depth and often it doesn't make sense either.

The National biodiversity strategic action plan (NBSAP) is an activity that fulfils a commitment under the Convention on Biological Diversity (CBD). With funds being made available (approximately NZD400, 000.00) the Cook Islands has completed this requirement and forwarded the report on to the CBD. This report notes that (from the WSSD Conference in April 2002) a further Capacity Building Add-on project for the Cook Islands is currently awaiting approval.

It was noted, from the information gatherers of the NBSAP, that there are plants in the Cook Islands whose value is no longer appreciated. This as well as other traditional information cannot be collected in the English language as it distorts the information too much. It has therefore been recommended that the information be recorded in the language that the tkp holder is most comfortable speaking.

Effects

- There are a number of issues that need to be looked at as a result of ignoring traditional knowledge and practices in the Cook Islands. These are:
 - Understanding the language of the knowledge holder,
 - Collecting the knowledge on biodiversity as natural indicators,
 - Reliable traditional knowledge,
 - Having access to places where knowledge is known and practiced,
 - Lack of recognition by Government of traditional knowledge and traditional practices unless the project is proposed by foreign influence i.e. for tourism, or is funded by an external source.
- Land developmental activities on sloping lands and the foreshore do not follow the knowledge on the traditional calendar resulting in further degradation of these environmentally sensitive lands that might have been avoided.

Past and Present Actions

The Ministry of Culture or its equivalent in the past has carried out various activities aimed at recording information on tkp. These have however been poorly archived and stored, and now

are longer available in some coherent form without the assistance of a knowledgeable curator. Unfortunately, a knowledgeable curator on the state of the materials is not available at this time.

Traditional Environmental Management (TEM) Project

The TEM project is funded by ADB through SPREP and the Tu'anga Taporoporo. The project has chosen as a pilot undertaking: the *arapo* or traditional knowledge practices which use the phases of the moon as a sort of information calendar as each lunar cycle ages. This knowledge was once known universally in the Cook Islands with each island having slight variations.

The project's goal is to document this information through the local language using a local consultant who has fluency in the local language. It is the aim of the project to obtain as much quality information as possible.

The knowledge of the *arapo* combines climatic factors, seasons and biodiversity. This project is drawing to a conclusion with two outcomes: a reference material on the *arapo* of Atiu as well as curriculum material, about how to teach the *arapo*, in the junior high school.

The *arapo* is considered a valuable planning tool for land and other resource management practices.

Actions Required

TEM

- Government must support the introduction of this project into the schools.

Culture & tkp

- Establishment of a National Marae to serve as a physical symbol of national unity and a place of learning valuable traditions and information.
- Establish a Language Institute or Academy to maintain Cook Islands language being taught formally in schools and also as a venue for other courses touching on the many aspects of our cultural heritage.
- Set up on-going training for archivists, curators and librarians to access and publish written resources for public consumption.
- Continued financial assistance for writers in the writing of Maori materials and the publishing of printed, video and audio materials for use in schools, in both Maori and English versions.

Biodiversity

- A body should be established to review access to, as well as the processing of knowledge on biodiversity and its use;
- The program of the Natural Heritage Project must be a Maori language program, to record all Cook Islands biodiversity with traditional information and this program should continue make such information available to the general public.
- Working group must be established to investigate ways to ensure that knowledge of biodiversity and its uses are adequately available to students as well as the general public.

2.11 Invasive Species

2.11.1 The situation

There is a large number of introduced species in the Cook Islands, mainly of the food and ornamental plant types, however, there is also a large number of plants that were introduced to improve soil for agricultural production. Such plant species include mimosa, Desmodium, kudzu (*Pueraria lbata*), the Brazilian lucern (*Stylosanthes guianensis*) as well as others. These leguminous plants have become widespread, particularly in the Southern Group, and are commonly seen along roadsides. Some species, for example the mimosa, have become unpopular weeds due to their prickly nature.

Other introduced weeds however have become major concerns and are considered to be a potential threat to the indigenous forest systems particularly on Rarotonga. The balloon vine (*Cardiospermum halicacabum*), balsam bear (*Momordica charantia*) and red passion fruit (*Passiflora rubra*) are three such weeds that almost always occur together. The balloon vine is only found on Rarotonga, (Wilder, 1930). In his publication about the flora of the Cook Islands Wilder described the weed as only being found in Avarua. Seventy years later this weed is found all over the island and is a feature of old neglected orange plantations (See photograph 10 below). On the outer islands the balsam bear and red passionfruit are common, especially on old and unattended plantations. The mile-a-minute (*Mikania micrantha*) is another commonly recognized weed, which has posed a challenge for growers.

Another introduced weed from the post-European era is the sorghum or tarapi (*Sorghum bicolor*), which is commonly found in plantations.

Other invading and colonizing tree species are the cecropia or *rau-maniota* (*cecropia palmate*), and the African tulip or *patiti-vai* (*Spathodea campanulata*). The *patiti-vai* has a bright red-orange flower and is mainly found in the interior of Rarotonga. The *rau-maniota* trees are quite destructive to the interior because of the way they cause large areas of land to be exposed every time a mature tree falls. This exposing of the inland soil provides the opportunity for noxious weeds to get into the interior. It also makes it easier for soil to be eroded. The java plum or pistat (*Syzygium cumini*) is widespread throughout the Southern Group. It is another large and fast-growing tree.

On Rarotonga, those species described above have invaded agricultural lands and have made the cultivators not continue with the use of their land, or use herbicide chemicals extensively which has placed other aspects of the environment under threat.

In the case of the more vigorous plant species, such as the mile-a-minute and the balloon vine, these destroy indigenous species by smothering and covering them disallowing the plants to have full access to sunlight. Photograph 10 illustrates this point also.

As described in above, the *rau-maniota* is very destructive to the soils of the inland forests of Rarotonga by opening up a large area of the forest every time one tree falls over. It also provides the opportunity for balloon vines and mile-a-minute to colonize large areas. On Aitutaki, the giant mimosa has for years prevented lands from being cultivated. The prickly weed is fast growing and spreads very quickly.



Photograph 10. Cleared forest area with extensive balloon vine coverage.

Effects

The transfer of invasive species through the use of earth moving machineries is very common. On Aitutaki where special attention was placed on the amount of land being affected by the Giant Mimosa, this type of problem was identified and a plan of action was put in place.

As for weeds, such as the *tita pikikaa*, its presence usually means that the land needs extensive work or that crops cannot be grown without difficulty. Other species, such as the balloon vine, balsam pear and mile-a-minute stop natural and more useful vegetation from establishing cover. The *rau-maniota* opens up the ground and causes small landslides especially near any creek or stream that in turn causes more soil and land loss. The spread of the *rau-maniota* in the forest of Rarotonga is aided by *moakirikiri* (bats) that feed on its fruits.

There are also the various species of rats (e.g. 'kiore' (*Rattus exulans*)) that spread balsam pear and red passion fruit over the agricultural lands.

Past and required actions for the future

Rarotonga

Public awareness and extensive public consultation by the NBSAP project has created a lot of awareness about the presence of various species that are causing problems on the island of Rarotonga. The consultative meetings brought to the public's attention the need to do the following.

Eradication initiative

- To develop a program, involving all islands, to survey invasive species in natural ecosystems and in the agro-ecosystem,
- To develop a community based program to eradicate those invasive weeds and animal pests that are not yet widespread on particular islands,
- To develop national programmes to assist with the control of the more serious invasive weeds and animal pests in both natural and man-modified ecosystems,
- Undertake a multi-sectoral review of the control of trans-boundary and inter-island movement of terrestrial and marine plants and animals, and of LMOs/GMOs (Living Modified Organisms/Genetically Modified Organisms), with a view to establishing an independent Bio-security Agency.

Ecosystem Management

- To develop a program for selecting areas to establish a national system of community-based protected areas in order to protect important terrestrial ecosystems.

Outer Islands

Eradication initiative

Similar to that of Rarotonga.

Ecosystem Management

- To develop a program to select areas to establish a national system of community-based protected areas for protecting important terrestrial ecosystems.

Actions Required

It is recommended that the actions proposed by the NBSAP should be implemented ASAP.

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