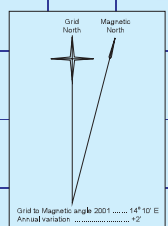
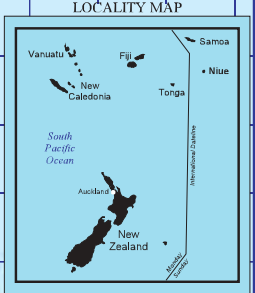

NIUE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN



MAP 3: Map of Niue Island



Niue Island



Legend

- Forest
- Managed land
- Littoral scrub
- Cleared
- Main roads
- Minor roads
- Reef
- Contours (m) (15m interval)

Acknowledgements
 Thematic map derived from SPOT multispectral data. Copyright CNRS1994. Classification based on an inventory prepared by Forest Section, Niue DAF, 1. National Forest of Niue Island merchantable forest survey 1990. 2. Botanical Survey of the Hualu Forest conservation area, Niue Island. Whalley, A. and Atherton, J. December 1997.
 Image classification by M. Kruuse, J. Dymond and J. Shepherd, Landcare Research, Palmerston North, New Zealand, 2001.
 Topographic base data from Land Information New Zealand (LINZ). Cartography and GIS operations by T.J. Savage, Landcare Research, Palmerston North, New Zealand, 2001.

Cautionary note
 Original mapping was based on a 'satellite image' rather than conventional photography. Contours were 'retouched' from the original imperial heights. This map should not be relied on for any navigation or planning purposes.

Map Grid
 The grid used on this map is the New Map Grid (NGD 1991 - GRS80).

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NATIONAL BIODIVERSITY
STRATEGY AND ACTION
PLAN OF NIUE

Compiled by: A Project Team assisted by staff of the Environment Unit, Department of Community Affairs

Overseen by: A National Steering Committee of Government Departments and Community Representatives

Edited by: Phyllis Richmond-Rex, Tagaloa Cooper and Judy Nemaia, Department of Community Affairs and David Butler

Funded under GEF/UNDP Enabling Activities — The Convention on Biological Diversity

Government of Niue 2001

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ISBN 0 473 08009 5

Copy-editing and Publication: Bateson Publishing Limited

Design & Layout: Unicorn Design Studio Limited

Printing: Hutcheson, Bowman and Stewart

Cover Design: Tagaloa Cooper & Judy Nemaia, Department of Community Affairs

Cover Production: Jackson Enterprise

Maps: Coral Pasisi, Land & Marine Resource Use Planning Unit, Department of Justice, Lands & Survey and Landcare Research New Zealand

This report is produced on paper made from 35% pre-consumer waste, 15% post consumer waste and 50% elemental, chlorine free pulp and to EPSA Standard (USA).

The inks used are made from vegetable oils and natural resins, are bio-degradable and do not contain polycyclic aromatics or volatile organic compounds.



FOREWORD

Fakatufono Niue Tau Kupu Vevete

Ko e tau 1996 ne fakamooli fakave' e Niue e Maveheaga ma e levekiaga he tau koloa mo e tau Mena Momoui oti ne tufugatia ha I ai he Takatakaimotu. Ha ko e fifiliaga loto malolo ia ne kua maeke ke mailoga maaliali ki ai e taliaaga mo e omoiaga he Fakatufono Niue mo e tau tagata ke muitua ke he Maveheaga ia.

Ma tautolu e tau Niue, ko e fekau kua hili kia tautolu ke fakamakamaka e tau loto katoatoa ke leveki fakamitaki e tau koloa poke tau taoga oti ne putoia ke he Takatakaimotu. Ko e fekau kua lago kia tautolu oti kana ma e tau atuhau tupuhake a mui. Kua aoga lahi foki ke eke e Maveheaga ia mena ke peehi mamafa aki e tau gahua ke fakatumau aki mo e fakatolomaki aki ki mua e tau fakaveaga moe tau puhala ne leveki po ke puipui aki, he tau tupuna ha tautolu a tau taoga ha I ai he Takatakaimotu. Ko e hokulo he fekau, ke kitia kua tumau, kae nakai galo fakaoti e tau taoga momoui ne talahau ki ai. Mooli ni to lali fakalahi ke muitua fakamooli ke he Maveheaga, to gahua ni fakalata ke he tuaga tote mo e nakai muhu mena loga ha tautolu a motu. Ko e Fakaveaga Gahua ha Niue ke lata mo e Maveheaga, fakalataha mo e Palana Gahua, kua tonuhia mo e hako e vaha ke taute mo e muitua ki ai ke kitia kua gahuahua fakalotomatala mo e fakaeneene ki ai. Kua mailoga foki ki ai, kua tonuhia pauaki he Palana Gahua ke kau auloa mo e tau tagata moe fakanogonogo ke he tau manatu ha lautolu.

Lafi atu ki ai, amanaki fakalahi au ke eke e Pepa Fakaiioaaga nei mo fakaakoaga ke fakaiahi atu ki mua e iloa mena moe maamaaga ha tautolu e aoga mo e kakano ko e ha ne pehe ai ke leveki moe puipui e tau koloa mo e tau taoga he Motu ke lata mo e tau atu hau tupuhake.

Ke fakaoti atu, manako au ke nava mo e fakaaue tulou ke he gahua fah mo e uka he Komiti ne lago ki ai e gahua he Pepa ke lata mo e fekau nei, ti pihia atu foki kia lautolu e tau hukui po ke tau matakau I fafo he Fakatufono. Amanaki foki, mo e ui-ina atu ke he tau Niue oti, po ke tau motu fe ni kua nonofo ai, ke kau auloa mo e tau loto fakamooli ke fakatumau a Niue ko e Matua Motu ha tautolu, fakalataha mo e tau koloa mo e tau taoga ne moui gahuahua ai ha talu Kautu.

Sani Elia Lagigietama Lakatani

PALEMIA



FOREWORD

Government of Niue Office of the Premier

In 1996, Niue ratified the Convention on Biological Diversity. That commitment a bold decision by the Government and people of Niue, is testimony of our support for the Convention and its principles.

For us Niueans, the necessity to conserve the value of our biological diversity and its various components both for the present and future generations (atuhau tupuhake) is a genuine obligation. It must be a collective responsibility. Equally, it is necessary to take advantage of the convention to promote the customary principles and beliefs of our forefathers (tau tupuna) and their traditional conservation methods and practices of Niue's biological diversity, in a sustainable manner with minimal threat to species. We will endeavour to uphold Niue's obligations under the convention, while cognisant of our smallness and resource constraints to implement fully the prescribed strategies in this document.

The National Biological Diversity Strategy and Action Plan is relevant and timely for the future as a mechanism under which we must continue to plan, manage and utilize our biological diversity wisely. We also recognise the need to ensure that the implementation of the Strategy Action Plan is undertaken in the most prudent and participatory approach while taking into account the overall views of the community.

In addition, I hope that the production of this document will enhance the knowledge and understanding of our people of the need to preserve the natural environment and biological diversity so that it may continue to support both the resident population and future generations.

In conclusion I commend the hard work of the Steering Committee responsible for the coordination of the biological diversity project, including the Non-Government organisations for their dedication. I sincerely hope and would like to invite every Niuean in the world today and in future to play your part in conserving the biological diversity resources on the mainland, Niue.

Sani Elia Lagigietama Lakatani
PREMIER

EXECUTIVE SUMMARY

Niue is characterised as the single largest uplifted coral atoll in the world, yet in contrast is the smallest self-governing nation. It is a unique island with its elevated rugged coastline and extensive forest cover, which comprises 65% to 70% of the land area, approximately 8.7 hectares per capita. While Niue is primarily an agriculturally-based economy, the value of the country's uniqueness and unspoilt environment has been realised, and Niue is marketed as an eco-tourism/adventure tourism destination.

Niue is an environmentally friendly nation in which conservation and the sustainable management of resources is an integral part of the life style of the people. This is exemplified by Niue acceding to and subsequently ratifying the Convention of Biological Diversity (CBD) along with its sister Conventions, the United Nations Framework to Climate Change Convention (UNFCCC) and the United Nations Convention to Combat Desertification (UNCCD). Further evidence of Niue's commitment to sustain and effectively manage its environment is the formulation of this Biodiversity Strategy and Action Plan (BSAP) and the development of the National Environment Strategy (NEMS) in 1992.

The key tenet of Niue's Integrated Strategic Plan (NISP) 1999-2003 is to —

'Preserve the natural environment and biological diversity so that it may continue to support both the resident population and the private sector in the long term.'

This plan identified three key Government departments — the Department of Community Affairs, Department of Agriculture, Forestry and Fisheries and the Department of Justice, Lands and Surveys — whose mission statements tie in with conservation of biodiversity. It is for this reason, as well as the technical capacity of the individual departments, that they have been identified as the agencies responsible for various actions in the Action Plan.

The Vision of this strategy is —

'Niue is an Environment Friendly Nation in which conservation and the sustainable management of biological resources support all the living community.'

Its Action Plan is grouped under seven themes covering terrestrial habitats, terrestrial species, marine biodiversity, governance, waste management and water resources, alien invasive species and public awareness and education. It is important to note that a significant number of their associated actions are currently being implemented, and it is hoped that this strategy will assist in strengthening this work and allow further activities to be undertaken. It also establishes a system for monitoring progress in its implementation.

Therefore in concluding, let us be mindful of the fact that —

'Biodiversity incites spirituality in the communities and helps shape our culture because of our dependence on it for supply of food, for a sense of identity and raw materials for commerce.'

ACKNOWLEDGMENTS

The production of this Strategy has involved many individuals. Key participants are named here. The contribution of many others through attendance at workshops or the provision of written comments is also gratefully acknowledged.

Project Team

Harkai Pihigia, Bradley Punu, Fusiika Sisikefu, Judy Nemaia

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Crossley Tatui: Director of External Affairs (Vice Chairperson)

Harkai Pihigia: Private Sector Representative

Sauni Togatule: Director of Agriculture, Forests & Fisheries

Kupa Magatogia: Director of Education

Togia Sioneholo: Director of Justice, Lands & Survey (DJLS)

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Christine Ioane: External Affairs

Felicia Nemaia: External Affairs

Falefoou Siavale: Village Council Representative

Mata Tahafa: Niue Council of Women Representative

Rev. Fellow Pahetogia: Church Representative

Misa Kulatea: Private Sector Representative

While all Steering Committee members were advised of an invitation to attend all meetings, some were not able to be present

Staff of Department of Community Affairs

Phyllis Richmond-Rex: Director

Tagaloa Cooper: Environment Officer

International Consultant

David Butler: Nelson, New Zealand

TAU MANATU FAKAAUE

Ke he tau matakainaga takitokotaha i Niue Fekai ne lagomatai e gahua lahi nei ha tautolu, oue tulou ha kua talia e mutolu ke kau auloa ke he fekau mahuiga nei ne lago ki luga ia tautolu oti. Fakaue foki ha kua lagomatai a lautolu kua fifili pauaki ke kumikumi fakamakutu atu moe fakamau e tau aga Fakamotu ha tautolu ne fakaaoga mo leveki aki e Takatakai Motu he motu tote nei ha tautolu. Ha kua tokologa lahi ia lautolu ne lagomatai, mua atu kia mutolu ne nakai gahua mae Fakatufono Niue, nakai maeke ke tokutoku fakamatafeiga atu.

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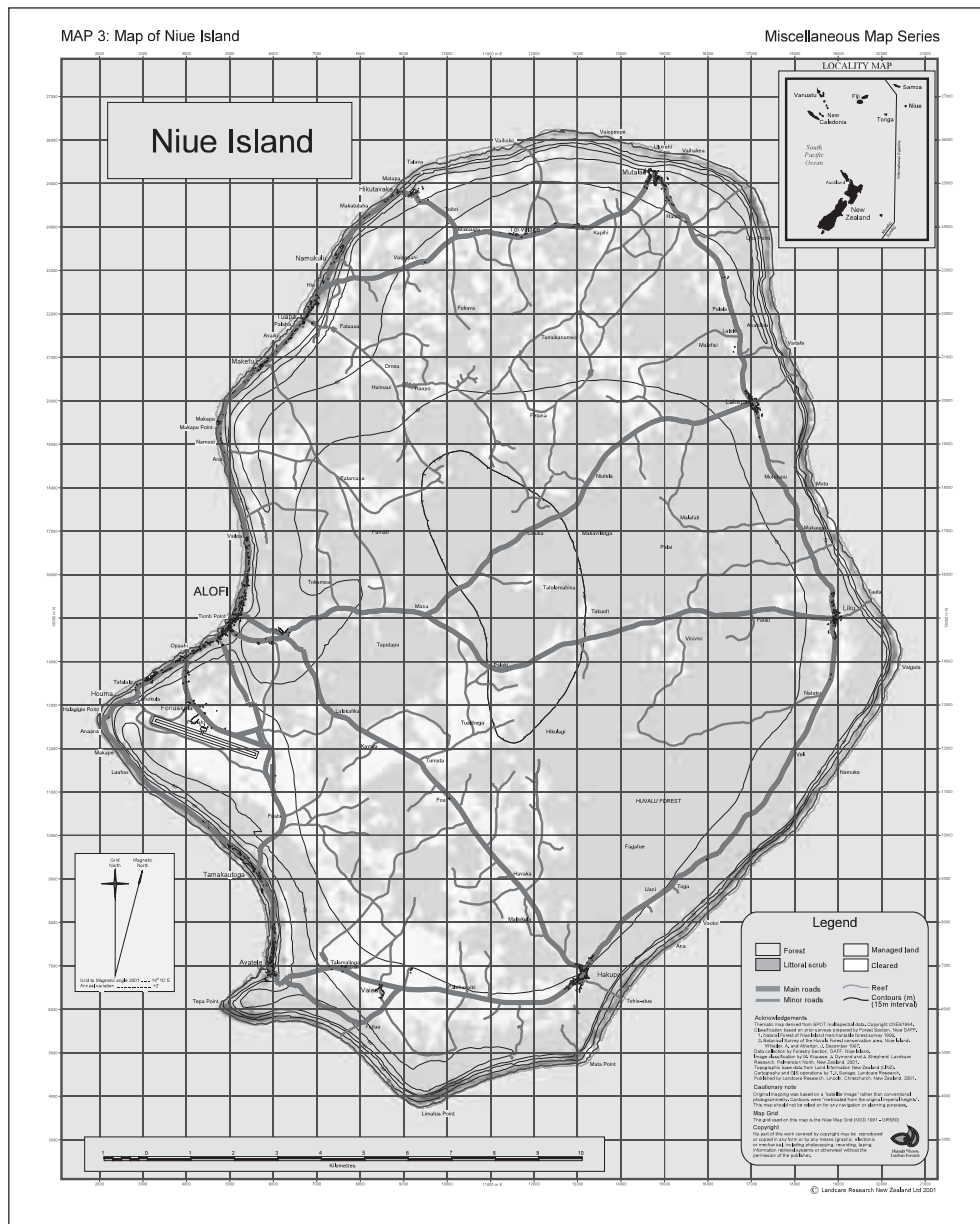
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SECTION 1: INTRODUCTION

1.1 Introduction to Niue

The nation of Niue consists of a single island of 261 km², the largest raised coral atoll in the world. It is situated in the South Pacific Ocean (Lat. 169°55'W, long. 19°02'S) approximately 480 km south west of Tonga, 660 km south of Samoa, 930 km west of Cook Islands, 2,400 km north east of Auckland, New Zealand and 3900 km north east of Sydney-Australia.



After periods of administration by Great Britain and New Zealand, the country adopted self-rule in 1974 ‘in free association’ with New Zealand. This partnership continues with New Zealand providing Niue with support, and New Zealand is the only country with a resident diplomatic representative or mission on the island. Niueans are Polynesian. The current population on the island is about 1770 individuals of which 14% are of non-Niuean ethnicity. Over 20,000 Niueans reside overseas, mostly in New Zealand.

The island still has an extensive forest cover — 65% to 70% of the land area, though only about one sixth of this is primary forest. Historically there has been a high rate of forest clearance for agricultural purposes, but this has slowed in recent years, increasing the area in secondary forest or reverting back to this. Niueans retain a close relationship with the forest, which provides timber for building, canoes and some carving, leaves and fruits used for food or medicinally. Three species of animal found there are of particular importance, the **uga** or coconut crab *Birgus latro*, the **peka** or flying fox *Pteropus tonganus* and the **lupe** or Pacific pigeon *Ducula pacifica*, all of which are hunted for food.

Niue is primarily an agriculturally based economy. Historically, subsistence agriculture was the main means of support, but recently this has been expanded to also produce crops for export. Prior to 1980 the main agricultural exports were copra, passion fruit, limes and honey. In the past two decades these have been replaced by taro (root crop), vanilla (flavouring) and **nonu** *Morinda citrifolia* — a tree with healing properties in its leaves and fruit, though a small honey industry has recently been revived. Developing a stable agricultural sector has proved difficult, with some crops proving vulnerable to natural disasters such as cyclones, and others dependent for their viability on changeable overseas markets. A recent illustration of the problem was the closure of the only fruit-processing factory in 1990.

Almost all households still depend on agriculture in some way — 410 of 446 in a 1989 census (DAFF, 1998b). At that time there were around 3900 land parcels on Niue of which 30% were used for agricultural crops, primarily taro, yams, cassava and banana, 20% were under coconuts and 50% fallow. Most families keep pigs and chickens, and a few graze cattle.

In recent years there has been an increased effort to develop a tourism industry, though there have been some problems with air links. Tourism can play a significant role in fostering biodiversity conservation. The attractions that bring people to a destination like Niue, its unspoilt nature, its green forests and the animals found there, its clear waters and marine life, are the same assets that this strategy seeks to protect. Nature tourism or eco-tourism is an increasing part of tourism promotion worldwide. In its purest form it helps ensure that some of the visitors’ funds go back into conservation.

1.2 Biodiversity conservation in the Niuean context

The small size of the country and the current small population, which results in less pressure on natural resources, provide opportunities to put sustainable conservation practices in place in Niue. However this small size also results in a natural instability, common to many small island states. Natural disasters such as cyclones can devastate a very high proportion of the land area, and introduced animals or plants may rapidly become pests in an environment of relatively few native species, which cannot provide a counter-balance.

In Niue, as in many of the Pacific Islands, biodiversity conservation must be intimately linked to the ownership of land, and understanding of the tenure system is important from the outset. Conservation programmes designed for different countries or cultures are rarely transferable to nations like Niue where land tenure is based on customary principles and shared ownership.

Apart from small areas owned by the Crown (1%) or leased to it (4%), all other land is Niuean Land. Traditionally the family descent group, or **magafaoa**, is the land holding unit, and this group selects a trustee, **leveki magafaoa**, to manage the use of the land. A land-titling project was initiated by the Department of Justice, Lands and Survey in 1990, with the assistance of the New Zealand Overseas Development Assistance programme (NZODA), aimed at making land administration easier. At present just under 12% of the land area of Niue has registered titles, of which half was registered in the last 10 years under this project. Land cannot be bought or sold in Niue, however there is legislative power for Government to purchase or take land (providing compensation to the landowner) for public purposes. The land ownership system tends to lead to high land fragmentation and lack of physical connections between land-holdings (DAFF, 1998b).

Niueans have always had strong cultural ties to the land. They apply a number of traditional conservation practices to its use, particularly the closing of areas or restricting activities within them through the imposition of **fono** — a temporary control, or **tapu** — a longer term taboo involving sacred beliefs, strongly observed for its spiritual power. They have a remarkable ability to read biological indicators, such as the flowering of a certain plant which would indicate that a certain type of fish was readily available, and use the cycles of the moon to time the planting of particular crops.

There has been a perception among communities that the traditional forms of conservation have addressed the country's environmental concerns. Yet in reality this is not the case. Growing outside influences and economic pressures has led increasingly to an over-exploitation of resources. The State of the Environment Report (Lane, 1994) highlighted the seriousness of the situation. It noted a lack of any systematic management of resources and few mechanisms to prevent over-use. As an example, some inshore fish stocks had declined through unregulated harvesting methods and lack of harvest quotas.

1.3 Niue's biodiversity conservation response

The Government has signalled its intention to address the issues affecting the conservation of biological resources through ratification of the State of Environment report and the accession to the Convention on Biological Diversity (CBD) in 1996.

In the same year Niue became part of the South Pacific Biodiversity Conservation Program (SPBCP) and within this programme it established the Huvalu Forest Conservation Area. Its first marine protected area, the Anono Marine Reserve, was created two years later.

The country's key planning document, the Niue Integrated Strategic Plan 1999-2003 (NISP), subtitled 'Working together to maintain a living community in Niue' identifies as a key tenet to —

'Preserve the natural environment and biological diversity so that it may continue to support both the resident population and the private sector in the long term.'

It identified insufficient protection of the environment as one of the main problems, but did not go on to identify any strategic steps to address this. The BSAP will serve to fill this gap.

While Niue has made a commitment to the CBD and produced this BSAP, it will require ongoing outside assistance to fulfil its commitments and obligations to the Convention and to achieve the actions set out in this Strategy. Current constraints include financial resources and the technical know-how to be able to assess its biodiversity resources, and to develop strategies and action plans to conserve and build capacity among all stakeholders to manage these resources in a sustainable manner at community and national levels. With this assistance the commitment would be there to halt the decline of biodiversity, recognising its fundamental importance to sustaining life on Niue and its profound impact on the nation's culture and identity. A moral obligation to future generations is also recognised so that what has been given the people of today is used in a sustainable way.

What is biological diversity?

Biological diversity is a term commonly used to describe the variety and number of all living organisms on earth. The debate over this issue over the past decade has taught us that life on earth is a mosaic of biological forms, intricately interacting in their niches and ecosystems.

Why conserve biological diversity?

Individual species and the ecosystems, which they form through combining together, are vital to human survival. Many species are used directly for food, clothing, and shelter, while ecosystems play less obvious roles — coral reefs protect the coastline, forests store and purify water and help form soils. The plants and animals around us also contribute to our rich experience of life and play a major part in defining what it means to be Niuean.

Biological diversity in Niue

The species of animals and plants found on Niue are largely determined by three factors. Firstly, Niue is isolated from other landmasses, the nearest country being the islands of Tonga 480 km to the north east, so a limited range of species reached the island. Secondly it is relatively young. Indications are that the upper terrace dates back to the inter-glaciations before last 500,000 to 900,000 years ago (Schofield, 1959), so that animals and plants arriving here have generally not had time to evolve into different species. Thirdly it is relatively small and provides a restricted range of habitats, with no freshwater wetlands for example. All these have served to limit the numbers of species and their endemism. No endemic species, those found only in Niue, are known in the plants or birds, though some of the latter are considered endemic at the sub-species level. There is one endemic sea snake and other endemic species probably exist among the invertebrates.

1.4 Introduction to this Report

Section 2 begins with necessary background information, followed by a review of current knowledge of Niue's biodiversity, which is presented in detail, as this information cannot readily be obtained from any other single source. It then reviews issues affecting biodiversity and current activities, legislation and institutional and financing arrangements. Section 3 comprises a Vision and Goals. Section 4 presents the Action Plan grouped under seven themes and Section 5 the proposals for implementing, financing, monitoring and reviewing this plan and the strategy as a whole.

1.5 Importance of a biodiversity strategy to Niue

The conservation of Niue's biodiversity is a key to ensuring the country's sustainable development. This strategy has been produced to plan and encourage biodiversity conservation as part of Niue's commitment to the Convention on Biological Diversity (CBD), which the country signed in 1996. The CBD can be seen as the founding document behind a global initiative to conserve biodiversity, recognising that continuing the way we were going would lead to disaster. Niue has been more fortunate than many countries in that it has lost few species and retains large areas of natural habitats. However the same negative trends are evident here as in the rest of the world, for example in the degradation of habitats and over-hunting of species. This biodiversity strategy can be seen as a very timely initiative to ensure that the country retains the wonderful assets that remain in the splendour of its forests, coastal areas and seas.

1.5.1 Niue's international position

Although Niue is small geographically, the international responsibility to participate in the programme derived from the CBD and contribute to the international push towards sustainable development is just as important as for any other country. The nation is therefore prepared to work over the next 20 years to follow and fulfil its duty under the CBD with expected actions to be undertaken by the Government, the departments responsible and more importantly, all the village communities.

1.5.2 The challenge on a regional level

The challenge on a regional level is to work through regional organisations to harmonise differing national priorities, particularly those for marine resources in both territorial waters and Exclusive Economic Zones. Co-operating regionally helps to provide the resources and technical expertise not available in each country individually.

1.5.3 National commitment

Ratifying the Convention on 28 February 1996 recorded Niue's commitment, and the formulation of this Biodiversity Strategy and Action Plan (BSAP) fulfils a requirement under its Article 7. The country developed its National Environment Management Strategy (NEMS) in 1992 identifying this as an important step towards linking economic growth and environmental management.

The challenge, at all levels in the community and in Government is to integrate biodiversity conservation considerations across all sectors and identify responsibilities for action. Institutional mechanisms, policies and legislation are needed for the protection and conservation of Niue's biodiversity. The commitment shown by many agencies in participating in the development of the BSAP is a very encouraging sign.

1.5.4 The challenge at the local level

While conservation is said to have been practised by our ancestors, the youth of today have less understanding of its true meaning. One need therefore is to educate young people in schools and in the home. The Government and village communities must have a joint role to guide and coordinate programmes to be implemented locally.

1.5.5 The challenge to every person

Niue's biodiversity is a lifeline for the people living here today and for future generations. The BSAP is a plan that provides integrated approach from both Government and community to identify the biodiversity systems and species that are affected. The Government is expected to take a leading note in driving the strategy, but the village communities must also be seen to have the same drive and commitment. Changes must also be made to ensure that modern developments will not have a negative impact on biodiversity. Everyone has some responsibility for seeing the objectives of the strategy realised.

1.6 Context of strategy

The Niue Integrated Strategic Plan (NISP) presents the vision for the Niue Government to follow in developing its legal, policy and institutional structures.

It identifies three Government agencies whose mission statements tie particularly into the conservation of biodiversity —

Department Of Community Affairs (DCA) which houses the Environment Unit

'We will endeavour to serve our people by supporting effective, sustainable development initiatives, opportunities and policies through consultation in order to enhance the delivery of quality community services in the fields of: Environment, Community Development and Services...' (And six other units including arts and cultural matters).

The Environment Unit's goal for 2000/2001 is *'to effectively manage our natural resources whilst promoting sustainable practices to ensure inter-generational equity'*.

Department Of Justice, Lands And Survey (DJLS) which houses the Environment Planning Unit

'To contribute to economic development by facilitating an effective and transparent management of lands, resources, judicial, electoral and related information services.'

Department of Agriculture, Forestry and Fisheries (DAFF)

'To promote and protect the development of an environmentally sustainable and viable agriculture, fishing and forestry base.'

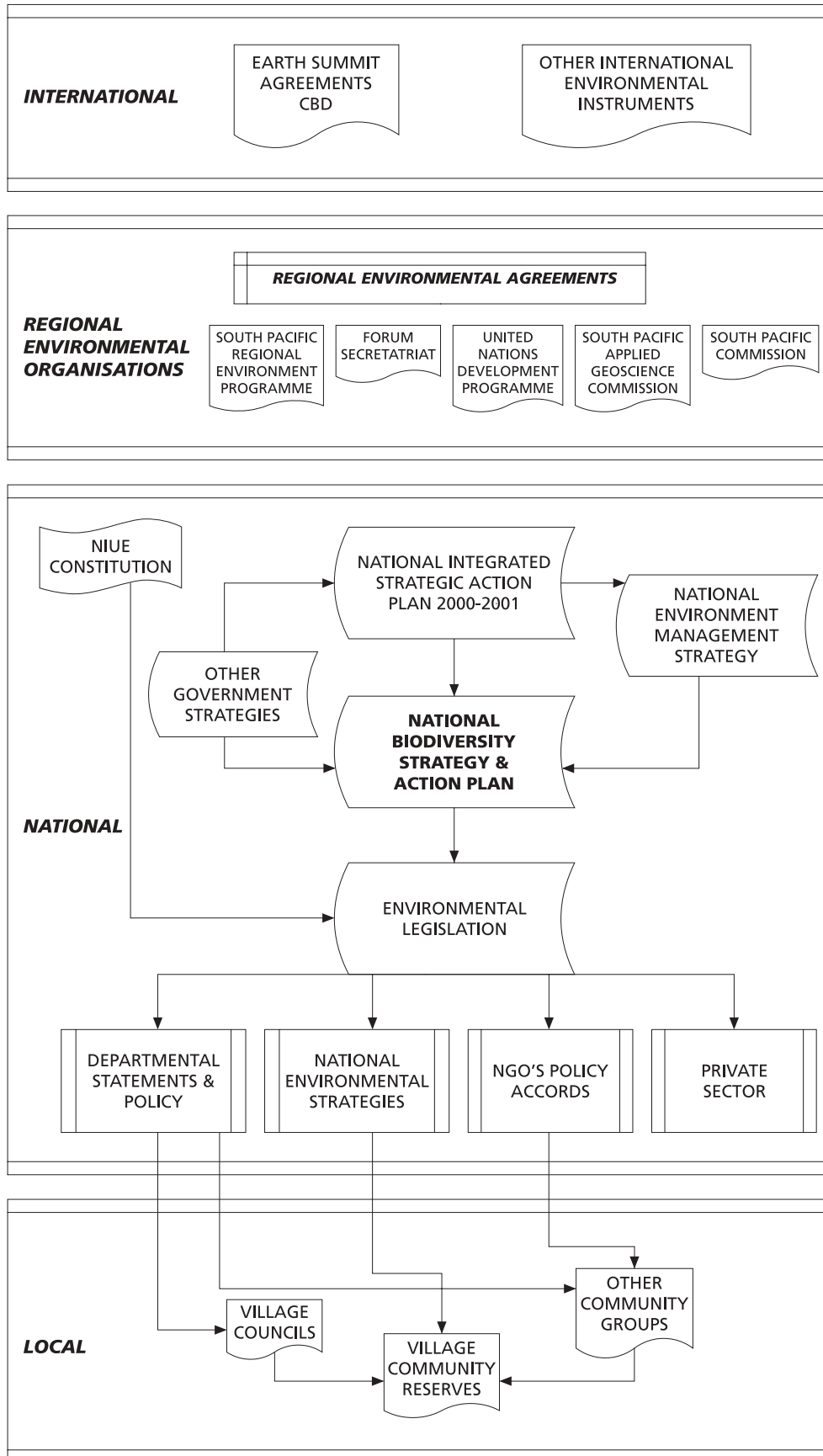
1.7 The process of strategy formulation

Niue's BSAP has been developed during a 23-month process involving extensive consultation with the full range of stakeholders under an Enabling Activities Project administered by the United Nations Development Programme (UNDP). The Environment Unit, Department of Community Affairs has been the lead agency, and the Director of the department was the project manager. The project co-ordinator was contracted, as well as a consultant from the private sector, two local consultants who carried out the stocktaking and assessment, and an international consultant. Overseeing the project has been a multi-agency Steering Committee whose membership is identified in the acknowledgments.

The timetable of activities was as follows —

- Sep 1999
 - Director, Community Affairs appointed as Project Manager
 - Project document signed off by Niue Government
 - Cabinet approved project implementation and membership of Steering Committee
- Dec 1999
 - Appointment of National Coordinator; signing of contracts for two National Consultants and National Coordinator
- Jan 2000
 - Visit of Biodiversity Officer from WWF (Fiji) to provide advice to project team and appraise project document
- Mar 2000
 - Official launch of project (aimed at raising awareness of programme)
- Jan-Apr 2000
 - Information gathering phase, through interviews and surveys by national consultants
- May 2000
 - First National Workshop, including participation of Niuean elders from overseas
- June 2000
 - Workshop for women
 - Recruitment of international consultant and TOR agreed
- July 2000
 - Workshop for youth
 - First visit of the international consultant
- Aug 2000
 - Workshop for men
 - Reports on workshops for women & youth written up and translated
- Dec 2000
 - Second visit of the international consultant
 - Production of first draft of BSAP
- Jan 2001
 - Dissemination of draft BSAP to government agencies & NGOs to comment
- Mar 2001
 - Collation of comments from agencies and NGOs and include into draft BSAP
- April 2001
 - Third visit of international consultant
 - Production of final draft of BSAP
 - Submit final draft to Steering Committee
- May 2001
 - Sign-off of BSAP by Steering Committee
 - Approval by Cabinet
- Sept 2001
 - Publication and Submission of version in English to CBD
 - Production of version in Niuean

Figure 1: Shows the Legislation, Policy and Institution Mechanism strategy framework at a national, regional and local level.



SECTION 2:

RESOURCE INFORMATION

2.1 Background

2.1.1 Geology and landforms

Niue consists of an uplifted coral limestone plateau perched on top of a submerged volcano. The topography is of a central plateau of gentle undulating relief, slightly dished in shape with the rim at about 68 m above mean sea level, dropping to about 30 m in the centre suggesting it was once a lagoon. A narrow lower terrace 100 m to 200 m wide at about 28 m above sea level surrounds this central plateau. The coastline is rugged, and consists of precipitous cliffs which drop straight into the sea, except for the west coast where there is a wave-cut rock platform 20 m to 80 m wide and then a very steep drop-off. The distinct shelving suggests that the island was lifted up in at least two steps.

The island is composed of pure limestone of three types — reef rock, beach conglomerate and cemented or loose coral sand (Schofield, 1959). The ground surface is often jagged with exposed sharp rock outcrops and boulders, with pockets of topsoil varying in depth between them. In some areas there is a thin coating of ash, thought to have been deposited by volcanic activity after the uplifting process, and the cause of locally high radioactivity.

There are no watercourses on the island. Rainfall infiltrates quickly through the thin layer of topsoil and down the cracks and cavities in the base rock. The permanent ground-water table is found about 60 m below the rim of the central plateau, indicating a mounded body of fresh water above mean sea level. Springs of fresh brackish water leak out from the base of the cliffs. Many caves occur around the coastline and in the centre of the island, those in the latter area often containing pools of freshwater. The freshwater lens below the island is its main source of water, tapped by a series of bores.

Seismic activity is not uncommon although major earthquakes have not been recorded in recent times. There are wide joints (chasms) showing evidence of past activities that were associated with the uplifting process.

2.1.2 Climate

The climate of Niue is hot and moderately wet in the summer months from October to April, and dry and cool in the winter months from May to September. Annual rainfall averages around 2000 mm but varies widely from year to year from a high of 3175 mm in 1924 to a low of 1070 mm in 1931. Maximum daily temperatures vary seasonally from 27° C to 31° C.

Niue lies well within the tropical cyclone belt and significant cyclones have occurred on average with a 10-year frequency. The most recent was cyclone Ofa in 1990 when wind speeds of 185 kph (100 knots) were recorded. The south

east trade winds blow steadily for most of the year but particularly between April and October, maintaining a steady breeze of between 10 kph and 20 kph during the day. The tidal range is of the order of 1.5 m with a corresponding fluctuation of 100 mm in the ground-water table.

The inability of Niue soils to hold surface water for long periods can have a serious effect on the vegetation, and severe droughts with three to four months without rain have been recorded.

2.1.3 Soils

The soils of Niue are generally fertile but shallow, (Lane, 1994) derived mainly from unconsolidated sedimentary materials and consisting largely of finely divided volcanic materials with some abyssal clay and deep-sea sediments. The soil pattern is unusual in that there are no areas of recent soil from alluvial or brown sand and no soils with a permanent water table within the range of roots.

The following four soil types have been classified (Wright & Westerndorp, 1965):

- i) Hikutavake Soils — black soils derived mainly from limestone
- ii) Hakupu Soils — sub soils are successively brown and granular
- iii) Fonuakula Soils — sub soils are reddish brown and finer grain
- iv) Palai Soils — sub soils are brownish red-to-red soils

The soils form a concentric pattern of rings towards the old lagoon area in the centre.

The history of land use on Niue shows that early Polynesian settlements were mainly established in the centre of the island where deeper soils are found, and it is likely that these were the main crop-producing soils. All the soils are high in calcium and magnesium, low in nitrogen, low in potassium and sodium and deficient in zinc, to the point that these last three may be limiting factors for plant growth. Declines in soil structure and fertility have been evident as a result of several agricultural practices.

2.1.4 Population and demography

Niue is a relatively sparsely populated island. The last complete village census in 1999 recorded a population of 1,913, reflecting a declining trend this century from 4,576 in 1899 (Rev F.E Lawes) through 3,500 in the 1979 census, 2,300 in 1994. The current estimate in 2001 is a population of 1,769 (Table 1). Demographically Niue is in a unique and difficult position as the population on the island steadily declines, with a corresponding build up of expatriates in New Zealand (Table 2), and to a lesser extent Australia. The causes of the net emigration are by no means clear and a number of measures to counteract this have been initiated with limited success.

Table 1: Estimates of Niue's population

Year to 30 December	Total population
1875	5076
1899	4576 + *19E
1921	3761
1945	4353 + *29E
1948	4326
1951	4507 + *46E
1956	4726 + *57E
1961	4864
1969	5296
1970	5111
1971	4937
1972	4591
1973	4142
1974	4008
1975	4048
1976	3954
1977	3816
1978	3578
1979	3500
1981	3200
1984	2900
1986	2500
1991	2200
1994	2300
1997	2000
2001	1769**

* Figures such as 19E refer to the number of Europeans present, which were recorded separately in earlier years.

** Estimate only

Sources: Department of Justice, Lands & Survey; Soils & Agriculture of Niue, Wright & Westerndorp (1965); Economic, Planning, Development & Statistics Unit, Premier's Department.

Table 2: Niueans living in New Zealand

Sex	1986	1991	1996
Males	6,267	7,173	9,183
Females	6,234	7,254	9,291
Total	12,501	14,427	18,474

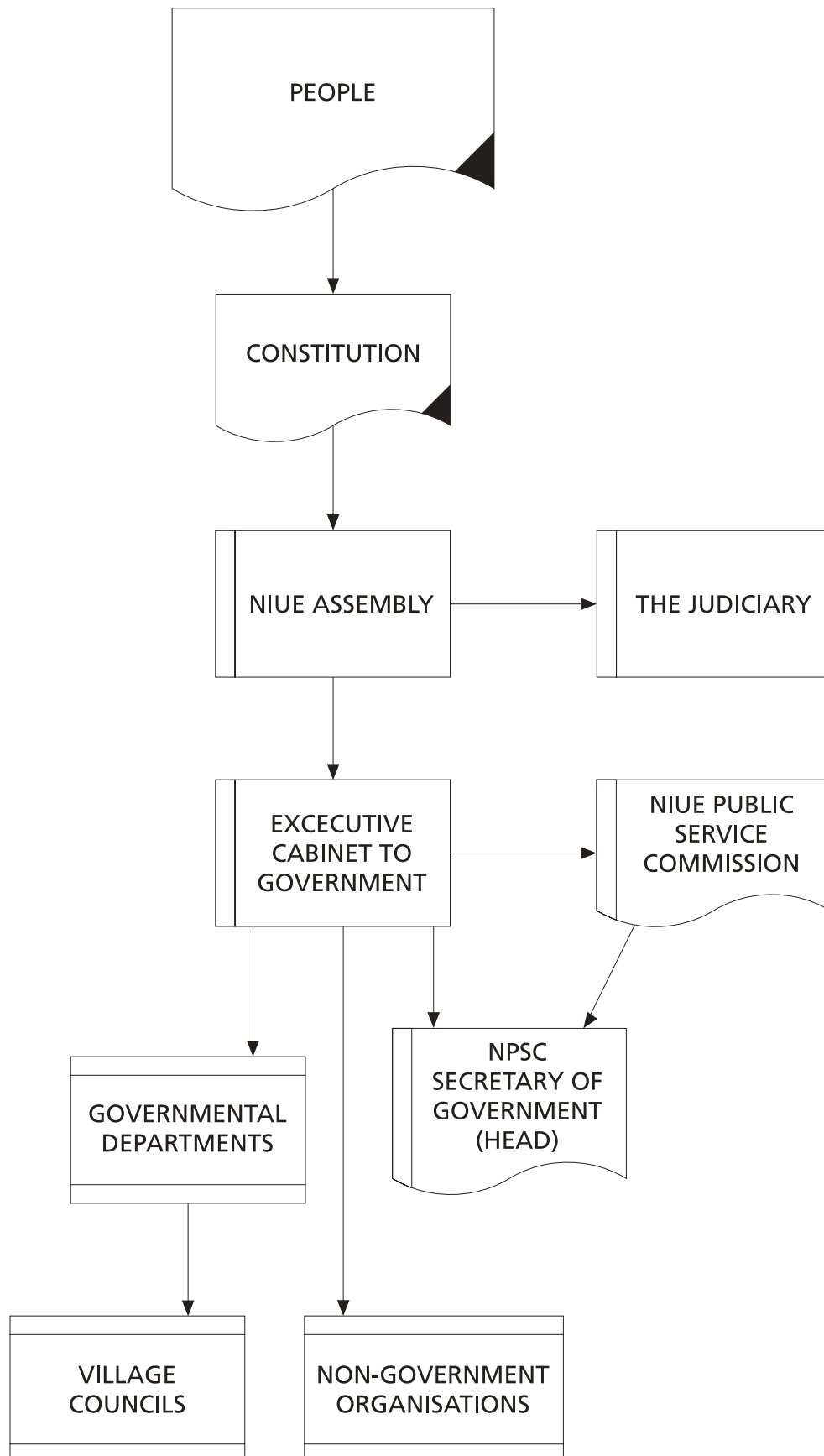
Source: Secretariat of the Pacific Community (1999)

2.1.5 Government structure

Niue is described as being self-governing, in free association with New Zealand. This means, besides Niueans remaining New Zealand citizens, that New Zealand remains responsible for Niue's defence, external affairs and for the provision of economic and administrative assistance. However, since this arrangement came into effect, there has been a gradual devolution of the responsibility for external affairs from the New Zealand Government to the Niue Government, to the extent that the Niue Government is a signatory to many international conventions and is a member of a number of international organisations.

Niue has adopted a Westminster parliamentary system with an elected Premier and members of Cabinet. There were no political parties when Niue became self-governing in 1974, but these have started to emerge over the past decade. The Government is the main employer and is the only entity that can undertake construction projects with major ones contracted offshore. There are 14 villages, which also form the parliamentary constituencies, and each has its own elected council that is involved in many environment and development issues and acts as the link between Government and the people. The Department of Community Affairs has main responsibility for environmental issues; management of land and resources is included within the Department of Justice, Lands and Survey, and management of agriculture, forests and fisheries within the Department of Agriculture, Forests and Fisheries.

Figure 2: Shows the outline of Niue's Constitutional Structure



2.2 Current status of Niue's biodiversity

2.2.1 Terrestrial

Plants

The last comprehensive listing of the flora of Niue was by Sykes (1970) though both he and Art Whistler of Isle Botanica, Hawaii have made further small collections since. At that time, 175 native vascular plant species were identified.

No plants are confirmed as endemic to Niue though further work needs to be done on one, *Psychotria insularum*, which may be different from forms found elsewhere (DAFF, 1998b).

There is a large number of introduced plants. A recent survey identified 26 species as potential invasive weed pests and others as aggressive weeds that could become a problem in the future (Space & Flynn, 2000). Control or eradication was recommended for eleven species and programmes are already in place for some of these. A further list covers species not yet found on Niue which could become serious pests if they arrived.

Vegetation

(Most information sourced from DAFF, 1998b) (Land cover map on facing page)

Seven types of vegetation are currently recognised, comprising cropland and fern land (both grouped as managed land vegetation) and littoral shrub land, littoral forest, coastal forest, mature forest and secondary forest, grouped as natural vegetation (Whistler & Atherton, 1997).

Mature forest has a high, closed canopy dominated by **kolivao** *Syzygium richii* and **kafika** *S. inophylloides*, with **moota** *Dysoxylum forsteri*, **kanumea** *Planchonella torricellensis*, **tava** *Pometia pinnata* and **le** *Macaranga seemanii*. A range of climbers, other trees and ferns form the under-storey and ground layers. Coastal forest has a similar range of tree species with a more open scrub on the seaward margin dominated by salt-resistant trees like **futu** *Barringtonia asiatica* and shrubs.

Secondary forest lacks the upper canopy layer of the mature forest and is dominated by a wide range of 'pioneer' species such as **fou** *Hibiscus tiliaceus* and **koka** *Baccaurea seemanii*.

During the time that managed land is left fallow (4 to 10 years) it becomes occupied by **fou**, **nonu** *Morinda citrifolia* and **le hau** *Macaranga harveyana*. If over-cropping occurs then ferns, particularly *Nephrolepis hirsutula*, take over the ground.

Niue's forests now cover an estimated 64% of the land area compared to around 90% in the 1950s, representing a severe rate of deforestation (DAFF, 1998b). An analysis of changes of forest cover recorded 3,288 ha (12.6%) was covered in merchantable forest — which can largely equate to mature forest — in 1981, 12,735 ha (48.6%) in light forest — equivalent to secondary forest, 2,276 ha (8.7%) in coastal forest — equivalent to coastal and littoral, and 7,874 ha (30.1%) in open and cleared areas — managed land vegetation (Martel et al., 1997). Between 1966 and 1981, open and cleared areas increased by 118%, representing the loss of 4,255 ha of forest (16.2% of the land area). The actual forest cleared amounted to 5,400 hectares, but some open land reverted to light forest in the same period.

Clearly such rates of forest loss could not be sustained. The current situation should be identified by studies now in progress. A SPOT satellite image is

LAND COVER MAP OF NIUE



THIS MAP IS REPRODUCED IN FULL COLOUR ON THE INSIDE BACK COVER

available from 1994 and this has recently been checked on the ground, which should provide comparable figures. Funds are being sought for a further image and these together should allow comparisons of the periods 1981-1994 and 1994-2001. Significant changes are anticipated in this latter period due to increased taro cropping for export.

While clearance for agriculture has been the main reason for forest loss, together with limited accidental burning, some timber has been directly harvested for domestic construction. A single logging company, Niue Timber Products, has been operating since 1994 with a harvest of an average of 175 cubic metres a year, though most of the timber demand is met by imports. The two main merchantable species harvested are kolivao and kafika and the sustainable harvest has been estimated at 3,250 cubic metres a year. A small re-forestation programme using introduced species began in 1992.

Mammals — native

The only native land mammals found on Niue are the Tongan flying foxes or **peka**, *Pteropus tonganus*. They are vital to the survival of some native trees as the only species known to pollinate them, and they play a major role in the dispersal of fruits. A survey in 1998 identified the available habitat for flying foxes as 182 km² — 30 km² coastal forest, 120 km² light and scattered forest, 32 km² merchantable forest — and found the population to be well below what it could be for such an area (Brooke, 1998). The population was estimated at between 1900 and 3800 but probably nearer the higher figure, and the two largest roosts found, north of the Alofi-Hakepa road, had around 600 to 800 animals. Peka are hunted by shooting, permitted only in December and January (Wildlife Ordinance) but reported as occurring illegally at other times. They have also suffered from loss of forest habitat. The current level of hunting is considered too great and likely to threaten the survival of the species — in 1998 the take was estimated at 1000 to 1500 whereas the maximum sustainable harvest for a population of 3800 is only 748 per year. A population target of 8000 animals was identified as desirable, both to allow the current take to be sustainable and to allow recovery of numbers after any cyclones.

Mammals — introduced

Two species of rat are numerous and widespread, the **kuma** or Polynesian rat *Rattus exulans* probably introduced with the first Polynesians, and the ship rat *Rattus rattus* that arrived between 1900 and 1950 (Hay & Powlesland, 1998). The house mouse *Mus musculus* is also present. Feral pigs, dogs and cats are also fairly common. Cattle were introduced for farming in the past but few remain, and alpacas were held at a quarantine station en route to New Zealand.

Reptiles

Five species of lizard have been recorded (Wodzicki, 1969), two geckos and three skinks though no detailed studies have been undertaken.

Invertebrates

A survey in the 1960s recorded 376 insect species in 15 orders (Eyles, 1965). More recent, comprehensive information will shortly be available from a survey conducted for DAFF by the South Pacific Commission.

Insect pests

Four fruit fly species have been identified, three of which are pests of some economic importance *Bactocera passiflorae*, *B. kiriki*, *B. xanthodes* and one of no economic importance. Other insect pests will have been identified during a recent survey by Horticultural Research, New Zealand whose results are not yet available.

Birds

Thirty-one birds species have been recorded in Niue, six seabirds, 10 shorebirds and 15 landbirds (Powlesland et al., 2000). Fifteen of these have been confirmed as breeding on the island. Several species have been added to the list in the past decade, compared with 25 species listed in Lane 1994, which are mostly wading birds on migration represented by very few individuals. None of the birds is endemic to the island at the species level, but there are two endemic sub-species the **heahea** or Polynesian triller *Lalage maculosa whitmeei* and **miti** or Polynesian starling *Aplonis tabuensis brunnescens*. A notable feature is the presence of only one introduced species, the feral fowl *Gallus gallus*. A recent study has documented the fossil avifauna of the island recording the former presence of a megapode, a large flightless night heron and a flightless rail (Worthy et al., 1998).

Observations made in 1994-1995 suggest that the status of three species is of particular concern (Powlesland *et al.op.cit.*). The **lupe** or pacific pigeon *Ducula pacifica*, which is hunted by shooting, appeared to be in decline and the **hega** or blue-crowned lory *Vini australis* and **moho** or spotless crane *Porzana tabuensis* close to extinction. A survey of two villages in April 2000 found that 83% of Niueans thought that there were not as many lupe as there used to be, and they considered hunting, predation by rats, and perhaps feral cats, and the heavy use of chemicals in agriculture to be the causes.

Land crabs

There are eight known species and these are used for food or fish bait.

The most significant and largest is the **uga** or coconut crab *Birgus latro*, which is hunted as an important traditional food, using coconut as bait or by digging at night. A detailed study by Schiller (1992) estimated the population at 200,000 — low considering the amount of habitat available, but still a much larger density than on many of the other islands on which it occurs. The population is considered to be in decline due to over-harvesting, clearance of forest areas and the impact of dogs. The harvest is both for local consumption and export, the latter taking two tonnes a year in the mid-1980s (Dalzell *et al*, 1991) though permitted only outside the October/March period (Domestic Fishing Regulations). A detailed survey was carried out as part of the Huvalu Conservation Area project, which estimated around 188,000 animals in the reserve of which only 33% were adults and less than 10% of these female (Bereteh, 1999). This suggests that there is possible over-harvesting, though people's perception, shown by 65% of respondents to a questionnaire survey in April 2000, is that uga are still plentiful.

Other varieties of land crabs are eaten during the breeding season when their bodies are fat, especially the females, while the smaller species are used for fish baits.

2.2.2 Marine

Most of the information in this section is derived from Dalzell *et al.* (1991), unless stated otherwise.

Niue has no lagoon and the coastline descends precipitously to over 1000 m within 5 km of the shore. There is a narrow fringing reef round most of the island with a thin layer of corals, and richer coral growth its the edge. The total area of reef flat and sub-tidal reef has been estimated at 620 ha.

The country has an Exclusive Economic Zone (EEZ) of 390,000 square kilometres. Within this lies Beveridge Reef, a partially emergent reef containing a sandy lagoon approximately 7 km long. Visits by divers suggest it has a rich and varied reef fauna.

In 1998, 21 foreign vessels were licensed to fish for tuna in Niue's EEZ. The country is also party to a multilateral treaty with the United States though only one of its purse-seiners have visited since the treaty was signed in 1988. Forty small, locally-owned fishing boats are also licensed for this fishery but their involvement is very limited by weather conditions. This fishery is the single most important source of revenue for Niue and there is the potential to develop more of a domestic fishing capacity. Up to four game fishing and charter boats operate for tourists.

The Fisheries Unit has drafted a management plan for this fishery including four tuna species, **wahoo** (jack mackerel), billfish (marlins, sailfish, swordfish), and by-catch species such as shark and **matimati** (snake mackerel). All species of shark and ray are protected in the EEZ under a 1996 Act.

The coral reefs of Niue have been subject to damage by cyclones, particularly cyclone Ofa, as well as by some fishing techniques such as the use of explosives and poisons. Coral bleaching has occurred in recent years.

Many Niueans fish although it is only the primary means of income for a few. In 1989 there were 241 canoes and 60 aluminium dinghies on the island catching an estimated 115 tonnes of fish a year. The catch from bottom fishing by dinghies was mostly snappers, from pelagic fishing by dinghies mostly wahoo then yellow-fin tuna, and from pelagic fishing by canoes largely yellow-fin.

Most fishing and collecting of invertebrates occur on the side of the island protected from the prevailing south-easterlies. The natural inaccessibility of the eastern coast means that this area plays an important role in marine conservation.

Corals

There are 70 coral genera commonly known in the Pacific Islands and at least 43 have been recorded on the Niue rock shelf (UNEP/IUCN 1988).

Algae

Niueans are familiar with only about five species of seaweed, three edible, though largely eaten in the past and two inedible (Sisikefu, personal comment).

Mammals

Humpback whales are the most common whales in Niuean waters and they are a particular feature during the months of July to September when they often

pass close to shore. Single minke whales and pods of pilot whales are also seen (Marsh, G. personal comment). One species of dolphin is present, the spinner dolphin. All marine mammals are protected in Niue.

Reptiles

Two species of turtle are found in Niuean waters, the hawksbill and green. In the past they were taken as food, but fewer are seen today and they are fully protected (Domestic Fishing Regulations 1996). The endemic Niuean banded sea snake is relatively abundant.

Fish

A preliminary checklist of fish lists around 240 species excluding small bullies and eels found in freshwater caves (Yaldwyn 1970). A 1998 survey of the Namoui Marine Reserve (Labrosse et al., 1999) recorded 103 of fish species in 19 families, including 79 used for food. The site had one of the lowest mean fish biomasses (54 gm/m²) for fringing reefs in the region, however a site at Avatele surveyed for comparison had one of the highest (155 gm/m²). The family with most species and highest densities and biomass was the Acanthuridae (surgeon fish), followed, in terms of density, by Serranidae (grouper, cod), Chaetodontidae (butterfly fish) and Mullidae (red mullet). The Scaridae (parrot fish) were the second family in terms of biomass. Twelve species accounted for over half the total biomass.

There is little information on changes in fish numbers. A questionnaire survey in April 2000 recorded that 37% of the people stated that there were still plenty of ocean fish in Niuean waters, while 20% stated there were not many.

Invertebrates

There is a rich, though largely undocumented, marine invertebrate fauna. Groups of possible commercial value have been subject to more detailed study. Crabs and crayfish/lobsters are well represented with around 20 species. There are five species of beche-de-mer, most of low value and two of giant clams *Tridacna maxima* and *T. squamosa*. Clam numbers were found to be depleted. Though consumption rates were not sufficient to threaten their survival, some active conservation was recommended with the formation of 'clam circles' to enhance breeding.

The Namoui Marine Reserve survey (Labrosse et al., 1999) sampled invertebrates in the intertidal zone there and at Avatele. Densities of sea cucumbers and clams were lower than Dalzell's results, probably as a result of fishing pressure, though there was some difference in sampling techniques.

The Domestic Fishing Regulations 1996 impose quotas of 10 clams or crayfish per day and determine that the minimum sizes for these are — tail length 130 mm and length of 180 mm respectively.

The crown-of-thorns starfish, whose periodic population increases have seriously damaged reefs elsewhere in the region, is found in low numbers at 1.3/ha compared with over 100/ha considered high numbers elsewhere. Problems with increased numbers have not been recorded in Niue.

2.2.3 Freshwater

Niue has no surface wetlands though there is standing water in some caves. Two species, a small bully and an eel have been found at these sites (Yaldwyn 1970). No amphibians are known from Niue.

2.3 Decline of biodiversity

There is little detailed information to quantify declines in Niue's biodiversity. Most information is available on birds. Studies of cave deposits have found three species of birds to be extinct, the Niue night heron, Niufo'ou megapode and Niue rail (Worthy *et al.*, 1998), probably associated with hunting by early peoples and with the mammalian pests such as the Polynesian rat that they brought with them. Numbers of remaining forest birds and plants will have declined as forest was cleared to make way for agricultural crops or for timber (see next section), particularly as this process has accelerated in recent years. Natural disasters will also have taken their periodic toll, the most significant recently being cyclone Ofa in 1990. Declines through harvesting have undoubtedly occurred in species such as the lupe, peka, uga and reef fish and invertebrates.

2.4 Threats to biodiversity

This section summarises ongoing threats to the survival of Niue's native biodiversity and identifies possible new threats that this strategy must address.

Forest clearance

There has been a progressive decrease of the indigenous forest area over the last 30 years, largely through clearance for agricultural purposes, reducing the overall forest cover from an estimated 86% in the 1980s to 64% of the island in 1994. This is equivalent to a rate of deforestation of 0.9% of the 1996 forest cover every year. The area of primary and regenerating forest has been reduced by 30% between 1966 and 1994, with most clearance from 1981 to 1994 (DAFF 1998b). Most clearance has occurred in the inner parts of the island, as coastal areas are typically very rocky and rugged.

Clearance has been increased by the use of bulldozers, which on occasion have also destroyed heritage sites. The Moui Faka Niue scheme has increased the affordability of land clearing for agriculture, but its impact on the rate of forest clearance is unclear (DAFF, 1998).

Reduction in the size of remaining forest patches means that they have reduced resilience to recover from natural disasters such as cyclones and wild-fires, and may be more liable to infestation by weeds and other pests.

Decline in soil fertility and structure

Traditionally, land cleared for cultivation was left fallow for over ten years after cropping and this sustained the soil. However more recently it has been left fallow for much shorter periods. Clearance by repeated burning, the use of bulldozers or herbicides, combined with a programme of disc-ploughing in the 1960s that increased the oversupply of calcium, along with the increased use of fertilizers, have all combined to reduce the organic matter in the soil, alter its chemical balance and reduce its ability to retain water. In some areas

the soil can now support little more than ferns, and one result has been an increase in the previous threat, the clearance of areas of primary forest.

Non-sustainable land management

Declining soil values is one measure that some current land management practices are not sustainable. Increased costs within agriculture such as herbicides for bush clearance and fertilisers make sustainability harder to achieve. This problem is also made worse by the declining population, which makes it uneconomic for farmers to invest in more sustainable practices, as there is a limited market for agricultural produce.

Planning for sustainable land management is hampered by the lack of sufficient baseline data and satellite imagery and by the limited capacity within Government departments.

Lack of sustainable management of marine resources

There are several barriers to maximising the sustainable use of marine resources such as poor access, lack of a viable local market for commercial fisheries, and poor transport infrastructure for exports.

Lack of information and understanding, and increased pressures at community level

Village communities, who have a major role to play in biodiversity conservation, tend to lack an understanding of how to manage their resources in a sustainable manner. Part of this is due to the shortage of information material prepared for them specifically. Until recently there has been no successful conservation model to balance against the demands of production, particularly with the new pressures from an increasingly cash-based economy.

Loss of traditional knowledge

The gradual and continual erosion or loss of traditional knowledge of conservation and management is recognised at present as a threat by environmental agencies. This concern is compounded by the low priority granted to the protection and maintenance of such knowledge in some government departments and in school curriculums.

Alien invasive species

The current range of animal and plant pests found on Niue threatens the survival of some native species. Certain pests present in countries with sea or air links to Niue that have not yet reached here pose an even greater threat. One does not have to look far in the Pacific to see the damage done by the taro blight in Samoa, the giant African land snail in many countries, or the brown tree snake in Guam.

Over-harvesting of 'traditional' species

Threats from over-harvesting exist for species like the uga, which is currently harvested both for consumption in Niue and for informal exports to the Niuean community in New Zealand, the peka and lupe.

Scarcity of freshwater resources

The underground water lens, which currently supplies Niue's freshwater requirements, is vulnerable to pollution from agricultural chemicals, industrial chemicals such as fuel oils, and domestic waste and sewage. It may also possibly be affected by any sea level rise associated with global climate change.

Loss of agricultural biodiversity

A few new ones are gradually replacing many older traditional cultivars of important root crops such as taro, yams and bananas. The traditional cultivars are potential sources of genetic material for disease resistance and other breeding purposes.

Lack of legislation or enforcement

Currently there is no legislation covering management of the environment as a whole, though two Bills, one including Environmental Impact Assessment, are in draft form. Where legislation does exist, as in the control of shooting of pigeons and flying foxes, it is often not well enough enforced.

Fragmented approach from Government and non-Government agencies

There is currently rather a fragmented approach to environmental management with several different agencies involved without clear co-ordination.

Population decline

The declining population while reducing pressures on natural resources is also considered a threat by some, making it harder to sustain conservation areas and to put in place the infrastructure needed to support these and other programmes.

Bio-prospecting

The prospecting for organisms, particularly plants that may have medicinal or other properties — bio-prospecting — is seen as offering future opportunities for earning overseas currency, but it can also carry high risk. It raises ecological and cultural issues and problems of ensuring equitable access to genetic resources and to benefit sharing.

Currently there is a reluctance to part with knowledge of traditional medicines through a fear of them being exploited solely for financial gain, a situation in which many consider them to lose their effectiveness. Past experiences in the region, particularly with outside pharmaceutical companies capitalising on kava as a highly marketable medication have taught the South Pacific the value of protecting its traditional knowledge.

The rights of the Niuean people in relation to indigenous genetic resources need to be identified and addressed by way of policy and/or legislation. A systematic approach to managing bio-prospecting also needs to be developed and will depend on an informed and consolidated inter-agency cooperation. There is a need for a national framework that will determine and manage access to genetic resources for commercial purposes as well as a framework that will ensure the equitable distribution of benefits.

2.5 Opportunities for biodiversity conservation

While there are significant threats to biodiversity conservation, Niue offers particular opportunities. Traditional conservation practices such as tapu are still being practised. Key species of traditional importance such as peka are still in sufficient numbers that sustainable management is still possible. One land and one marine conservation area have already been established to provide possible models for future projects, and forest conservation is increasingly recognised as important to tourism. The reduced human population level places fewer demands on biodiversity. There is also a good level of co-operation between different Government agencies.

2.6 Benefits of biodiversity

An economic valuation has not been undertaken and is suggested as a follow-up activity to this strategy. It will enable some dollar values to be put on biodiversity conservation, measuring both the direct values from using natural resources such as fishing and indirect values such as the role forests play in maintaining water quality and climate.

There is a range of methods that can be used to measure values of biodiversity. Cost benefit analysis counts all the costs and benefits, tangible and intangible, whether readily quantifiable or difficult to measure, that will accrue to all members of society if a particular project is adopted.

Preventative expenditure approaches examine the up-front payments paid in order to prevent environmental degradation.

2.7 Summary of biodiversity activities on Niue

2.7.1 Surveys

The following surveys have been carried out in recent years providing a fairly comprehensive picture of Niue's terrestrial and inshore marine biodiversity. They provide baseline figures which can be used for future monitoring purposes for animals like the uga and peka, and for fish and invertebrates in the marine reserve.

Surveys of Huvalu Conservation Area — Forests (Whistler & Atherton, 1997), peka (flying foxes) (Brooke, 1998), uga (coconut crab) (Bereteh, 1999).

Surveys of Anono Marine Reserve (Labrosse Et al., 1999)

South Pacific Commission survey of insects — Report not yet available

NZ Horticultural Research survey of invertebrate pests — Report not yet available.

Survey of Sub-fossil (Worthy et al., 1998) and extant Birds (Powlesland et al., 2000).

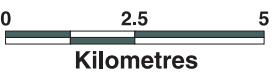
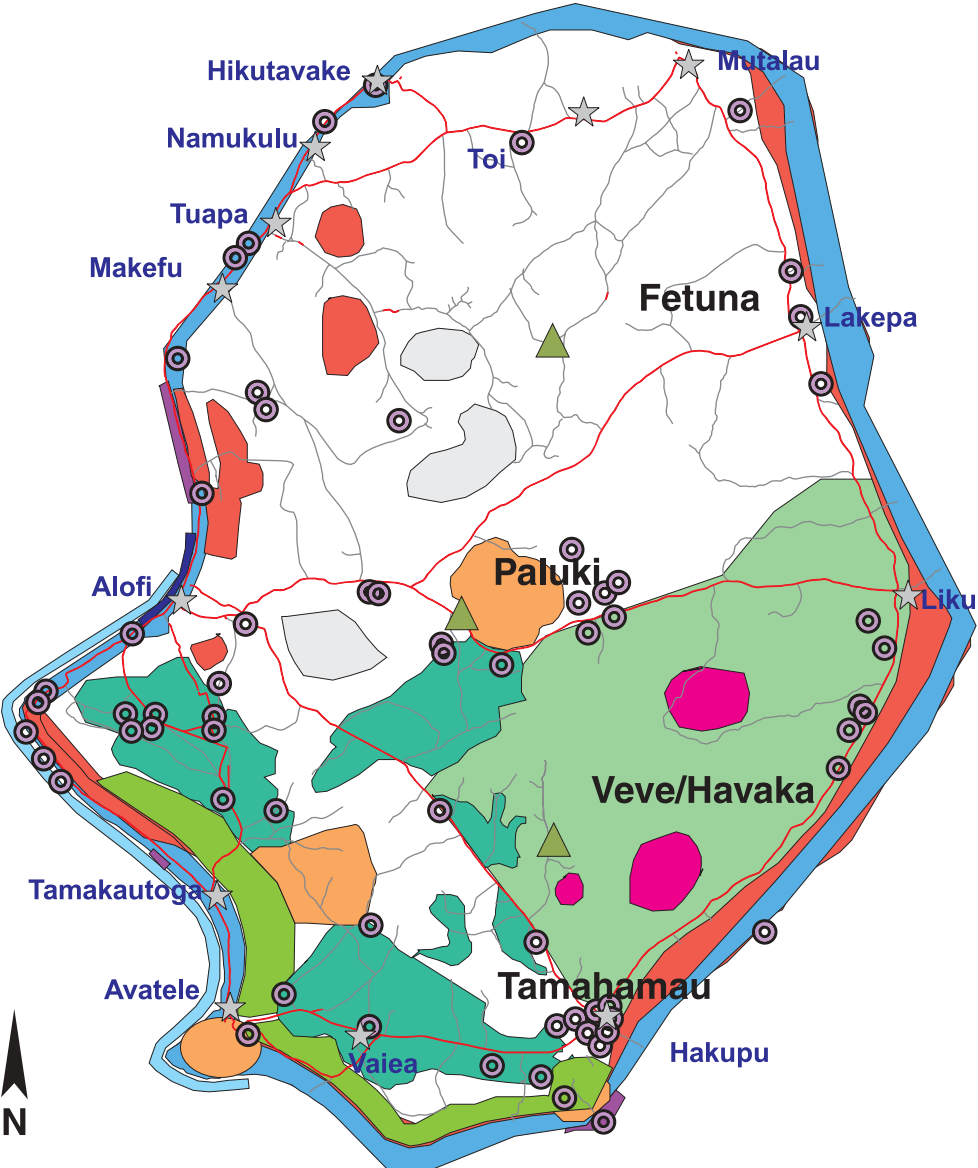
Merchantable Forest Survey, (DAFF, 1992).

2.7.2 Protected areas and other conservation initiatives

2.7.2.1 Huvalu forest conservation area project

This project was established in 1992 by the Environment Unit in consultation with the villages of Liku and Hakupu, and with financial and technical assistance from the South Pacific Biodiversity Conservation Programme (SPBCP). It aimed to conserve the biodiversity of the Huvalu Forest Area through developing or strengthening traditional conservation activities and ensuring the sustainability of any resource use. It is designed to have the full participation of the village

CONSERVATION MAP



Conservation Status	
■	Coastal Landscape
■	Huvalu Conservation Area
■	Mollusc Migration
■	Other Landscape
■	Overuse Land
■	Peka & Lupe Area
■	Potential Tapu
■	Reef Overuse
■	Reef Protection
■	Tapu
■	Uga Area
○	Caves
▲	Old Villages
—	Main Roads
—	Bush Roads

PRODUCED BY: THE ENVIRONMENTAL
 PLANNING UNIT, DJLS. 1999.
 GOVERNMENT OF NIUE.

FORESTS



Forest interior. Photos by T.H. Worthy



Forest edge with creepers. Photo by R.G. Powlesland

communities and at the same time use modern planning and management techniques.

The Huvalu Forest Conservation Area is situated on the eastern part of the island covering an area of approximately 54 km² (5,400 ha) surrounding the largest area of primary forest in Niue. It is located between Liku to the north and Hakupu to the south and also includes an area of reef platform about 15 to 20 metres from the high tide mark.

The project site is divided into three areas according to local traditional practices. The core of the reserve around 100 hectares in size is tapu, a most sacred site, and hunting, logging or even research is prohibited. A surrounding area of about 2500 ha of primary forest provides some protection to the core, but is used for hunting and other activities under the management of land-owning families and the two village councils. Outside this is a buffer zone of approximately 2800 ha of agricultural land subject to controlled, shifting cultivation to ensure sustainability.

A major aim of this project was to develop income generating activities to make sustainable use of the shared resources of the villages of Hakupu and Liku and to provide employment for the villagers. Consequently, eco-tours were developed in each village incorporating historical and natural sites and displays of handicrafts and weaving. The tours are complemented by two traditional information centres or fales, located in each village. The forest area boasts a scenic track fitted with descriptive signage and information.

Whilst the village of Liku plans to grow and produce nonu juice for the local and international market, Hakupu has developed as its income generating activity a DME plant that produces coconut oil products and soaps for the local and growing New Zealand market, and employs up to twenty people.

The Huvalu Conservation Project has conducted surveys of its biological resources, including the vegetation, and populations of peka, and uga. Villagers have been trained in survey techniques and there is a monitoring programme in place for bird species.

Current funding for the Huvalu Forest Conservation Area is due to be phased out at the end of 2001 and other financial assistance is being sought to ensure its future.

2.7.2.2 Hakupu Heritage and Cultural Park (HHCP)

The HHCP extends south from the Tuhia access track in the village of Hakupu. To the North is the Huvalu Forest Conservation Area. This project was largely initiated by Misa Kulatea of Hakupu with the support of family members. The area is managed by a committee comprising mainly family members who share ownership of its land.

The primary objective of the project is to inventory and protect areas of historical and ecological significance. This includes caves used traditionally for burials and others where the women of the village undertook weaving, as well as fortress sites identified as ancestral dwellings and a flying fox sanctuary Tauga Peka.

Natural reserves identified for management include three fresh water caves at the Tuhia Sea Track and blowholes at Mata along the reef. The project plans to develop income-generating activities, particularly eco-tours, that will provide employment for villagers as well as those who will manage the cultural centre.

2.7.2.3 Anono (formerly known as Namoui) Marine Reserve

This site, located south of Makapu Point, was registered as a fisheries reserve in 1998 as a precautionary measure to protect and preserve its overall marine biodiversity for the benefit of future generations. Its total water surface area to the 50 m isobaths is 27.67 ha (DJLS Government of Niue). A fish survey was carried out in 1998 by SPC and Fisheries Division staff to inventory fish of commercial or ecological importance, survey the habitat and fish community structure and to formulate a monitoring programme (Labrosse *et al.* 1999).

2.7.2.4 Traditional village reserves (Fono and Tapu) (DAFF, 1998b)

Villages or members of extended families have traditionally used two practices to manage land and prohibit activities which serve to conserve that land. The first — fono — is a temporary restriction imposed usually for a year, prohibiting access to an area, land or marine, and prohibiting harvesting in it, as a mark of respect to a deceased family member. Fono may also be enforced for a few months to facilitate the harvesting of certain species of fish, for example the **kaloama** or yellow-striped goatfish *Mulloidis flavolineatus*.

A tapu is a permanent restriction imposed by the whole village, protecting a certain area because it is sacred or vital to the breeding of certain species such as flying foxes. Many tapu cover primary forest and a key part of the Huvalu Conservation Area is protected by this means.

There is some concern that such traditional measures are weakening, due to lack of awareness amongst the young, the poorly defined boundaries of such areas, and the pressures to clear more land or harvest more resources.

2.7.2.5 Local Area Plans

This initiative is part of an AusAid funded Environment Management and Planning project. Staff of the Environment Planning Unit, Department of Lands, Justice and Survey, have developed draft Local Area Plans for several villages which map out the land to be used for different purposes (See page 30 for one example). Drawn up in consultation with the villagers, these plans divide land into that to be used for agriculture and that to be managed for cultural or environmental purposes such as forest reserved as an uga area. Once plans have been completed using a GIS mapping system there will be further consultation with the villages with the aim of adopting and implementing them.

2.7.3 Strategies

Niue's National Environment Management Strategy (NEMS) was developed within a regional project of the South Pacific Regional Environment Programme (SPREP). Co-ordination of its implementation is now a major task for the Environment Division of the Department of Community Affairs. The NEMS identified six broad objectives and a series of strategies and action plans to address them.

1. Integrating environmental considerations into sustainable economic development
2. Improving environmental awareness and awareness
3. Strengthening the resource information database

COASTAL SCENERY



South-west coast. Photo by D.J. Butler



Matapa Chasm. Photo by D.E. Cole



Cliffs and reef platform, Tuapa. Photo by D.E. Cole

FISHING



Fishing from a vaka. Photo by D.E. Cole



Fish caught for a ceremony.
Photo by D.E. Cole



Carrying a vaka.
Photo by D.E. Cole

4. Protecting areas of high ecological wilderness and cultural value
5. Improving waste management and controlling pollution
6. Sustainable use and management of natural resources



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2.8 Legislation and departmental policies and programmes relevant to biodiversity conservation

2.8.1 Legislation

Draft legislation

An important legal framework for this strategy is provided by two pieces of draft legislation. One, the Environment Bill, has undergone several changes since initially developed in 1992. The draft includes provisions for the role of the unit/division and for Environment Officers, the responsibilities of the Minister and powers to give direction and make orders, and the creation of an Environment Council (Part II). It also details environmental offences, enforcement mechanisms and penalties (Part III).

The other is the draft Integrated Environment Planning and Management Bill which makes provision for Environmental Impact Assessments (EIAs) and establishes land management procedures.

Enacted legislation

TERRITORIAL SEA AND EXCLUSIVE ECONOMIC ZONE ACT 1997

This makes provision with respect to the territorial sea of Niue and establishes an Exclusive Economic Zone for Niue adjacent to the Territorial Sea. It affirms the sovereign rights of Niue to make provision for the conservation and management of the resources within the zone and other related matters.

DOMESTIC FISHING ACT 1995

Includes provisions for the prohibited of certain methods of fishing, for example the use of any explosives, the use of firearms or hand-held power heads and the use of fish poisons such as the New Guinea creeper or akau niu kini.

DOMESTIC FISHING REGULATIONS 1996

This provides measures to protect certain species from being harvested and from being exported overseas. Protected species include the Niuean banded sea snake, all marine mammals and turtles, live corals, egg-carrying or soft-shelled crustaceans and certain fish. A similar list identifying those species that cannot be exported without written Cabinet approval also includes live tropical fish, sea cucumbers (beche-de-mer), live sea shells and crayfish. The export of uga is also prohibited from 1 October to 1 March each year, without written Cabinet approval.

The regulation establishes minimum size limits for uga — thoracic length 36mm, crayfish — tail length 130 mm, clams — 180 mm, **tapatapa** (slipper lobster *Paribacus caledonicus*) 80 mm in length, as well as quota limits of 10 clams or 10 crayfish per day per person.

The organisms considered destructive to the reefs and permitted to be destroyed are the crown of thorns starfish, Japanese starfish and the long-spined coral-boring sea urchin.

AGRICULTURE QUARANTINE ACT 1984 AND ASSOCIATED REGULATIONS

The Act provides for the prohibition of the importation of plants, plant materials, animals and animal products, organisms and biological product into Niue. A provision also provides for the administration and enforcement of the Act. The

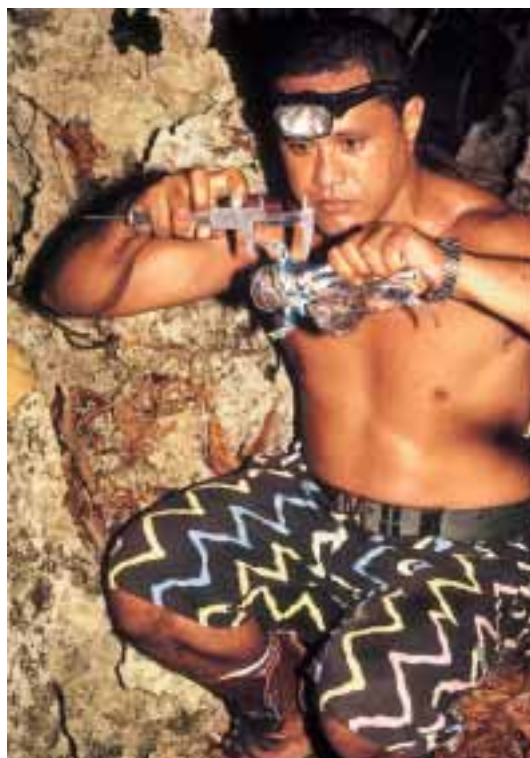
HABITATS AND SPECIES



Coral Reef. Photo by Nuie Dive



Kalavi land crab. Photo by M. Kulatea



DAFF officer measuring uga, coconut crab. Photo by D.E. Cole

AGRICULTURE



Nursery shed, Agriculture Station. Photo by D.E. Cole



Taro plantation.
Photo by R.G. Powlesland



Plantings of Pandanus.
Photo by R.G. Powlesland



Weeding taro. Photo by D.E. Cole

Act and associated regulations mitigates, prevents, control and eradicated the intention and unintentional introduction of alien species. The Act and the regulations also prevent the impact of invasive species that threaten Niue's ecosystems, habitat and native species.

The associated regulations are —

- Plant Quarantine Regulation
- Prevention of Animal Disease Regulations
- Animal Disease Control Regulations

The Act and Regulations allow Niue to regulate its border and ensure effective quarantine measures are in place.

WATER RESOURCES ACT 1996 (INCLUDES THE RESPONSIBILITY OF THE VILLAGE COUNCILS)

This Act aims to ensure the optimum development and use of Niue's water resources; the coordination of all activities which may influence the quality, quantity, distribution, use and management of water; the application of appropriate standards and techniques for investigation, use, control, protection, management and administration of water resources; and the proper disposal of any waste products that could pollute water.

PESTICIDES ACT 1991

This provides for the assessment and issuing of permits for the importation and sale of a pesticide and the promotion of efficient, prudent and safe use of pesticides by the public.

MINING ACT 1997

This provides Cabinet with the authority to grant and regulate the granting of prospecting licenses. It includes a provision determining that the area of land in a mining lease shall not exceed 40 acres and the length of the area, as far as practical, shall not exceed twice its width.

MISUSE OF DRUGS ACT 1975

Regulations identifying prohibited plants and detailing penalties for their cultivation.

THE LAND ORDINANCE 1969

This includes a provision to allow the court, on application of any leveki magafaoa and with the consent and the majority of the members, to set aside any Niuean land for a reserve, fishing ground, village site, land place, place of historical interest, water supply, church site, building site, recreation ground, bathing place or any other specified purpose.

NIUE DOG ORDINANCE 1966

This provides for the registration of all dogs more than six months of age, for the control of numbers of dogs by the killing of female pups in certain circumstances, and for the destruction of dangerous dogs.

NIUE IMPOUNDING ORDINANCE 1967

Provides for the impounding of trespassing or wandering animals.

ANIMAL TRESPASS ACT 1997

This act was established to control the ever-increasing feral pig population, a problem not only to taro plantations but also a major threat to other plant and animal species on the island.

NIUE PUBLIC HEALTH ORDINANCE 1965

In addition to prescribing general and specific measures for the promotion and conservation of human health, this Ordinance includes requirements for proper siting, construction and maintenance of latrines and septic tanks, for the protection and control of water supply for domestic purposes, and controls over the laying of poisons.

MARINE POLLUTION ACT 1975. MARINE POLLUTION ACT 1974 (NZ)

An Act to make better provision for preventing and dealing with pollution of the sea, and to enable effect to be given to certain International Conventions, which also includes measures to prevention pollution and deal with spills.

THE VILLAGE COUNCIL'S ORDINANCE 1967

Includes identification of the function of Village Councils to undertake, provision, construct and maintain, manage and regulate in the following biodiversity related areas —

- Bush roads (excluding public roads)
- Public parks, gardens, recreation areas, scenic resorts and lookouts and other public places, reserves and land vested in the Council or placed under the control either permanent or temporary
- Supply of water, light and power, water conservation and storm water drainage
- Establishment and maintenance of forest plantation and natural forest-reserves
- Establishment of pounds and impounding of animals in accordance with the Niue Island Impounding Ordinance 1967
- Agricultural, pastoral, horticultural and forestry industries and the economic use of Niuean Customary land
- Protection of fish resources, in accordance with the Niue Island Fisheries Protection Ordinance 1965, and flora and fauna

2.8.2 Departmental policies and programmes

2.8.2.1 Department of Community Affairs

The Department's mission includes supporting sustainable development initiatives, opportunities and policies, in order to enhance community services in the areas of art and craft, cultural heritage and environment. Its current programmes include —

- Implementation of Huvalu Conservation Area Project and facilitation of phase-out of SPBCP involvement
- Niue State of Environment Programme focusing on resource monitoring and maintaining a database

CAVES



Excavating for bird bones in cave.
Photo by T.H.Worthy



Cave interior.
Photo by T.H. Worthy



Cave formations. Photo by M. Kulatea

TRADITIONAL USES



Stripping fou from poles. Photo by D.E. Cole



Weaving fou. Photo by D.E. Cole



Girl wearing fou dress.
Photo by D.E. Cole



Pandanus. Photo by T.H. Worthy

- Implementation of the Capacity Building for Environmental Management in the Pacific (CBEMP) project
- Implementation of this Biodiversity Strategy & Action Plan
- Review of, and capacity building for, the Aluminium Can Recycling Programme
- Establishment and implementation of the Pacific Environment Information Network (PEIN Project) for the exchange of information with counterparts as well as public dissemination
- Implementation of an Environmental Education and Awareness Programme
- Facilitation of the implementation of the Cartagena Protocol on Biosafety
- Implementation of the framework of guidelines for the protection of traditional knowledge and access to genetic resources on Niue and fair access to benefit sharing
- Development of an environment web page as a promotional and educational tool incorporating the Huvalu project and the unit's work programme
- Facilitation of the implementation of the Waigani Convention
- The ongoing provision of technical and policy assistance to the Hakupu Heritage Park.
- Publication of the Trees of Niue book in collaboration with DAFF and SPREP.

2.8.2.2 Department of Agriculture, Forestry and Fisheries

The Department's focus is to promote and protect the development of agriculture, fisheries and forestry in a sustainable manner. Current objectives and programmes include —

- To improve and promote sustainable agriculture farming systems
- To promote and practice biological control and the use of integrated pest management
- To promote the conservation and effective management of all marine resources and ecosystems
- To promote the sustainable harvesting of marine resources
- To promote the sustainable use of forest resources and encourage the establishment of forest plantations
- To improve and promote good animal health husbandry

Projects

Development of a National Forest Policy

A National Forest Policy Statement was endorsed in December 2000, with funding and technical support from the South Pacific Commission and the GTZ-Pacific German Regional Forestry Project. It aims to provide key principles and a vision for the conservation and sustainable use of the remaining forest areas on Niue. This project involved significant consultations with villages and the results of these, summarised in DAFF 1998b Volume 2, provide a very

valuable record of community attitudes that should be considered in any projects involving the conservation and sustainable use of forests, and the sustainable utilisation of forest resources including wildlife.

Moui Faka Niue Scheme

The Moui Faka Niue programme (MFN) was established in 1991. It was set up by the Government of Niue and the New Zealand Government to provide some sort of employment opportunities for public servants that were made redundant in 1992. There are four components in the MFN programme.

1. To facilitate cottage industries, by providing financial and marketing assistance
2. To locate and secure orders for Niuean handicraft and train Niuean people in traditional handicraft production
3. To increase agriculture production with emphasis on earning overseas income. This involves a programme to advance landowners the costs of clearing land, for repayment later.
4. To assist all villages to participate in the programme.

A grant of \$250,000.00 was donated by the New Zealand Government to fund the programme. The fund was supposed to be set up as a revolving fund. Since the inception of the scheme, problems have arisen in recovering funds from trading activities, like the sales of taro to Niuean communities and importers in New Zealand.

The agriculture production assistance programme was the only programme that survived until the late 1990s. The programme to advance the costs of land clearance was often criticised by people for promoting deforestation and a threat to Niue's biodiversity.

Niue Forestry Project funded by NZODA (Landcare Research, 2000)

This project seeks to assist in the transition from Government plantation forestry to private conservation and the development of land and forest resources, largely through the implementation of the Niue National Forest Policy. It includes the privatising of mahogany plantations, the development of agro-forestry and tree cropping.

Inshore Fisheries Management Plan

This plan is being developed as a joint project between the South Pacific Commission and DAFF.

2.8.2.3 Department of Justice, Lands & Survey

The Mission Statement of the Department of Justice, Lands & Survey is —

‘To contribute to Economic Development by facilitating an effective and transparent management of lands and resources, judicial, electoral and related information systems’.

It is responsible for the surveying and titling of untitled land and the management of titled land. It maintains databases of titled land (ownership) as well as environmental planning, traditionally known as town and country planning, which includes effective management of land and resources.

Land and Marine Resources Planning Project (AusAid)

This project has included the development of a GIS mapping system, the drafting of the Integrated Environment Planning and Management Bill and associated regulations and planning procedures, and a programme to develop Local Area Plans.

2.9 Conventions relevant to biodiversity conservation in Niue

CONVENTION ON BIOLOGICAL DIVERSITY (CBD) 1992

International Convention to conserve biological diversity, ensure the sustainable use of its components and the fair and equitable sharing of the benefits arising out of this use. Includes provisions for appropriate access to genetic resources, appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies.

APIA CONVENTION 1976

Officially called the Convention on the Conservation of Nature in the South Pacific, this regional convention seeks to encourage the creation of protected areas.

CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES (CITES) 1973

Convention for international cooperation to protect certain species of wild fauna and flora against over-exploitation through international trade.

WORLD HERITAGE CONVENTION (CONVENTION FOR THE PROTECTION OF THE WORLD CULTURAL AND NATURAL HERITAGE.) 1972

International convention for the protection of the cultural and natural heritage sites that are of outstanding interest and universal value and therefore need to be preserved as part of the world heritage of mankind.

SPREP CONVENTION 1986

Also called the Convention for the Protection of the Natural Resources and Environment of the South Pacific Region, this convention provides a broad framework for cooperation to prevent pollution of the marine and coastal environments.

CONVENTION ON WETLANDS OF INTERNATIONAL IMPORTANCE (RAMSAR CONVENTION) 1971

International convention aimed at stemming the progressive encroachment on and loss of wetlands, because of their great economic, cultural, scientific, and recreational value, and especially as a waterfowl habitat.

CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS 1979

International convention to ensure the conservation and effective management of migratory species of wild animals through the concerned action of all states within whose boundaries such species spend any part of their life cycle.

CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AND OTHER MATTERS 1972

International convention requiring parties to control sources of pollution of the marine environment and to prevent pollution of the sea by the dumping of waste and other matters.

CONVENTION FOR THE PROTECTION OF THE OZONE LAYER 1985

International convention aimed at protecting human health and the environment against the adverse effects resulting from the modifications of the ozone layer.

FRAMEWORK CONVENTION ON CLIMATE CHANGE 1992

International convention to protect the climate from the increasing atmospheric concentrations of greenhouse gases that is resulting in the additional warming of the Earth's surface and atmosphere.

UNITED NATION CONVENTION ON THE LAW OF THE SEA 1982

This convention lays down the basic legal regime for the conservation and utilisation of marine resources. It gives coastal states jurisdiction over all resources, including living resources, in an exclusive economic zone (EEZ) that can extend up to 200 nautical miles (370 km) from their coasts. The convention also contains built-in safeguards for the protection and preservation of the living marine resources beyond the limits of national jurisdiction.

WAIGANI CONVENTION

Regional convention, signed by all forum countries except the Marshall Islands, prohibiting the shipment of hazardous wastes from outside Pacific Islands into Pacific Islands. To date three countries have ratified it but it needs ten parties to sign before it enters into force.

AGREEMENT FOR THE IMPLEMENTATION OF THE PROVISIONS OF THE UNITED NATIONS CONVENTION OF THE LAW OF THE SEA RELATING TO THE CONSERVATION AND MANAGEMENT OF STRADDLING FISH STOCKS AND HIGHLY MIGRATORY FISH STOCKS. 1995 (UNIA)

This agreement initiated at the Earth Summit was adopted in 1995 but requires further countries to ratify or accede before it comes into force. It introduces a number of innovative measures obligating states to adopt a precautionary approach to fisheries exploitation and gives expanded powers to port states to enforce safeguards for the proper management of fisheries resources.

CONVENTION FOR THE REGULATION OF WHALING 1946

This convention's objective is to protect all species of whales from over-fishing and to safeguard for future generations the great natural resources represented by whale stocks. The convention sets up a Whaling Commission to encourage research and investigation, appraise, and disseminate information concerning whaling and whale stocks, and to meet annually to adopt regulations for the conservation and utilisation of whale stocks.

CONVENTION FOR THE CONSERVATION AND MANAGEMENT OF HIGHLY MIGRATORY FISH STOCKS IN THE WESTERN AND CENTRAL PACIFIC OCEAN 2000

The objective of this convention is to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the Western and Central Pacific Ocean in accordance with the 1982 United Nations Law of the Sea Convention and the UNIA.

SECTION 3: VISION AND GOALS

3.1 Vision

Niue is an Environmentally Friendly Nation in which conservation and the sustainable management of biological resources support all the living community.

3.2 Goals

3.2.1 Protection of biological diversity

To retain and enhance existing biodiversity, maintaining sufficient remaining habitats and ecosystems to support the population of all species and their genetic diversity.

Explanation

This goal focuses on preventing any further declines of species by maintaining as much remaining natural habitat as possible. It also needs to improve the situation with programmes to increase the numbers of certain species and to encourage the restoration of more areas to primary forest.

3.2.2 Policy, planning and institutional frameworks

To integrate the conservation and sustainable use of biological diversity into Government development policies and plans.

Explanation

Biodiversity conservation is recognised as a shared responsibility. Some Government agencies have a direct role in biodiversity conservation, while others undertake activities that can have positive or negative effects on it. It is therefore important for the policies and plans of all these to have regard for the conservation and sustainable use of biodiversity.

3.2.3 Local communities and customs

To improve village and family understanding about biodiversity and to motivate and support village and family actions to conserve and make sustainable use of our biological resources and to have equitable share from these resources.

Explanation

This goal recognises that village communities and individual families are making decisions and carrying out actions on a daily basis that affect biodiversity on land and at sea. The process of developing this strategy has involved many people in workshops, and began a process of providing them with the necessary information to sustainably

manage their resources. This needs to be further developed during its implementation. An emphasis will be placed on the use of traditional measures wherever appropriate.

3.2.4 Institutional strengthening

To strengthen in-country capabilities in planning and implementing sustainable natural resources management programmes.

Explanation

It is recognised that the full implementation of this strategy is not possible with the current resources of Government agencies and other organisations. While training and development of existing personnel can contribute to this, it is recognised that additional personnel are desirable and that outside funding will also be needed.

3.2.5 Financial sustainability

Develop local, national, and regional financial mechanisms for conservation and sustainable management of biodiversity resources.

Explanation

The development of financial mechanisms is a key to achieving many actions in this strategy. There are currently considerable international efforts being made to identify appropriate mechanisms, such as conservation trust funds. Lessons learned from such efforts will need to be adapted and applied to the Niuean situation during the implementation of the BSAP.

3.2.6 Environmental education and awareness

To strengthen environmental education, raise awareness and improve information sharing to enhance the conservation and sustainable use of Niue's biological resources.

Explanation

Biodiversity conservation requires some commitment from all the people. This will only be attained if they have the necessary information on the importance and values of biodiversity, on the threats to it and on the means to achieve its conservation and ensure that any use is sustainable.

SECTION 4: ACTION PLAN

Actions in this plan are grouped into seven themes —

Theme 1. Conservation and sustainable management of terrestrial habitats

Theme 2. Conservation of terrestrial species

Theme 3. Coastal, inshore and marine biodiversity

Theme 4. Governance

Theme 5. Waste management and water resources

Theme 6. Pests and invasive species

Theme 7. Public awareness & education

The actions have originated from recommendations from the following sources —

- Four workshops, held during the preparation of this strategy, with women, youth, men and Niueans living overseas
- Consultations with Government departments and other agencies
- The State of the Environment Report and the NEMS
- Departmental plans and policies, for example draft Forests Policy, draft Tuna and Billfish Management Plan
- Regional Strategies, for example Invasive Species Strategy
- Scientific papers, for example flying fox and bird studies

Under each action is a listing of those with major responsibility for seeing it carried out. The following abbreviations are used.

AG — Attorney General's Office

DAFF — Department of Agriculture, Forests and Fisheries

DCA — Department of Community Affairs

DJLS — Department of Justice, Lands and Survey

NGO — Non-Governmental Organisations

PWD — Public Works Department

VCs — Village Councils,

NTO — Niue Tourism Office

NIFA — Niue Island Fishermen Association,

NISFA — Niue Island Sport Fishing Association

CACC — Conservation Area Coordinating Committee

Theme 1 — Conservation and Sustainable Management of Terrestrial Habitats

This theme covers the management of land, whether it is for agricultural purposes or forest conservation. The existing patterns of land use are based on a number of factors including soil fertility, makatea outcropping, land clearing and agricultural practices, types of crops and land ownership. Measuring land use is difficult due to lack of maps, coordinated land information and the patchwork nature of areas used for cropping. Several authors have referred to the fact that sufficient areas of forest should now have been cleared for agricultural use, so that no further primary forest need be felled for this purpose. A key challenge is to then make more economic sustainable use of cleared lands.

Changing land-use practices are evident in the fact that 80% of households use bulldozers to clear land and 87% use herbicides, mainly paraquat, at a rate of 5 to 10 litres/month/household (DAFF, 1998b).

The conservation of Niue's terrestrial biodiversity depends on the protection and sustainable use of its different forest habitats. The strategy seeks to ensure this through the continued development of the Huvalu Forest Conservation Area and by the conservation of other forest areas in village Local Area Plans.

OBJECTIVE 1 Forest conservation and management

The following issues are constraints to the sustainable management of Niue's native forests — customary and fragmented ownership of forests, amount of past forest clearance, limited timber available for a sustained yield, and continuing pressure from agriculture. However on the positive side the Niuean people remain strongly linked to their forest, the resource is still relatively large, there is good natural regeneration, there may be an opportunity for Tropical Timber Certification (timber from sustainable sources), and forests are seen as a key resource for tourism.

The Niue National Forests Policy identifies an opportunity for plantation forestry. There is already a sound base of expertise and goodwill, but rationalising is needed to choose appropriate trees and sites and recognise that economic viability may not be an appropriate target. A planting programme between 1989 and 1998 saw 290 ha of plantations established, mainly toona *Toona ciliata* var *australis* and mahogany *Swietenia macrophylla*.

The policy also identifies that agro-forestry should fit well with mixed cropping systems, for example vanilla — with first plantings in 1990s and first harvest of 154 kg in 1996 and 280 kg predicted in 1997, nut and fruit trees and nitrogen fixers.

Action 1.1 Implement the Niue National Forest Policy.

Responsibility: Premier's Department, DAFF, DCA, DJLS, VCs and Village Communities

Action 1.2 Investigate the provision for providing legislation to retain primary (merchantable) forest, using only secondary forest and fern lands for cropping.

Responsibility: DAFF, DJLS, DCA

Action 1.3 Integrate results of Forest Policy consultation and its recommendations into the Integrated Environment Planning & Management Bill and the Environment Bill.

Responsibility: DAFF, DJLS, DCA

Action 1.4 Support in principle the implementation of the management plan for the Huvalu Conservation Area Project.

Responsibility: DCA, CACC, DAFF, Village Communities of Hakupu and Liku

Action 1.5 Encourage the establishment of further community-based conservation areas in consultation with landowners and village councils, for other potential sites using the approach of the Huvalu Conservation Project, Local Area Plans or other appropriate methodologies.

Responsibility: DCA, DAFF, DJLS, VCs, CACC

Action 1.6 Support and facilitate the implementation of the activities of the Hakupu Heritage and Cultural Park.

Responsibility: DCA, Hakupu Heritage Park Coordinating Committee, DAFF, DJLS, Premier's Department

Action 1.7 Research the development of a sustainable logging industry. Approve the Code of Logging for the logging industry limiting the cut per year and technology to be used. Note: the present logging is well under a sustainable level.

Responsibility: DAFF, DJLS, DCA, logging industry, Premier's Department

Action 1.8 Investigate ways to ensure that designated protected areas for biodiversity, heritage or traditional restrictions are excluded from timber harvest, hunting and farming practices.

Responsibility: DAFF, Logging Industry, DCA, DJLS, VCs, landowners

Action 1.9 Investigate the use of native trees for any future timber plantations as they provide food for wildlife, which most introduced species do not.

Responsibility: DAFF, VCs

Action 1.10 Encourage and promote agro-forestry systems.

Responsibility: DAFF, DCA, VCs

Action 1.11 Promote forest-based eco-tourism and ensure coordination of efforts with conservation initiatives to avoid land-use conflicts or duplication of effort.

Responsibility: NTO, DCA, DAFF, DJLS

Action 1.12 Facilitate the development of income-generating activities making sustainable use of non-timber forest products (such as handicrafts, medicinal and health products) and wildlife.

Responsibility: DCA, DAFF, VC's, private sector, NTO, Planning & Economic Development

OBJECTIVE 2 Sustainable management of cleared lands for agricultural and other purposes

This objective covers the sustainable management of areas in which the primary forest has already been felled. Such areas should be managed sustainably for agriculture or allowed to revert back eventually to primary forest. Actions cover the management of soils, the methods used to clear land and the use of chemicals, and sustaining their agricultural productivity.

Action 2.1 Develop a Code of Practice for land clearance using best practice including the following, and provide necessary training —

- Restricting D9 bulldozers to public infrastructure work or land clearance in previous fallow areas. This would serve to protect areas of primary forest, which D6s are not capable of clearing.
- Ensure that operators keep their bulldozers away from reserve land, burials, historical sites, and traditional forts.
- Ensure that bulldozer operators are made aware of which trees are useful food sources for wildlife and which are used as boundary markers between landowners.
- Ensure that bulldozer operators leave a litter layer and do not disturb the soil.
- Discourage or ban the use of fire to clear land.

Responsibility: PWD, DAFF, bulldozer operators, landowners, DJLS

Action 2.2 Continue and encourage research into alternatives to chemical fertilizers, for example bio-fertilisers, green manure with legumes and increased composting.

Responsibility: DAFF, Pesticides Committee, research organisations, farmers, Growers Association

Action 2.3 Promote organic farming and develop markets for organic products.

Responsibility: DAFF, Treasury, farmers, Organic Farmers' Association, Chamber of Commerce, Planning & Economic Development

Action 2.4 Undertake research to identify new crops suitable for Niue that will make sustainable use of cleared land.

Responsibility: DAFF, Niue Council of Women

Action 2.5 Develop monitoring programmes for key environmental indicators such as forest cover. Maintain and develop Niue's GIS and land mapping capability.

Responsibility: DJLS, DAFF, DCA

Action 2.6 Identify, develop and implement the conservation of the genetic resources of Niue, particularly agricultural crops.

Responsibility: DAFF, Regional Organisations, VCs, DJLS

THEME 2 — Conservation of Terrestrial Species

Niue still lacks detailed information on some of its terrestrial biodiversity and requires more surveys. For well-known groups like birds, or for well-studied

species like the coconut crab or flying fox, much is already known and measures for their conservation can be set out in a series of detailed actions.

OBJECTIVE 1 General measures

Action 1.1 Undertake further systematic botanical, wildlife and natural resource surveys.

Responsibility: DCA, DAFF, research organisations, VCs

Action 1.2 Produce a bibliography of the biological diversity of Niue.

Responsibility: DCA, DAFF, research organisations, VCs

OBJECTIVE 2 Conservation of birds

Action 2.1 Ensure the conservation of the lupe in sufficient numbers to sustain a harvest for traditional purposes through the following —

- Review the hunting season and ensure that any lasts no more than two months. Undertake research to determine the breeding season and adjust the timing of the hunting season to avoid this.
- Gather information on population size and trend and breeding rate to determine a sustainable harvest level.
- Maintain and expand the lupe monitoring programme.

Responsibility: DCA, Police Department, DAFF, VCs,

Action 2.2 Strictly enforce the firearms management system and the hunting season.

Responsibility: Police Department, DCA, VCs, hunters

Action 2.3 Develop and implement a plan for the conservation of the endangered hega (blue-crowned lory) including consideration of localised rat control, nest protection through tree banding and captive breeding.

Responsibility: DCA, DAFF, VCs

Action 2.4 Enact and enforce legislation to give partial protection to the lupe, allowing for regulated hunting, and full protection to all other bird species.

Responsibility: DCA, AG, DJLS, Police Department

Action 2.5 Undertake surveys and monitoring to establish the status of all Niue's bird species.

Responsibility: DCA, DAFF, VCs, overseas ornithologists

OBJECTIVE 3 Conservation of the peka — flying fox

Action 3.1 Develop a Management Plan for the conservation of the peka, to include the following —

- Consideration of restrictions on hunting to allow population to recover to around the 8000 level.

- Placing of temporary hunting bans after any cyclones until numbers increase to the same level.
- Monitoring of the numbers of peka shot each season, either by random survey of hunters at the end of the season, or by requiring a report of the number shot in the first month before purchase of ammunition for the second month, to determine if population has increased enough for hunting to resume.
- Legislating for the determination of the hunting season (if any) annually based on the results of the monitoring.
- Closing Huvalu Forest to peka hunting and protecting from cutting the primary forest including that alongside the Alofi-Lakepa road as they are key roosting and foraging areas.
- Eliminating shooting of peka at roosts, allowing these to become tourist attractions.
- Enforcing the ban on peka hunting outside the shooting season and carrying out research to confirm that the shooting season and breeding season do not overlap.

Responsibility: DCA, DJLS, Police Department, Hunters, VCs

OBJECTIVE 4 Conservation of the uga (coconut crab) and other land crabs

Action 4.1 Ensure the conservation of the uga through the following —

- Enforce the current legislation on minimum sizes, etc.
- Actively discourage the harvesting of breeding females.
- Investigate means to reduce the export of uga.
- Close all areas to hunting during the breeding season in December and January.
- Ensure dogs are not used for hunting.
- Protect crab sanctuaries using Hakupu Heritage Park as an example.
- Undertake monitoring to ensure numbers do not decline further.
- Develop a public awareness programme to promote the conservation of the uga and explain the regulations.
- Encourage further research into the biology of the uga.

Responsibility: DAFF, DCA, VCs, Police Department, Education Department

THEME 3 — Coastal, Inshore and Marine Biodiversity

OBJECTIVE 1 Conservation of biodiversity of inshore coral reefs

Action 1.1 Ensure that the Fisheries Division continues to strengthen the management of inshore marine resources and enforce legislation and regulations.

Responsibility: DAFF, Police Department, NIFA, NISFA, NTO

Action 1.2 Consider further regulations to conserve the inshore fishery including —

- To regulate the size of fishing nets that are being used for inshore fishing.

- Discourage the use of fish nets on the reef.
- Eliminate the use of fish poisons.

Responsibility: DAFF, Police Department, NIFA, NISFA

Action 1.3 Integrate appropriate traditional fishing practices with modern management methods as a means of effectively managing stocks, and educate people in their use.

Responsibility: DAFF, VCs, NIFA, NTO

Action 1.4 Put in place legislation to protect recognised traditional fishing grounds.

Responsibility: DAFF, VCs, NIFA

Action 1.5 Develop a programme to increase the number of Marine Protected Areas in Niue.

Responsibility: DAFF, VCs

Action 1.6 Maintain monitoring at Anono Marine Reserve, the Hakupu Heritage Marine Area and other sites.

Responsibility: DAFF, VCs, DJLS

Action 1.7 Undertake research to identify and document all marine organisms and resources, including assessment of the status of stocks, particularly those of commercial, nutritional and environmental indicator value.

Responsibility: DAFF, VCs, NIFA

Action 1.8 Develop and implement a comprehensive inshore fisheries management plan, including assessment and monitoring of offshore reefs such as Beveridge Atoll.

Responsibility: DAFF, NTO

Action 1.9 Develop and improve data collection, survey and monitoring of fisheries resources.

Responsibility: DAFF, DJLS

Action 1.10 Continue to promote and develop programmes aimed at reducing fishing pressure on inshore fisheries resources such as Fish Aggregation Device (FAD) programme.

Responsibility: DAFF

OBJECTIVE 2 Conservation and sustainable management of off-shore fisheries

The following series of actions are mostly recommendations from a draft tuna and billfish management plan. The main objectives of this are to —

- Ensure that utilisation of the tuna, billfish and wahoo stocks in the fisheries waters of Niue is consistent with the sustainable utilisation of these stocks in their entirety.
- Eliminate illegal fishing activity in the fishery waters of Niue.
- Maximise benefits to Niue, including economic and social, from the long-term sustainable utilisation of its tuna and billfish resources.

- Minimise any adverse interactions between fisheries, in particular, between the large-scale commercial fishery and the subsistence, small-scale commercial, charter and recreational fishers.
- Minimise the impact of target fishing on both the marine environment and non-target, associated and/or dependent species.

Action 2.1 Identify and secure funding to support the development and implementation of the tuna and billfish management plan.

Responsibility: DAFF

Action 2.2 Encourage the Government to carry out a survey and/or feasibility study to assess the value of fisheries for comparison of benefits from foreign fishing vessels fishing in Niue's Exclusive Economic Zone.

Responsibility: Premier's Department

Action 2.3 Enforce the appropriate prosecution of all fishing vessels that fish illegally in Niue Waters.

Responsibility: DAFF, Premier's Department, AG

Action 2.4 Amend the legislation (TS and EEZ Act 1997 and/or Domestic Fishing Act 1995) as identified in draft management plan, and develop new legislation for the management of offshore reefs.

Responsibility: DAFF, DJLS, AG

Action 2.5 Enact the Prevention of Marine Pollution Bill.

Responsibility: DAFF, DJLS, Premier's Department

Action 2.6 Develop appropriate data collection programmes to assist in the effective management of pelagic/offshore marine resources.

Responsibility: DAFF, NIFA

Action 2.7 Mobilise resources to increase capacity in the area of fisheries management to ensure effective management of fisheries resources on a national, regional and international level.

Responsibility: Premier's Department, DAFF

Action 2.8 Develop guidelines and policies for the development of a commercial offshore fishery to ensure sustainable utilisation of resources and to ensure the use of proper and environmentally safe fishing practices.

Responsibility: DAFF, NIFA, Premier's Department, NISFA, NTO

THEME 4 — Governance

OBJECTIVE 1 Enact necessary legislation for the conservation and sustainable use of biodiversity

Action 1.1 Ensure that immediate action is taken to enact into law the draft Environment Bill.

Responsibility: Premier's Department, DCA

Action 1.2 Ensure that immediate action is taken to finalise and pass into law the Integrated Environment Planning and Management Bill.

Responsibility: Premier's Department, DJLS, AG

Action 1.3 Draft and enact bio-prospecting regulations to protect traditional knowledge applicable to the use of the biological resources of Niue.

Responsibility: DJLS, DCA, AG

Action 1.4 Adopt the draft Access to Benefit Sharing (ABS) guidelines consistent with the regionally accepted 'Access Laws Checklist' and 'Guidelines and Access to Genetic Resources in the Pacific Island Countries'.

Responsibility: DCA, DJLS, AG

Action 1.5 Draft the required regulations to complement and ensure maximum protection of the water supply, as a matter of urgency.

Responsibility: DJLS, Health, AG, PWD

Action 1.6 Ensure that Niue becomes a party to the Cartagena Protocol (bio-safety protocol).

Responsibility: DCA, Premier's Department, AG

Action 1.7 Continue the current arrangement with respect to the Convention on International Trade in Endangered Species (CITES) enabling New Zealand to act at the request of the Niue Government.

Responsibility: DAFF, DJLS, DCA

Action 1.8 Ensure that the Agriculture Quarantine Act 1984 is reflected in any new entry and departure forms.

Responsibility: DAFF, Customs, Immigration

OBJECTIVE 2 Develop appropriate policy statements for biological diversity conservation

Action 2.1 Ensure that any development projects undergo an Environment Impact Assessment (EIA).

Responsibility: Planning & Economic Division, DCA, DJLS, PWD

Action 2.2 Ensure Niue meet its obligations as a signatory to the World Heritage and Cultural Convention.

Responsibility: DCA, World Heritage Committee, Premier's Department, DJLS

OBJECTIVE 3 Develop appropriate institutional mechanisms and capacity for the implementation of this strategy

Action 3.1 Maintain the Steering Committee, reviewing its membership, to plan and organize a programme for its implementation.

Responsibility: Premier's Department

Action 3.2 Build capacity in the Environment Unit, DCA, as the key implementing agency to ensure the full realisation of this strategy.

Responsibility: Premier's Department

THEME 5 — Waste Management and Water Resources

Actions in this section largely come from the Waste Management Plan prepared by an inter-departmental working group.

OBJECTIVE 1 Improve the management of waste in Niue

Action 1.1 Adopt and implement the draft Waste Management Plan.

Responsibility: Health, Water Management Committee

Action 1.2 Ensure that the Government works very closely with the Chamber of Commerce and in consultation with the South Pacific Regional Environment Programme (SPREP) to introduce appropriate new technology and systems for managing waste on Niue.

Responsibility: Premier's Department, Chamber of Commerce, health

Action 1.3 Investigate the feasibility of a treatment plant to treat human waste.

Responsibility: Health, VCs

Action 1.4 Make more use of a centralised rubbish dumping site and continue improvements in its management.

Responsibility: Health, VCs, PWD

Action 1.5 Establish a system to ensure proper disposal of rubbish in village sites.

Responsibility: Health, VCs

Action 1.6 Obtain an appropriate incinerator for the disposal of hospital and other toxic wastes.

Responsibility: Health, Premier's Department

Action 1.7 Continue a programme to replace asbestos in roofs, declaring houses with asbestos roofing as a health hazard, consider the safe removal and disposal of all asbestos roofed houses that are unoccupied, and ban any further imports or use of asbestos. Dispose of the asbestos in a way that minimises impacts on environment and human health.

Responsibility: Health, PWD, Premier's Department

Action 1.8 Research means to reduce use of pesticides, change to less toxic products or replace them with integrated agricultural management techniques.

Responsibility: Health, DAFF

Action 1.9 Continue and support public awareness to prevent littering.

Responsibility: Health, VCs, Police Department

OBJECTIVE 2 Develop recycling programmes wherever possible

Action 2.1 Continue to support the existing recycling programme for aluminium cans.

Responsibility: DCA, Health, Premier's Department, Catholic Church, private sector, Treasury

Action 2.2 Support the recycling programme for batteries to send overseas.

Responsibility: Health, DCA, Premier's Department, VCs

Action 2.3 Investigate re-cycling options for all other non-biodegradable materials, for example plastics, used vehicles and tyres.

Responsibility: DCA, Health

Action 2.4 Government and retailers to agree and implement a systematic and suitable method of separating the different types of waste, for example – food, waste meat, plastic wrappings, tin cans and empty bottles.

Responsibility: Chamber of Commerce, Health, DCA

Action 2.5 Encourage separation and composting of organic waste.

Responsibility: DCA, DAFF, Health, Education Department, VCs

Action 2.6 Investigate new technologies that reduce waste and contribute to ecologically sustainable development.

Responsibility: DCA, DAFF, Health

OBJECTIVE 3 Ensure Niue retains a safe and sustainable supply of freshwater

Action 3.1 The Water Supply Division of PWD and Health Department continue to work together to increase public awareness of ways of conserving and maintaining water quality.

Responsibility: Health, PWD

Action 3.2 Set up a rigorous programme of water monitoring to test for chemical or bacteriological contamination or radioactivity, as required by the law and current WHO standards.

Responsibility: Health, PWD

Action 3.3 Re-establish the village rainwater tanks as a back-up water supply and as a precautionary measure in case of pollution of the ground water lens.

Responsibility: PWD, VCs, health

Action 3.4 Undertake research to determine possible impacts on the underground water from sea level rise due to global warming and other causes.

Responsibility: Health, PWD

Action 3.5 Raise people's awareness of the appropriate legislation governing water supply systems.

Responsibility: Health, PWD

Action 3.6 Consider impacts on the underground water supply of any planned industrial developments, both the amount to be used and possible pollution effects.

Responsibility: PWD, Health, DCA, Planning & Economic Development, DJLS

OBJECTIVE 4 Manage mineral extraction to minimise environmental impacts

Action 4.1 Take action to reduce the number of small sites used to extract materials for road construction and concentrate this activity at a few well-chosen sites.

Responsibility: DJLS, DCA, PWD

Action 4.2 Investigate options for the rehabilitation of previous areas of mineral extraction.

Responsibility: DAFF, PWD, DJLS

OBJECTIVE 5 Minimise marine pollution

Action 5.1 Undertake surveillance of ships to ensure there is no discharge of waste or ballast in Niuean waters, and fine polluters.

Responsibility: Health, Customs, Police Department, DAFF

Action 5.2 Maintain an active Oil Spill Contingency Plan with appropriate well-maintained equipment held in Niue.

Responsibility: PWD, Police Department, health, DCA, Disaster Management Committee

THEME 6 — Alien and Invasive Species

The actions in this theme are grouped according to the aims of the regional strategy 'Invasive Species in the South Pacific' produced by the SPREP (Sherley, 2000). There is a long history of problems on Pacific islands caused by the introduction of alien species, animals, plants, and disease organisms. Though Niue has a range of pest or potential pest species, it is also free of many others found in neighbouring countries such as the taro blight, coconut rhinoceros beetle, and the giant African land snail. Maintaining strong border control to keep these out could provide Niue with a competitive advantage when it comes to growing certain crops. Avoiding the need to use pesticides and herbicides provides an opportunity for growing produce organically to obtain premium prices.

The main emphasis must be placed on preventing the arrival of new invasive species. Then, if any do arrive, they need to be detected and eradicated as soon as possible. Eradication once a species is widely established, or ongoing control become very expensive.

A survey was recently conducted of invasive plant species of environmental concern (Space & Flynn, 2000). This identified key weeds that need to be kept out — Objective 1 below, others to be eradicated — Action 2.6, Objective 2 — and sought more raising of awareness of the issue — Objective 3.

OBJECTIVE 1 Prevent the introduction of new invasive species

Action 1.1 Strengthen the border control and quarantine system to detect and destroy alien invasive species entering the country.

Responsibility: DAFF, Customs

Action 1.2 Monitor ships in port to ensure they do not discharge ballast water (a potential source of serious marine pests) or other wastes.

Responsibility: Customs, Health, Niue Yacht Club, DAFF

Action 1.3 Establish procedures to assess the environmental risks before introducing any new species for agricultural, aquaculture or garden use (Pest Risk Analysis).

Responsibility: DAFF, DCA

Action 1.4 Establish procedures to detect the arrival of any alien invasive species through the port or airport and to organise their immediate eradication.

Responsibility: DAFF, Customs

Action 1.5 Strengthen the Agriculture Quarantine Regulations to ensure that they include adequate fines for anyone involved in the introduction of an invasive species.

Responsibility: DAFF, Premier's Department

Action 1.6 Ensure that an Environment Impact Assessment (EIA) study is conducted before all live animal imports to the quarantine farm, such as the introduction of alpacas from Peru to New Zealand through quarantine in Niue.

Responsibility: DAFF, Health, Customs, Planning & Economic Development

OBJECTIVE 2 Reduce and eliminate the impacts of existing pest species

Action 2.1 Control the numbers of feral pigs and encourage their eradication through the bounty system.

Responsibility: DAFF, VCs

Action 2.2 Provide information on and enforce regulations to ensure that all pigs are confined to pens, and prosecute those who allow them to wander.

Responsibility: Police Department, DJLS, DAFF

Action 2.3 Control the numbers of feral dogs through enforcement of the Niue Dog Ordinance and Niue Impounding Ordinances.

Responsibility: Police Department, VCs

Action 2.4 Investigate the feasibility of control or eradication of rats on Niue.

Responsibility: DAFF, DCA

Action 2.5 Educate the public in ways to eliminate feral cats and encourage owners to prevent cats going feral.

Responsibility: DCA, DAFF

Action 2.6 Provide guidelines for the management and eradication of invasive weed species.

Responsibility: DAFF

Action 2.7 Establish legislation requiring people to control or eradicate certain identified invasive weeds or their land.

Responsibility: DAFF

Action 2.8 Maintain the program to monitor and carry out surveillance for fruit flies.

Responsibility: DAFF

Action 2.9 Develop a facility for the disposal of unwanted domestic animals.

Responsibility: DAFF, Premier's Department

OBJECTIVE 3 Raise awareness of the risks posed by invasive species

Action 3.1 Produce publicity material for shipping companies and arriving air passengers, identifying the range of potential invasive species in the region and the risks they could pose to Niue's environment and its agricultural, fisheries and tourism sectors.

Responsibility: DAFF, NTO, Customs

OBJECTIVE 4 Build the capacity required to manage the threats posed by invasive species

Action 4.1 Link closely into the current regional programme to receive updated information of potential new pests in the region — particularly in countries with which Niue has air and sea links — and new eradication and control measures.

Responsibility: DAFF, DCA

Action 4.2 Develop an early response plan for the eradication of newly introduced alien invasive species.

Responsibility: DAFF

Action 4.3 Provide necessary equipment and facilities to deal with any intrusion and introduction of alien species.

Responsibility: DAFF

THEME 7 — Education and Public Awareness

The development of education and public awareness programmes are important to all the Strategy's themes. However actions have been grouped together in a separate theme to provide emphasis and facilitate co-operation in this area.

Action 1 To provide a public education programme to increase understanding of the sustainable use of natural resources.

Responsibility: DAFF, DCA, VCs, Education Department

Action 2 The Health Department to continue to educate the public on proper ways and means of managing waste at home, on road sides, community buildings and village surroundings.

Responsibility: Health, DCA, Education Department

Action 3 Develop active national and village environmental education campaigns focused on sustainable management and utilisation of forest resources.

Responsibility: DAFF, DCA, VCs, Education Department

Action 4 Provide more information for tourists and Niueans returning overseas on which species are fully protected under CITES which may not be imported into signatory countries, for example coral, clam shells and turtle products.

Responsibility: DAFF, Customs, NTO

Action 5 Enhance and support the 'Keep Niue Clean' awareness programme.

Responsibility: Health, DCA, VCs, Education Department

Action 6 Educate people on the importance of retaining the knowledge of traditional practices associated with biodiversity conservation.

Responsibility: DCA, Education Department

SECTION 5: IMPLEMENTATION, MONITORING AND EVALUATION

5.1 Implementation

The key to the implementation of this strategy will be the development of work-plans identifying the priority actions over a given period. Initially this will be done annually but the frequency will be subject to review. Some actions will be priorities because they need to happen urgently, others because they are wide reaching and offer major opportunities to turn around trends in environmental degradation. Time frames and resource requirements will need to be identified for priority actions. The work plan will be linked to the Articles of the CBD where possible, so that reviewing it will also contribute directly to the production of future Country Reports to the Conference of the Parties (COP) of the CBD.

5.1.1 Principles to be applied during implementation

5.1.1.1 Ensure that all stakeholders are involved in implementation.

Traditionally there has been a tendency in many countries for women and young people to be partially excluded from decision-making affecting biodiversity conservation. Those developing actions to implement this strategy should ensure their full involvement.

5.1.1.2 Contribute to the conservation of language and culture.

During workshops to develop the BSAP there was considerable emphasis placed on the conservation of the Niuean language and culture. While it was not felt appropriate to develop specific actions for this in the Action Plan, it will be important to bear this in mind during implementation. It means that where appropriate all or part of the documents associated with biodiversity conservation should be translated into Niuean, and emphasis should be placed on conserving traditional customs and ways of managing biodiversity.

5.1.1.3 Develop a Code of Ethics for research

An existing International code should be modified for the Niuean situation to ensure among its provisions that scientists keep local people fully informed about their work, leave copies of all information, hold seminars locally and so forth.

5.1.1.4 Carry out ongoing reviews of capacity of implementing agencies

The capacity particularly the human resources of the implementing agencies will need to be kept under review as implementation proceeds. The need to co-house the Environment Unit and the Environment Planning Unit in the same department was one priority identified by some to aid strategy implementation.

5.1.2 Prioritised work plan for 2001/2002

A prioritized work plan for 2001/02 is under development.

Two lead agencies (DCA and DAFF) have identified the following actions as their initial priorities

Theme 1

Action 1.1	Forests Policy		
Action 1.4	Huvalu Conservation Area	Ongoing project	External funding needed
Action 1.6	Hakupu Heritage Park	New project	External funding needed
Action 1.10	Agro-forestry	Ongoing project	External funding identified
Action 2.1	Land clearance code of practice	Ongoing project	Internally funded
Action 2.2	Alternatives to chemical fertilizers	Ongoing project	External funding needed
Action 2.3	Organic Farming	New project	External funding needed

Theme 2

Action 1.1	Further research surveys	Ongoing project	External funding needed
Action 1.2	Bibliography of Niue's biological diversity	New project	External funding needed
Action 2.1	Stock Assessment — Lupe	Ongoing project	Internally funded
Action 2.2	Management methods — Lupe	Ongoing project	Internally funded
Action 3.1	Stock Assessment — Peka	Ongoing project	Internally funded
Action 3.2	Management methods — Peka	Ongoing project	Internally funded
Action 4.1	Stock Assessment — Uga	Ongoing project	Internally funded
Action 4.2	Management methods — Uga	Ongoing project	Internally funded

Theme 3

Action 1.1	Legislation & Regulations		
Action 1.3	Integration of old & new fishing methods	New project	Internally funded
Action 1.2	Inshore fishery	Ongoing project	Internally funded
Action 1.9	Data collection & monitoring	Ongoing project	External funding needed
Action 2.1	Management plan for tuna & billfish	New project	External funding needed
Action 2.2	Feasibility study	Ongoing project	Internally funded
Action 2.4	Management of offshore reefs	Ongoing project	Internally funded
Action 2.7	Capacity building	Ongoing project	External funding needed

Theme 4

Action 1.6	Cartegena Protocol	New project	
Action 1.1	Enact Environment Bill		
Action 2.1	EIA for development projects	Ongoing project	Internally funded
Action 2.2	Obligations to World Heritage & Cultural Convention	New project	External funding needed
Action 3.2	Capacity building of leading agencies	Ongoing project	External funding needed
Action 3.1	Steering Committee	Ongoing project	Internally funded

Theme 5

Action 1.1	Implement Waste Management Plan		
Action 1.5	Rubbish disposal methods in villages	Ongoing project	Internally funded
Action 2.4	Waste sorting	Ongoing project	Internally funded
Action 2.6	New technologies to reduce waste	New project	External funding needed
Action 3.2	Water monitoring	Ongoing project	External funding needed
Action 3.4	Underground water management	Ongoing project	External funding needed
Action 4.1	Reduce mineral extraction sites	Ongoing project	Internally funded
Action 4.2	Land rehabilitation	Ongoing project	Internally funded
Action 5.1	Discharges from ships	Ongoing project	Internally funded
Action 5.2	Oil spill contingency plan	Ongoing project	Internally funded

Theme 6

Action 1.1	Border control	Ongoing project	Internally funded
Action 1.5	Quarantine Regulations	Ongoing project	Internally funded
Action 2.1	Bounty system for feral pigs	Ongoing project	Internally funded
Action 2.6	Eradication of invasive weeds	Ongoing projects	External funding identified
Action 4.1	Regional eradication programmes	Ongoing project	External funding needed
Action 4.2	Response plans	Ongoing project	External funding needed

Theme 7

Action 1	Public education programme	Ongoing project	Internally funded
Action 3	Active educational programme	Ongoing project	Internally funded
Action 6	Importance of retaining traditional knowledge	Ongoing project	Internally funded

5.1.3 Financing

Government contributions towards financing biodiversity conservation through the budgets of the relevant departments will continue to require subsidising with significant additional funds if the objectives of this strategy are to be achieved. A recent workshop — the Regional Workshop on Financial Mechanisms for implementing National Biodiversity Strategies and Action Plans Suva, Fiji 30 October to 3 November 2000 — summarised a variety of methods to achieve this, including the following.

- International donor contributions

There is a wide range of donors active in supporting biodiversity conservation whether through international or regional programmes, such as UNDP and SPREP respectively, or bilateral aid. Niue will need to remain aware of the different organisations and projects from which funds can be sought. This strategy should also allow donors to identify Niue's needs and design programmes to accommodate them.

- Conservation Trust Funds

Such funds are increasingly being developed for biodiversity conservation. A sufficient sum needs to be assembled for the capital to last in perpetuity and the interest to fund necessary activities. Fees or taxes, identified below, contributions from local sources, Niueans living overseas and donors could be sought.

- User fees

Fees can be used as a means of financing protected areas, by charging those who visit the area or carry out particular activities there, such as diving, research and commercial photography. A survey could be conducted of visitors to the Huvalu Conservation Area, for example, to determine who would be prepared to pay what in the way of an entry fee and set rates accordingly. Commercial operators who make use of natural areas can be asked to pay a concession fee for that access, an option that might be appropriate if nature tourism becomes well established in Niue. User fees can go into a Conservation Trust Fund.

- Environmental tax

Several countries have added a specific sum to their airport departure tax, which is set aside in a fund for conservation purposes. All travellers would receive a leaflet explaining this. The tax could be applied to all travellers or those not resident in Niue only. Income from this tax could go into a Conservation Trust Fund.

- Debt for nature swaps

This is a technical arrangement in which typically the banks sell the debt owed by the Government of a developing country involved to a conservation organisation at a discount. In return the government promises to give a certain amount of funds to local conservation projects, amounting to less than the original debt.

5.1.4 International support

It does not yet seem to be clear what international funding support will be provided for the implementation of NBSAPs or how it will be delivered. A WWF/

SPREP Regional Workshop on Mainstreaming National Biodiversity Strategies and Action Plans being held in Fiji (28 May to 1 June 2001) included as one of its objectives the development of a 'draft regional plan to support national actions in implementing NBSAPs'. Its sounds as if this will be an important initiative on a regional basis.

It is to be hoped that individual donors will make use of Niue's BSAP in identifying areas that they can be of assistance on a bilateral basis.

5.1.5 Role and list of experts

It is suggested that the country maintains a register of experts, with knowledge of the biodiversity of Polynesia and Niue in particular, that can be called upon to advise on the implementation of identified actions. This could be developed and housed by the Environment Unit as a BSAP Secretariat (see below).

5.2 Monitoring and evaluation

Monitoring and evaluating implementation will be the responsibility of a BSAP Coordinating Committee. This will be based on the Steering Committee who has supported the production of this strategy, but a review will be conducted to determine if other representatives should be added. Its role will be as follows —

- Meet at least once a year to review the work plan for the previous 12 months and develop a new plan for the year ahead
- Finalise and approve Country Reports to the COP — currently required every two years
- Facilitate coordination between the different implementing agencies and individuals.

Supporting the work of the committee will be a BSAP Secretariat within the Environment Division of the Department of Community Affairs. The roles of the Secretariat will be to —

- Draft annual work plan by liaison with all implementing agencies and individuals
- Draft review of previous work plan for consideration by the Coordinating Committee
- Act as a focal point to facilitate co-ordination between the different implementing agencies and individuals
- Draft the Country Reports to COPs
- Draft Supplements to the BSAP.

The Focal Point for the CBD will continue to be the office of the Secretary to Government.

The review of BSAP Annual Work Plan would involve assessing the following —

- Progress within ongoing or new projects for which funding had been obtained
- Progress in obtaining funds for the other priorities identified

- New priority projects that have been identified
 - Any problems that arose during the year and possible solutions to them.
- It will also be worthwhile to summarise achievements under the headings of the articles of the CBD to tie into the 'Country Reports to COPs' process, as follows.

Article 6

National strategies, plans or programmes developed
 Progress integrating conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies

Article 7

Surveys and monitoring programmes carried out
 Data management systems established

Article 8

Number of protected areas established (and their land or sea area)
 Progress in the rehabilitation of degraded ecosystems
 Progress in the recovery of threatened species
 Responses to the risks associated with the use of living modified organisms (from biotechnology)
 Progress in the control or eradication of alien invasive species
 Success at keeping out new invasive species
 Programmes to protect/use traditional knowledge

Article 9

Development of any *ex-situ* conservation programmes

Article 10

Any initiatives to promote the Sustainable Use of Components of Biological Diversity

Article 11

Any incentive measures developed to promote biodiversity conservation and their success

Article 12

Research and training programmes undertaken

Article 13

Public awareness and education programmes undertaken

Article 14

Progress in the development of EIA procedures and their implementation

Article 15

Initiatives taken to manage access to genetic resources

Article 16 & 17

Actions taken to provide access to and transfer of technology and exchanges of information for biodiversity conservation

Article 18

Examples of technical and scientific cooperation with other countries

Article 19

Any programmes to handle biotechnology and distribute its benefits

Article 20

Financial resources applied to biodiversity conservation during the year in question

Review of BSAP as a whole

The BSAP will soon go out of date as new information is obtained, projects proceed and new issues emerge. It is proposed that every two years, tied into the reporting to COP cycle, a supplement to the BSAP will be produced, identifying the following —

- New information obtained such as changes in the status of species from new surveys and the arrival of new invasive species
- New programmes established such as new regional programmes through SPREP, UNDP or other agencies
- New legislation, policies or plans in place
- Any changes in the implementing agencies structures
- New issues that have arisen such as new threats to biodiversity conservation
- New actions required
- Summary of actions from the original BSAP that have been completed and where information related to them can be found.

A full re-drafting of the BSAP may be required at some point in the future, either because of a local need or perhaps a requirement identified by agencies administering the CBD. The presence of a series of two-yearly supplements will greatly facilitate this.

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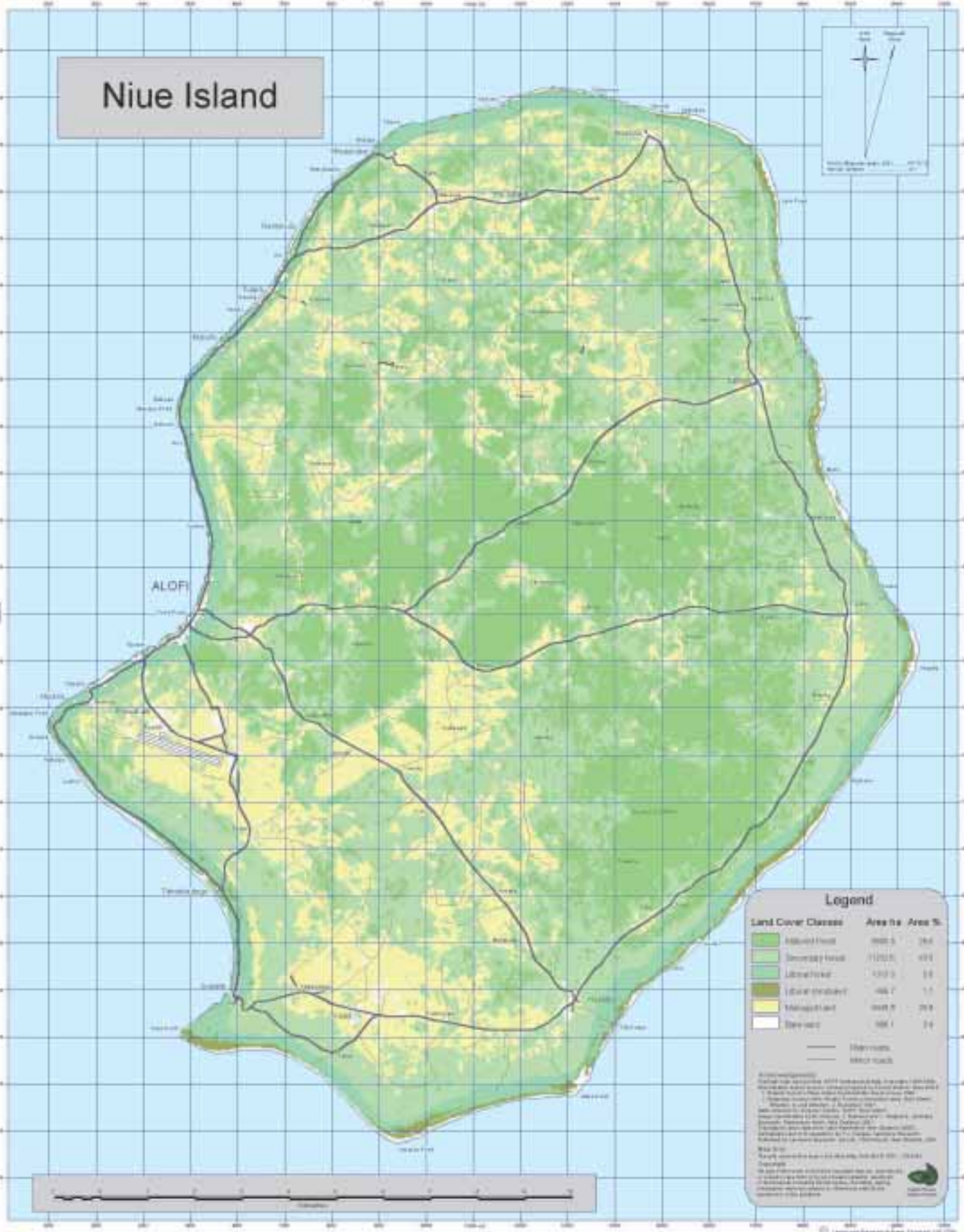
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MAP 2: Land Cover Map Of Niue Island (as at 8th September 1994)

Miscellaneous Map Series

Niue Island



Legend

Land Cover Class	Area (ha)	Area (%)
Primary Forest	988.5	26.6
Secondary Forest	1120.0	31.9
Urban Forest	132.0	3.8
Urban (Inhabited)	486.7	13.7
Mangrove Land	888.7	25.0
Sea Wall	106.1	3.0

Main Roads
 Minor Roads

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