



The Kingdom of Tonga

First National Report

In response to its commitment under the
United Nations Convention of Biological Diversity





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First National Report

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CONVENTION



EXECUTIVE SUMMARY

Article 1 of the United Nations Convention on Biological Diversity (UNCBD) spells out clearly the objectives of the Convention and Article 6 calls on Parties to develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity. Further, Article 26 also requires Parties to report to the Conference of the Parties the implementation of the provisions of the Convention. This First National Communication Report is submitted in compliance with the intent of Article 26 and it contained measures which Tonga considers appropriate in terms of achievement of the objectives of the Convention.

The issue of vulnerability of Small Island Developing States (SIDS) in terms of global warming and associated climate change and sea level rise is well documented in the literature. Also closely related is the unanimous acceptance by the global community that realistic resolution of this global issue depends almost entirely on sustainable use of resources in the natural environment. For Tonga, its survival both in the short-term and long-term perspectives is based on ensuring that sustainable development is pursued seriously.

Tonga is a SIDS with a land area of about 688 square kilometers. Altogether, there are 170 islands spreading across 360,000 square kilometers of the Pacific Ocean. Except for a few high islands of volcanic origin, most of the islands are made of coral limestone and given this they are generally low-lying and very susceptible to the effects of sea-level rise.

Given the scarcity of natural resources, Tonga's development hinges predominantly on the utilization of its biodiversity both in the marine and terrestrial environment. Agriculture remains the mainstay of the economy employing various technologies for subsistence and commercial farming. Fisheries development has increasingly become important given the need for foreign earning and development of the local economy. Tourism is a rising sector utilizing the pristine nature of the local environment as its main attraction. But these have



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unfortunately impacted heavily on the local environment leading to loss of wildlife habitat, over-exploitation of coral reefs, pollution and introduction of alien invasive species. The extent of the environmental degradation is even made worse when the effects of drought, cyclones and inadvertent use of pesticides are taken into consideration.

Fully cognizant of the scale of environmental calamity confronting Tonga, both the government and non-government/civil society have made great efforts to make realistic improvements in the utilization of the local biodiversity. Such efforts include setting up of the Department of Environment and the National Environmental Coordinating Committee (NECC) to oversee, among other things, development of biodiversity resources as well as making policy direction on other issues related to biodiversity. Additionally, the government has also enacted environmental impact assessment legislation which should become effective in terms of assessment and monitoring of the impacts of development initiatives on biodiversity resources.

In addition, the development of the First National Communication Report on biodiversity was made concurrently with formulation of the National Biodiversity Strategy and Action Plan for Tonga (NBSAP) and this should provide the framework for coordinating efforts of local, national, regional and international groups in terms of advancement of sustainable development in Tonga. This must eventually be realized if Tonga is to survive in the long-term perspective.



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ACRONYMS

ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
AusAid	Australian Aid
CBD	Convention on Biological Diversity
CLD	Crown Law Department
COP	Conference of the Parties
CPD	Central Planning Department
DO	District Officers
EEZ	Exclusive Economic Zone
DoE	Department of Environment
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product
GIS	Geographical Information Systems
ICWM	Integrated Coastal and Watershed Management
IPGRI	International Plant Genetic Resource Institute
MAFF	Ministry of Agriculture Forestry and Fisheries
MDGs	Millennium Development Goals
MOE	Ministry of Education
MOH	Ministry of Health
MLCI	Ministry of Labour, Commerce & Industries
MLSNR	Ministry of Lands, Survey & Natural Resources
MMP	Ministry of Marine & Ports
MOP	Ministry of Police
MOW	Ministry of Works
MPA	Marine Protected Areas
NBSAP	National Biodiversity Strategic Action Plan
NGO	Non-government Organisations





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OFM	Oceanic Fisheries Management
PGRFP	Pacific German Regional Forestry Programme
PIER	Pacific Island Ecosystems at Risk
PRAP	Pacific Regional Agricultural Programme
PSC	Public Service Commission
SDP	Strategic Development Plan
SPC	Secretariat of the Pacific Communities
SPREP	Secretariat of the Pacific Regional Environmental Programme
TO	Town Officers
TTC	Tonga Traditional Committee
TTL	Tonga Timber Limited
TVB	Tonga Visitors Bureau
UNFCC	United Nations Framework Convention on Climate Change

1.0 INTRODUCTION

1.1 Geography

The Kingdom of Tonga's geography is a major determinant of its development opportunities and constraints. Its land area is about 688 square kilometers (688 sq km) consisting of 170 islands spreading across 360,000 sq km of Pacific Ocean. The four main island groups are Tongatapu and 'Eua, Vava'u, Ha'apai and the Niuas. The capital, Nuku'alofa, is in Tongatapu. Tonga is well endowed with agricultural and marine resources. The exclusive economic zone (EEZ) is approximately 700,000 sq km.

The climate of Tonga is tropical. Tonga lies within the south-east trade wind zone of the South Pacific. Wind speed over its surrounding oceans averages around 12 knots. Strong winds are during tropical cyclone passages in summer (November – April) and gales from eastward migrating high-pressure systems during winter (May – October).

Temperature variations throughout the Kingdom show an increase in daily and seasonal variations with increasing latitude. Mean annual temperatures vary from 26°C at Niuafu'ou and Niuatoputapu to 23°C on Tongatapu. During the Hot Wet Season (November – April), the average temperature ranges from 25-26°C, whereas at Dry Cool Season (May – October), the average temperature ranges from 21-24°C.

1.2 Biodiversity in Tonga

Biodiversity conservation is one of the most difficult environmental issues facing Tonga. Often it poses choices between environmental protection and economic development and conflict between landowner rights and the government's growing role in its stewardship responsibilities.

The importance of biodiversity, as a basis for sustainable human development, becomes clearer when a cultural value has been added. As stated by Thaman et al., 1996, if cultural survival and economic sustainability are important objectives, the focus of biodiversity conservation programmes should NOT over emphasise only native and endemic terrestrial and marine species, or larger “charismatic megafauna”, such as the whales, sea turtles, giant clams, rare birds, endemic plants, etc., but must also include a wide range of endangered or ecologically and culturally important ubiquitous and exotic (non-indigenous), and wild and domesticated, species or varieties.

The Government of Tonga has statutory laws that have provisions for biodiversity conservation. These laws require strengthening, by means of consultation processes, assessments and than making necessary amendments or establishing new legislations to encompass emerging environmental issues.

1.3 Commitment to the Convention on Biological Diversity

The Kingdom of Tonga ratified the United Nations Convention on Biological Diversity (CBD) on 19 May 1998. Additionally, the Cartagena Protocol on Biosafety to the CBD was ratified on 18 May 2003. This represents Tonga’s commitment to sustain and effectively manage its environment by developing a National Biodiversity Conservation Strategy Action Plan (NBSAP), which is a requirement that is under Article 6 of the Convention. This plan will assist Tonga to meet its obligations under the CBD including its first Country Report to the Conference of the Parties (COP).

Since Tonga’s ratification and ongoing commitment to the Convention, environmental sustainability has become an overarching goal for Tonga’s Millenium Development Goals (MDGs) and National Strategic Development Plans (SDP).

1.4 National Biodiversity Strategic Action Plan

The aim of the NBSAP is to formulate through participatory and analytical process, the

strategies and actions necessary for the protection, sustainable use and the equitable sharing of benefits from the use of its biodiversity in Tonga, and to prepare a Plan for its implementation.

The NBSAP is designed to guide the Government Organisations, who has the leading role in managing and conserving the environment, civil society, NGOs and the community, to make aware of the importance of biodiversity and to build their commitment to saving it. Its task is to engage and empower people to act by making the connection between biodiversity and the people's daily lives and basic values. Moreover, meet the challenges by developing communication strategies that motivate people to protect their biodiversity, and have pride in their natural heritage.

2.0 BACKGROUND

2.1 Legal and Policy Framework

Tonga does not have legislations and policies specific for biodiversity conservation or for the purpose of preparing strategy and action plan, however there are biodiversity related legislations which are outlined under the four sectors of biodiversity in Tonga, namely Agro – biodiversity, Terrestrial Fauna, Forest Ecosystems and Marine Ecosystems .

2.1.1 Agro-biodiversity

Agriculture remains Tonga's main economic sector and the main contributor to the country's GDP. Because of its fundamental role in the economic development, it is one of the main sector that government focuses for development, along with Fisheries and Tourism. This reflects in the set up of the government's 5 year Strategic Development Planning (SDP), where agriculture is one the main target sector in this planning scheme. In the latest government SDP7 (2001 – 2004), the following policy guidelines falls within the framework of agro-biodiversity conservation activities:

- To broaden the base of agricultural exports

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- To diversify export markets for agricultural products
- To create opportunities for agricultural production for export in outer region
- To consider possibilities for generating agribusiness profitability
- To provide Institutional Strengthening and support to key institutions in the country
- To consider options for establishing an effective mechanism to facilitate linkage between key players in agriculture

To facilitate overseas trade, the Tonga government has to comply with international agreements in order to be able to export agricultural fresh produce overseas. Thus, legal policies and framework has to be set up to support and to sustain overseas export viable and active. These are vested under the jurisdiction of various government and non-government institutions rather than within a particular Ministry. The Ministry of Agriculture and Food's aims have been the sole player in its implementation.

Existing Legislation that addresses agro-biodiversity issues

- a) Sustain of agricultural wealth
 - (i) *Land Act*: defines the requirement of the land and for appropriate uses for agricultural purposes. This act defines a certain number of coconut trees to be planted in each tax allotments
 - (ii) *Tax Allotment Holder*: defines the requirement for the tax allotment holder to cultivate the land with agricultural crops. It stated that every tax allotment holder must cultivate his land with crops or he could be taken to court
 - (iii) *Land Tenure Act*: defines the age where a male Tongan citizen legally inherits any land or estate through his father. Every male Tongan citizen is allowed to inherit land that owns by his father at the age of 16 years. If he does not have land through his father, he is capable to apply for 8 acres piece of land

as for bush allotment from, the government, the noble, or any estate holder.

b) Protection of agricultural crops

- (i) *Crop Compensation Act*: This act was drawn to compensate, in monetary value, damages to agricultural crops caused by roaming domestic animals, fire, or by machinery. It defines the value, in monetary value, of every agricultural crop to solve dispute between farmers over the damage of ones crops by someone's roaming domestic animals, fire or by machinery.
- (ii) *The Plant Quarantine Act, Vol. 4, 1988*: This act define the authorisation vested upon the Minister of Agriculture and Food jurisdictions to controls the importation of living or fresh plants and animals, or any of their products, from any foreign country. This act was set to protect Tonga's biotic system from foreign plant pests or diseases.
- (iii) *The Pesticide Act and Regulations, Vol. 4: 2002*: This act defines the authorisation vested upon the Minister of Agriculture and Food jurisdictions to controls the imports of pesticides into the country. It also defines the roles of the National Pesticide Committee in screening every agri-chemicals that is about to be imported into the country by local importers. Chemicals have to be screened for its main active ingredient and the quantity that have been imported. They have the authority to accept or deny any requested agri-chemical by local importers.
- (iv) *Rhinoceros beetle Act, Vol. 4, 1988*: This act was set for inter-island quarantine in the control of rhinoceros beetle after discovering the rhinoceros beetle in Vava'u during the 1950's. It defines rules that should be conforming by inter-island traveling boats to prevent spreading of the rhinoceros beetle to other island groups within the Kingdom.

Existing Legislations are shown in Table 1 which reinforces the protection of agro-biodiversity and its sustained wealth.

2.1.2 Forest Ecosystems

The Government of Tonga had recently made a positive contribution towards forestry biodiversity conservation through the establishment of the new Ministry of Forests in March 2005. This move resulted in the former Forestry Division (FD) of the Ministry of Agriculture, Forestry and Food (MAFF) to Ministry level. As a result, appropriate amendment to the 1961 Forest Act was made to transfer relevant powers and responsibilities from the Minister MAFF to Minister MoF.

The Forest Act CAP 126 provides the Minister of Forests with the Cabinets consent to make regulations in areas of concern to Tonga's forests. The Forest Act also allows issuing of license in respect to forest produce. There are existing legislations with powers vested with the Minister of Forest, which includes *Noxious Weeds Act (CAP 128)*, to proclaim noxious weeds under the authority to administer the *Plant Quarantine Act (CAP 127)* and the authority to permit the collection of specimens under the *Birds and Fish Preservation Act (CAP 125)*.

Tonga does not have a formal national forest policy, however MoF operates on defined core functions which are as follows:

- Develop policies, legislations and regulations to enable sound management of the country's forests resources
- Promote forestry operations to contribute towards economic development
- Ensure the natural forest reserves are protected, developed and monitored
- Promote and undertake relevant scientific researches
- Promote and encourage plantation forestry to improve local timber and wood production through;

- Promote and encourage production of high valued tree species for export
- Promote participatory agro - forestry development.
- Promote production and protection forestry development activities on potential uninhabited islands.

2.1.3 Terrestrial Fauna

Current legislation effectively dealing with the conservation of terrestrial fauna in Tonga is:

- The Land Act 1927
- Birds & Fish Preservation Act, amended in 1974
- Parks & Reserve Act 1976
- Terrestrial and Fisheries (Conservation and Management) Regulation 1994
- Environmental Impact Assessment Act 2003
- Quarantine act
- Rhinoceros beetle act

2.1.4 Marine Ecosystems

The overall management and protection of Tonga marine biodiversity is not vest under a single institution, but under the jurisdiction of different government departments and ministries. The Ministry of Fishery when first established was targeting marine edible fisheries with special attention to those with high market values. The concept of management and conservation of marine resources were later absorbs by the Ministry of Fishery as the key player, as well as the Department of Environment, Lands and Surveys, and the Ministry of Marine and Ports.

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It is not surprising as there are sectoral approach to policies and legislations, with the mandate vested under different sectors of the government. To make it clear, there is no single comprehensive and holistic legislation in place, that encompass all biodiversity related issues in Tonga.

The sectoral nature of management jurisdiction on marine biodiversity leaves several gaps and overlaps over the existing legislations. There is a need for gaps to be bridged, if Tonga's biodiversity be conserved for the future.

Existing Legislation that addresses marine biodiversity issues

Outlined in Table 1 are existing legislations that addresses marine biodiversity in Tonga including definitions as follows:

- i) Establishment of Continental shelf, 12 nautical miles and EEZ
 - ***Royal Proclamation 1887***- Defines Tonga boundaries which within lat 15°S and 23.5°S and long 173°W and 177° W .
 - ***Royal Proclamation 1972***: defines the islands of Teleki Tokelau (North Minerva Reef) and Teleki Tonga (south Minerva Reef)
 - ***The Continental Shelf Act of 1970*** [CAP. 63]: the protection, exploration and exploitation of the continental shelf
 - ***The Territorial Sea and Exclusive Economic Zone Act 1978***: This Act is not yet in force, however, it define the twelve nautical mile territorial sea and a 200 nautical mile exclusive economic
- ii) ***The Fisheries Act 1989***: The Act provides for the management and development of fisheries in Tonga

Part V: General Provisions, including:

- Prohibited Fishing Methods
 - Reserved Fishing Areas
 - Fish Processing Establishments
 - Leasing of Land for Aquaculture
 - Import and Export of Live Fish
 - Controls over the Export of Fish and Fish Products
 - Statistics
- iii) ***Parks and Reserves Act 1976:*** The establishment of 5 Marine Parks and Reserves:
- Hakaumama'o Reef
 - Pangaimotu Reef Reserve
 - Monuafe Island Park and Reef Reserve
 - Ha'atafu Beach Reserve
 - Malinoa Island Park and Reef Reserve.
- iv) ***Fisheries Regulations:*** Three separate sets of Fisheries Regulations have been proposed by the Ministry of Fisheries and are currently under review to implement the Fisheries Act 1989.
- The Fisheries (Conservation and Management) Regulations 1994.
 - The Fisheries (Foreign Fishing) Regulations 1992.
 - The Fisheries (Local Fishing) Regulations 1995.

v) *Fisheries Management Act 2002:*

The new 2002 Fisheries Management Act is to amend the Fisheries Act 1989

Further, the new 2002 Fisheries Management Act requires conservation, management, sustainable utilisation and development of fisheries resources in the Kingdom and fisheries waters.

vi) Species conservation

- *Tuna Exploitation Policy*

His Majesty's Cabinet approved this policy on 28 October, 1993 and is as follows:

- *Turtle*

A closed season from 1 December to 31 January was introduced in 1967. This was subsequently changed to also include November).

- *Whale*

Whale fishery is currently protected here in Tongan water since Royal degree in 1978 and so there is no current legislation in term of management and conservation except new *Fisheries Management Act 2002*

vii) Coastal Marine Resources

- The Land Act 1927
- Birds & Fish Preservation Act, amended in 1974
- Parks & Reserve Act 1976
- Fisheries Act 1989
- The Fisheries (Conservation and Management) Regulations 1994

- Fisheries Management Act 2002
 - Aquaculture Management Act 2003
 - Environmental Impact Assessment Act 2003
 - Marine Pollution Act 2002
- viii) Coastal foreshore areas
- ***The Land Act***
Defines “foreshore” as the land adjacent to the sea alternately covered and left dry by the ordinary ebb and flow of the tides and all the land adjoining thereunto lying within 15.24 meters of the high water mark of ordinary tides.
- ix) Management of marine resources
- ***Birds & Fish Preservation Act, amended in 1974***
Defines “protected area” as any area comprising land, or water, or land and water, as is specified in the Third Schedule hereto;
 - ***Parks & Reserve Act 1976***
Provides for the establishment of a Park and Reserves Authority and establishing preservation and administration of Parks and Reserves.
 - ***Fisheries Management Act 2002***
The conservation and management, and the sustainable utilisation of fisheries resources in the Kingdom.
 - ***Aquaculture Management Act 2003***
For the management and development of aquaculture fisheries in Tonga.

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x) Protection

- *Environmental Impact Assessment Act 2003*

Some of the key features relevant to this report include:

Section 2: "environment" includes all natural, physical and social resources, people and culture and the relationship that exists between these elements;

Section 6: All major projects shall be supported by an appropriate environmental impact assessment report

- *Marine Pollution Act 2002*

Protect marine environment from land base pollution and pollution from ships.

- *Quarantine Act 70*

For the protection of Tonga marine environment from invasive and foreign species.

Table 1: Existing Legislation for each sector and responsible Ministry

Sector	Existing Legislation	Responsible Ministry
Agro-biodiversity	<i>Crop Compensation Act</i> <i>The Plant Quarantine Act, Vol. 4, 1988</i> <i>The Pesticide Act and Regulations, Vol. 4: 2002</i> <i>Rhinoceros beetle Act, Vol. 4, 1988</i> <i>Land Act</i>	Ministry of Agriculture and Food
	<i>Land Tenure Act</i>	Ministry of Land, Survey and Natural Resources
Forest Eco-systems	<i>Noxious Weeds Act (CAP 128)</i> <i>Plant Quarantine Act (CAP 127)</i> <i>Birds and Fish Preservation Act (CAP 125)</i> <i>Forests Act, CAP 126</i>	Ministry of Forests
Terrestrial Ecosystems	<i>The Land Act 1927</i> <i>Birds & Fish Preservation Act, amended in 1974</i> <i>Parks & Reserve Act 1976</i>	Ministry of Land, Survey and Natural Resources
	<i>Terrestrial and Fisheries (Conservation and Management) Regulation 1994</i>	Ministry of Fisheries
	<i>Environmental Impact Assessment Act 2003</i>	Department of Environment
	<i>Quarantine Act</i> <i>Rhinoceros Beetle Act</i>	Ministry of Agriculture and Food

Marine Ecosystems	<i>Royal Proclamation 1887</i> <i>Royal Proclamation 1972</i> <i>The Continental Shelf Act of 1970 [CAP. 63]: The Territorial Sea and Exclusive Economic Zone Act 1978:</i> <i>Mineral Acts 1949</i> <i>The Land Act 1927</i> <i>Birds & Fish Preservation Act, amended in 1974</i>	Ministry of Land, Survey and Natural Resources
	<i>Fisheries Act 1989</i> <i>Fisheries Regulation</i> <i>Fisheries Management Act 2002</i> <i>Aquaculture Management Act 2003</i>	Ministry of Fisheries
	<i>Marine Pollution Act 2002</i>	Ministry of Marine &
	<i>Environmental Impact Assessment 2003</i>	Department of Environment
	<i>Waste Management Act 2005</i>	
	<i>Quarantine Act 1970</i>	Ministry of Agriculture & Food

2.2 Institutional Arrangement

Specific institutions are responsible for the four sectors of biodiversity. The Ministry responsible for Agrobiodiversity and Terrestrial Fauna is the Ministry of Agriculture and Food. Forestry is under the care of the newly established Ministry of Forests and the Ministry of Fisheries is responsible for the marine sector. The

Department of Environment plays a coordinating role with regards to environmental issues of the four sectors.

Outlined below are institutional arrangements responsible for the four sectors of biodiversity in Tonga.

2.2.1 Agro-biodiversity and conservation

The following tables outline institutional responsibility (Table 2a), ongoing programmes (Table 2b) and past projects (Table 2c).

Table 2a: Institutional responsibility for agro-biodiversity

Institution	Responsible for Agro-biodiversity and Conservation
<p>Ministry of Agriculture and Food (MAF)</p>	<p>It is the mandate of MAF to ensure food security. MAF has been the key player in plant conservation for agro-biodiversity. It has worked cooperatively with regional and international organisations, like SPC, ACIAR, FAO, etc. in agricultural projects to prevail food security.</p> <p>MAF’s various divisions have different roles in sustaining agro-biodiversity.</p> <p>The Research Section of the Research and Extension Division (RED) develop crop production through breeding techniques, which requires crop diversity. They emphasize on testing and evaluating exotic crop varieties that are performing well in Tonga’s environment and distribute them to farmers.</p> <p>The Tissue Culture laboratory at the RED station act as a genebank for some agricultural varieties of some of Tonga’s food crops.</p> <p>A Field collection of agro-biodiversity is necessary and should be the mandate of MAF. Field collection should be at the RED as the most centralized location.</p> <p>Extension Unit of RED should be active in training and advising farmers on methods to multiply seedlings and conserving agricultural crop varieties.</p> <p>Conducting of the agricultural shows and demonstrations promote high enrich of variety conservations by farmers</p> <p>The Quarantine and Quality Management Division of the Ministry is active in protecting Tonga’s shores from foreign pests and diseases.</p> <p>The Livestock Division controls the quarantine services for domestic animals.</p> <p>National Pesticide Committee monitor the import of agro-chemicals as to prevent environmental impact due to heavily used of agro-chemicals</p>

Table 2b: Ongoing programmes

Institutions	On-going Programmes
Ministry of Agriculture and Food	<ul style="list-style-type: none"> - Maintaining field collections of various root crops, fruit trees at the Research Station - Collections of crop varieties - Operation of the Tissue Culture laboratory - Establishing nurseries - Evaluations and testing of exotic agricultural crops - Training and providing technical assistance to farmers - Conducting agricultural shows and demonstrations - Quarantine inspections to all export and import goods at all port of entry within the Kingdom and to all vessels arriving the Kingdom - Issuing of license to importers of agro-chemicals - Capacity building - Public awareness
NGOs	<ul style="list-style-type: none"> - Training of farmers in village communities - Providing technical assistance to farming groups - Support village farming groups and youth groups
International/Regional Organisations	<ul style="list-style-type: none"> - Provide technical and financial assistance to government's ministries and NGOs

Table 2c: Past Projects

Regional/International Organisations	International and regional organisations provide both technical and financial assistance to national projects on agro-biodiversity.
Ministry of Education	Incorporate Plant Conservation and agro-biodiversity into schools curriculum
Churches	Promoting agricultural plantings amongst church members
NGOs	<p>NGOs play a major role in training farmers how to store and conserve seeds.</p> <p>Provide technical assistance to farmers</p>
Village Farmer Groups	<p>Most old varieties are kept by farmers, especially subsistence farmers, probably due to some desirable traits.</p> <p>Farmers are good sources of planting materials and variety collection.</p>

2.2.2 Forestry

The major government institutions directly involved in forestry biodiversity conservation are MoF and DoF. Other ministries contribute indirectly primarily on policy matters. The other line ministries with potential contributive functions towards forest biodiversity conservation are Ministry of Lands, Survey and Natural Resources (MLSNR), with powers on land holding and land tenure. Ministry of Education (MoE) contributes in the way of formulating and implementing of appropriate school syllabus and curriculum. Ministry of Fisheries (MoF) tasked with marine and coastal forest protection. Tourism Department (TVB) increases awareness towards forests and tree planting and conservation and the Ministry of Finance (MoFin) determines budget allocation.

Tonga Trust is the most prominent non-governmental organization. There is a great need to give support towards encouraging of the NGO's rural development activities. Effectively, a lot of the NGOs have established rural development projects through Tonga. They provide community-based research and extension support to the current forestry activities.

Generally, the above-mentioned institutions operate independently from each other. There is no common ground for which the existing resources are utilised collectively on a structured basis. This report is not intended to point fingers but to bring about to the attention of policy makers to the pressing need to consolidate institutional efforts in order to avoid duplication of efforts hence minimise operation costs. One institution's shortfall may be filled by another line institution. There are experts in various fields in these line institutions. Mobilisation of local expertise to undertake local development activities is part of the on-the job capacity building.

Facilities

Generally, the basic forestry facilities throughout Tonga are sub-standard and in short supply. Forest nurseries are located in all the six major centers mentioned above. However,

the only reasonable standard nurseries are those in Matalikufisi and Fatai.

Major development efforts are required for the Mata'aho, Vaipoa, Niualahi and Matavai nurseries. Areas requiring attention and developments are nursery infrastructures, equipments such as water sources, irrigation systems and tools. Properly run nursery in all the six main centers will ensure a consistence supply of trees and plant seedlings to cater for the reforestation demand.

A plant herbarium for collection of local trees and plant samples is not available. Such facility is vital for any forestry development activity. One is required for Tonga and it is suggested to be constructed, when funds are available, at the MoFo Matalikufisi compound.

Database, is one significant facility for the forest biodiversity conservation development. Proper recording, analysing and dissemination of proven data is considered another essential element of this development.

National parks set up utilities require appropriate signs and viewing facilities.

Funding

Approximately 95 percent of the ongoing MoFo activities are funded from the government recurrent estimate. Some 70 percent for staff salary and the other goes into operation costs.

External funding for forestry development activities are made available through the assistance of regional coordinated bodies such as the Secretariat of the Pacific Communities (SPC), FAOSAPA, GTZ Pacific German Regional Forestry Program (PGRFP), European Union (UN), and AUSAID. Funding can only be tapped if there is a regional project is materialised.

2.2.3 Terrestrial fauna

Stocktaking and the national planning for conservation of terrestrial fauna in Tonga currently involves the entomologist from the ministry of agriculture and food (MAF) plus the coordinator for the NBSAP project.

There is urgent need for the Department of Environment to recruit or train a zoologist to conduct all research and monitoring activities on terrestrial fauna in the kingdom.

2.2.4 Marine biodiversity and conservation

The following tables outline institutional responsibility (Table 3a) and ongoing programmes (Table 3b).

Table 3a: Institutional Arrangement and Responsibilities for marine biodiversity conservation

Institution	Responsibilities for Marine Biodiversity Conservation
Department of Environment (DoE)	<p>The Department plays an advisory role to other Ministries who have the mandates for marine biodiversity conservation. This advice is based from the Department’s marine/coastal management research. The Environmental Planning and Assessment Division of the DoE is the body which carries out these surveys and assessment.</p> <p>Monitoring programmes have been established which are designed to assess and gather baseline information on important ecosystems and habitats, including Fanga’uta Lagoon, Marine Protected Areas, coral reefs. Other related responsibilities include:</p> <p>Propose and recommend potential Marine Reserves site for designation in accordance with the Parks & Reserves Act (1976)</p> <p>Increase public/community awareness of environmental issues nationally like lagoon, coastal related issues, biodiversity)</p> <p>Develop strategies for the conservation of biodiversity</p> <p>The DoE also stands as the coordinating organisation for all international donor funded projects in the environmental sector. It also handles compliance with the international conventions such as the United Nations Framework Convention on Climate Change (UNFCCC) and Convention on Biological Diversity (CDB)</p>

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<p>Ministry of Lands, Survey and Natural Resources (MLSNR)</p>	<p>The responsibility of MLSNR that addresses marine biodiversity conservation is the authority of the Minister to declare an area in the coastal environment a Marine Protected Area (MPA)/Marine Reserve under the Parks and Reserves Act 1976 and Revised 1988. This Act is for the protection, preservation and control of any aquatic form of life and any other organic matter contained within this MPA boundary.</p> <p>The MLSNR with the authority of their Minister is charged with the responsibility to mine, bore, quarry, dig for, win and work all or any material under the Minerals Act 1949.</p>
<p>Ministry of Fisheries (MoF)</p>	<p>The responsibility for the conservation, management and development of fisheries in Tonga.</p> <p>The Fisheries Act, 1989 gives authority to the Minister and MoF to conserve endangered inshore marine resources by enforcing size limits on lobsters, giant clams, turtles, winged pearl oyster etc. This Act gives the MoF responsibility of enforcing the penalty if an offender is caught breaking the law</p>
<p>Tonga Visitors Bureau (TVB)</p>	<p>The Tonga Visitors Bureau do not have any direct responsibilities in protecting the marine resources which are mostly related with tourism for example whales and dolphins.</p> <p>However they have a supportive and enforcement responsibility to other relevant authorities like Ministry of Fisheries where a conjunction between TVB and MoF to introduce guidelines and codes of practice for whale watching operators.</p> <p>TVB also introduced code of practice for diving and snorkeling operators requiring them to comply with regulations and approved practices.</p>

Table 3b Ongoing Programmes

Institution	Ongoing Programmes
Department of Environment	<ul style="list-style-type: none"> ● National Monitoring – Pollution of marine environment using indicators such as species. ● Reef Check – Assess the health of coral and other marine benthos and fish ● EIA – Assess the impact of development to the marine environment including biodiversity in the area ● MPAs monitoring – monitoring of marine parks and reserves ● Conservation areas management – Ha’apai group ● Survey of health of the marine environment and resources ● Awareness program ● Training ● Capacity building ● Research
Ministry of Fisheries	<p>Management of marine resources</p> <p>Aquaculture</p> <p>Licensing of fleets, fish fence, aquarium fish, etc</p> <p>Community base MPAs</p> <p>Research</p> <p>Enforcement of existing laws</p> <p>Public Awareness</p> <p>Capacity building</p> <p>Data Collection – catch snappers and deep water fishery</p> <p>Stock assessment of important marine fisheries</p> <p>Training</p>



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Ministry of Lands, Survey and Natural Resources	Establishment of MPAs Enforcement of MPAs Act Awareness Allocation of coastal waters lease
Ministry of Marine and Ports	Enforcement of Marine Pollution Act Control pollution of marine environment from ships and land base Training
Ministry of Agriculture and Food	Assess the importation of foreign fisheries and invasive species to the Kingdom of Tonga

Ongoing Projects

Ministry of Fisheries:

- (1) *Vessel Monitoring System for Tracking of Fishing Vessels Operating in Tonga*
- (2) *Mini Longline Trial and Bait project*

Diversify inshore fisheries to deepwater fisheries resources

- (3) *Tonga Fisheries Project (AusAID)*

Providing assistance to small-scale fishers, and developing commercial tuna longline fishing.

- (4) *Tonga Fisheries Project:*

The Project is an integrated sectoral development and resource management project. The purpose of the Project is to improve the welfare of the people of Tonga through sustainable development and management of living marine resources, with attention

to remote and disadvantaged communities.

Department of Environment:

(1) *National Biodiversity Strategy Action Plan and First Report to the COP*

The objective is to formulate the strategies and actions necessary for the protection and sustainable use of the biodiversity in the Kingdom of Tonga and, to prepare a National Biodiversity Strategy and Action Plan

(2) *Development of the National Biosafety Framework*

The main objective of this National Project is the preparation of a National Biosafety Framework in accordance with the relevant provisions of the Cartagena Protocol on Biosafety.

(3) *International Waters Programme*

The goal of the action plan for this project is to achieve integrated sustainable development and management of International Waters.

The project purpose is to address the root causes of degradation of International Waters through a programme focus on improved Integrated Coastal and Watershed Management (ICWM) and Oceanic Fisheries Management (OFM).

(4) *'Eua Man and Biosphere Project*

Protection of the environment through establishing a biosphere reserve.2.2

^a

Biotic Assets

2.3.1 Agro-biodiversity

Table 4a: Biotic assets for agro-biodiversity

Common Names	Scientific names	Tongan Names	Number of current varieties
Root crops			
Yam	<i>Dioscorea alata</i>	`Ufi	23
	<i>D. esculenta</i>	`Ufilei	5
	<i>D. rotundata</i>	Lose	1
	<i>D. bulbifera</i>	Hoi	Not known ^a
	<i>D. pentaphylla</i>	Lena	Not known ^a
	<i>D. nummularia</i>	`Ufi Palai	Not known ^a
Taro	<i>Colocasia esculenta</i>	Talo Tonga	7
American taro	<i>Xanthosoma sagittifolium</i>	Talo Futuna	3
Sweet Potato	<i>Ipomoea batatas</i>	Kumala	7
Cassava	<i>Manihot esculenta</i>	Manioke	9
Giant taro	<i>Alocasia macrorrhiza</i>	Kape	4
Irish potatoes	<i>Solanum tuberosum</i>	Pateta	3 ^b
Fruit Crops			
Banana & Plantain	<i>Musa balbisiana</i>	Hopa	17
	<i>Musa spp.</i>	Siaine	4
		Pata	5
Breadfruits	<i>Artocarpus altilis</i>	Mei	10
Tahitian Chestnut	<i>Inocarpus edulis</i>	Ifi	3
Fruit Trees			
Mangoes	<i>Mangifera indica</i>	Mango	8
Pacific Litchi	<i>Pometia pinnata</i>	Tava	4

Citrus	<i>Citrus sinensis</i>	Moli kai	Not known ^a
	<i>C. reticulate</i>	Molipeli	Not known ^a
	<i>C. maxima</i>	Moli Tonga	Not known ^a
	<i>C. aurantifolia</i>	Laimi	Not known ^a
	<i>C. lemons</i>	Lemani	Not known ^a
Coconuts	<i>Cocos nucifera</i>	Niu	13
Malay apple	<i>Syzygium malaccense</i>	Fekika	Not known ^a
Papaya	<i>Carica papaya</i>	Lesi	6
Soursop	<i>Anona muricata</i>	`Apele `Initia	Not known ^a
Custard apple	<i>A. squamosa</i>	`Apele Tonga	Not known ^a
Avocado	<i>Persea americana</i>	`Avoka	Not known
Pineapple	<i>Ananas comosus</i>	Faina	4
Vi	<i>Spondias cytherea</i>	Vi	Not known ^a
	<i>S. dulcis</i>	Vi	Not known ^a
Watermelons	<i>Citrus vulgaris</i>	Meleni	9 ^b
	<i>C. lunatis</i>	Meleni	18 ^b
Passion fruits	<i>Passiflora edulis</i>	Vaine	3 ^b
	<i>P. quadrangularis</i>	Pasione	Not known ^a
Coffee	<i>Coffea spp. (Arabica)</i>	Kofi	9
	<i>C. spp. (Robusta)</i>	Kofi	6
Vegetables			
Tomatoes	<i>Lycopersicon esculentum</i>	Temata	25
Pumpkins	<i>Cucurbita maxima</i>	Hina	Not known ^a
Squash buttecup	<i>C. pepo</i>	Hina	13 ^b
Cucumber	<i>Cucumis sativus</i>	Kiukamipa	5 ^b
Cabbage	<i>Brassicca oleraceae</i>	Kapisi	5 ^b
Chinese Cabbage	<i>B. chinensis</i>	Kapisi Siaina	5 ^b
Lettuce	<i>Lactuca sativa</i>	Letisi	5 ^b

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Capsicum	<i>Capsicum annuum</i>	Polo	6 ^b
Eggplant	<i>Solanum melongena</i>	Paingani	5 ^b
Carrots	<i>Daucus carota</i>	Kaloti	5 ^b
Cauliflower	<i>Brassicca oleraceae botrytis</i>	Kaulifalaoa	5 ^b
Rock melon	<i>Cucumis melo</i>	Meleni maka	5 ^b
Onion	<i>Allium cepa</i>	Onioni	6 ^b
Beet root	<i>Beta vulgaris</i>	Piiti luti	2 ^b
Bean	<i>Phaseolus vulgaris</i>	Piini	10 ^b
Okra	<i>Hibiscus esculentus</i>	Pele	5 ^b
Sweet corn	<i>Zea mays</i>	Koane	2 ^b
Radish	<i>Raphanus sativus</i>	Latisi	5 ^b
Other Traditional Crops			
Paper mulberry	<i>Broussonetia papyrifera</i>	Hiapo	Not known ^a
Pandanus	<i>Pandanus spp.</i>	Lou'akau	11 ^a
Kava	<i>Piper methysticum</i>	Kava	7
Sugar cane	<i>Saccharum officinarum</i>	To	7
Si	<i>Cordyline tesminalis</i>	Si	5

Variety numbers are not exactly known but it is anticipated that there are existing varieties available and require updating of documented recordings

^b These are existing varieties; however, most of these varieties are new introduced due to commercial plantings

Threatened Agro-biodiversity List

Most of Tonga's staple foods are based on root crops, fruit crops, and fruit trees. However, there are other crops, which have cultural value with medicinal, ornamentals, and handicraft purposes are also worth to address. Some of the varieties within some crop species are endangered and rarely available (Table 4b)

Table 4b: Endangered crop species

Common Name	Scientific Name
Yam varieties	<i>Dioscorea alata</i> var. Lautoka <i>D. alata</i> var. Paholo hina <i>D. alata</i> var. Sivoli <i>D. alata</i> var. Kivi <i>D. alata</i> var. Malekini <i>D. alata</i> var. Palai <i>D. alata</i> var. Laumahi
Sweet Yam	<i>Dioscorea esculenta</i>
Sweet potato varieties	<i>Ipomoea batatas</i> var. Hawaii <i>I. batatas</i> var. Kula <i>I. batatas</i> var. Palu <i>I. batatas</i> var. Teiko <i>I. batatas</i> var. vai <i>I. batatas</i> var. Lauveli <i>I. batatas</i> var. Tongamai
Taro	<i>Colocasia esculenta</i> var. Sikavi
Giant taro	<i>Alocasia macrorrhiza</i> var. Fohenga <i>A. macrorrhiza</i> var. Kape `uli
American taro	<i>Xanthosoma saggitifolia</i> var. Talo Tea
Cassava	<i>Manihot esculenta</i> var. Silika <i>M. esculenta</i> var. Tano'a <i>M. esculenta</i> var. Tanusia
Pacific Arrowroot	<i>Tacca leonopetaloides</i>

2.3.2 Forest Ecosystems

Natural Forests

Three different reports estimated total forest areas ranging from 11.58 to 5.8 percent nationwide. Desloges (1994) summarized that, of the 691 km² of total land area of Tonga, 8,000 ha (approximately 11.58%) is covered by natural forests (primary and secondary growth). FAO (date not known) estimated a 6 percent natural forest cover. Another report estimated the total natural hardwood forest area for Tonga as being 4,000 ha, about 5.8 percent, Pacific Island Economies (1995).

One comprehensive inventory of Tongatapu undertaken by Wisser et. al. (1999), where a total of 4.43 percent of Tongatapu and nearby islands were covered by natural forests. Bellingham and Fitzgerald 1996 presented “Maps of ‘Eua Vegetation”. Apart from these two islands, the remainder of Tonga is not being thoroughly surveyed.

It is therefore recommended that a national forest inventory for Tonga is significant to the forestry biodiversity conservation development. It is important to know Tonga’s forest, the extent, richness, related risks, prior to formulating a sound strategic development plan.

Exotic Forests

Some 750 ha of exotic forest plantation is planted on the island of ‘Eua (Pacific Island Economies, 1995). The ‘Eua exotic forest plantation consists of two separate ownerships, one is the Government of Tonga and the other is Her Royal Highness, Queen Halaevalu Mata’aho. The government-owned plantation was established by the former Forestry Division of MAFF and was later handed over to Tonga Timber Limited (TTL) in 2003, with major species comprised of *Pinus caribaea*, *Toona ciliate*, *Sweitenia macrophylla*, *Agathis robusta* and *Eucalyptus spp.* The whole purpose of the lateral transfer of the plantation to TTL is to maximise local timber production in lieu of minimising timber import. The

extent of the 'Eua watershed areas falls within the forest plantation.

Coconut palms

Coconut palm *Cocos nucifera* is referred to by Tongans as the “tree of life”. Coconut is found in all the islands of the archipelago. Burrows and Douglass (1996) undertook a thorough inventory of coconut palms and gave a brief summary of the land areas as all agricultural land in Tonga amounted at 48,000 ha; total cultivated (with coconut palms) area of 35,347 ha. This equates to some 47 percent of the total land area of 74,700 ha. One of their major recommendations was to replant 100,000 coconut seedlings annually in order to maintain a sustainable use of the resources.

Coconut palm is an integral part of the Tonga farming systems and one of the base crop for subsistence livelihoods. It has been recommended in previous regional meetings that Tonga declares coconut palm as a forest species based on its usefulness rather than biotic makeup.

Species Richness & Endemism

Whistler (1989) highlighted that flowering plants species native to Tonga number about 330, with approximately one third consist of ferns. He further discussed that the rate of plant endemism in the archipelago is low. Specifically, Whistler mentioned that there are about 11 endemic species in Tonga. Nearly two-third of native species are also found in Samoa, with an even higher percentage shared in Fiji.

With regards to rare species, Wisser et.al. (1999) did not list any endermic species but recommended that proper recording in the form of database and a booklet of rare and endemic species be formulated and updated.

Fusimalohi (Date not known) mentioned kolitoto scientific name , fekika *Syzygium malaccense*, and nukonuka *Decaspermum fruiticorsum*, as being rare in Tongatapu, Vava'u, Ha'apai, and 'Eua. These species are valuable flower, food and medicinal plants.

2.3.3 Terrestrial Fauna

Terrestrial fauna in Tonga is categorised into two major groups, the invertebrates and vertebrates.

Invertebrates

There is little literature available relating directly to the insect species that live in the natural environment of Tonga. Almost all the information regarding insects is limited to the species that have an adverse effect on agricultural production in Tonga.

The *Pest List Database for Tonga* is a database maintained by MAF that contains information on all insect species affecting crop production in the kingdom, comprising of approximately 295 species.

An *agricultural biased collection of insects* is currently based at the Vaini Research Station on Tongatapu. The collection comprises of over 500 species of insects with almost all specimens occurring in Tonga. Most of the specimens were from collections conducted in 1975-6 (Orton Williams, Maddison et al. 1976) and 1990 (Williams and Watson 1990).

Other insects have been collected in Tonga such as ant specimens that are currently preserved in the the New Zealand Arthropod Collection and were dated as far back as 1793 (Rhode and Berry 2000).

Almost all of the literature available is limited to insect species of agricultural importance. A national agricultural insect survey is to be conducted in November – December, 2005 to update the current database.

Vertebrates

Agricultural Livestock

Records on agricultural livestock in Tonga reflect how agriculture has a huge influence on vertebrate statistics (Table 5a).

Table 5a: Number of Households Keeping Livestock and Number of Livestock kept as of the Time of Enumeration, by Kind of Livestock, Kingdom of Tonga: 2

Kind of Livestock	No. of Households	No. of Livestock Kept	Average No. of Livestock kept
Cattle	2,311	10,354	4
Pig	11,594	113,580	10
Horse	1,640	3,255	2
Goat	805	2,741	3
Chicken	7,729	177,829	23
Duck	126	1,119	9

Source: Ministry of Agriculture and Forestry & Statistics Department, Government of Tonga (Department of Statistics and MAF 2001)

Birds

Scientific literature cited have confirmed that Tonga supports 20 freshwater and sea bird species (Table 5b). *Pachycephala jacquiniti* (Hengehenga - Tongan whistler) is the only endemic species, and confined to the Vava'u group of Islands (Rinke 1986b; Statterfield 1998).

Megapodius pritchardii (Malau - Niuafou'ou megapode) is not fully endemic since it has a sub-species population extirpated to Vanuatu.

Watling(2001) claims a list of 74 bird species being sighted in Tonga of which 22 species are native land species and 23 are native sea species. An additional 6 bird species are introduced (Terrestrial Fauna, Ch3, NBSAP draft 2005).

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Table 5b: A checklist of Tongan birds (Watling 2001)

Species	Status	Species	Status
Wandering Albatross	VS	Spotless Crake	BL
Southern Giant Petrel	VS	Purple Swamphen	BL
Cape Petrel	MS	Pacific Golden Plover	MW;OW
Tahiti Petrel	S	Bristle-thighed Curlew	MW
Phoenix Petrel	VS	Bar-tailed Godwit	MW
White-naped Petrel	MS	Wandering Tattler	MW;OW
Herald Petrel	BS	Sharp-tailed Sandpi- per	?
Kermadec Petrel	BS	Ruddy Turnstone	MW;OW
Mottled Petrel	MS	Sanderling	MW
Black-winged Petrel	BS	Pomarine Skua	VS
Collared Petrel	VS	Arctic Skua	VS
Gould's Petrel	?	South Polar Skua	VS
Stejneger's Petrel	?	Crested Tern	BS
Audubon's Shearwater	BS	Black-naped Tern	BS
Wedge-tailed Shearwater	BS	Sooty Tern	BS
Short-tailed Shearwater	MS	Grey-backed Tern	BS
Buller's Shearwater	VS	Bridled Tern	BS
Sooty Shearwater	MS	Roseate Tern	?
Wilson's Storm-petrel	?	Blue Noddy	BS?
Polynesian Storm-petrel	BS?	Grey Noddy	BS
Red-tailed Tropicbird	BS	Brown Noddy	BS
White-tailed Tropicbird	BS	Black Noddy	BS
Masked Booby	BS	White Tern	BS

Brown Booby	BS	Feral Pigeon	I
Red-footed Booby	BS	Friendly Ground-dove	BL
Great Frigatebird	BS	Pacific Pigeon	BL
Lesser Frigatebird	BS	Many-coloured Fruit-dove	BL
Eastern Reef Heron	BL	Crimson-crowned Fruit-dove	BL
White-faced Heron	BL	Blue-crowned Lory	BL
Mangrove Heron	VL	Red Shining Parrot	I
Pacific Black Duck	BL	Long-tailed Cuckoo	ML
Northern Pintail	VL	Barn Owl	BL
Tongan Megapode	BL	White-rumped Swiftlet	BL
Junglefowl	I	White-collared Kingfisher	BL
Pacific Harrier	BL	Pacific Swallow	BL
Banded Rail	BL	Polynesian Starling	BL
European Starling	I	Tongan Whistler	BL
Jungle Mynah	I	Polynesian Triller	BL
Red-vented Bulbul	I	Wattled Honeyeater	BL
Lesser Shrikebill	BL		

NX Extinct/extirpated native breeding species (historic times)

IX Extirpated introduced species;

I Introduced breeding species

? Current status uncertain or questionable/unverified record

BL "Resident, native breeding land bird"

BS Resident breeding seabird

VL Vagrant Land bird (irregular visitor or arrival)

VS Vagrant Seabird (irregular visitor to country's waters)

VW Vagrant Shorebird (irregular visitor)

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- S Seabirds not known to breed but are regularly present throughout the year
- ML Migrant Land bird (of annual occurrence)
- MS Migrant Seabird (believed to be of annual occurrence)
- MW Migrant Shorebird (believed to be of annual occurrence)
- OW Wader known to overwinter

Bats

Pteropus tonganus (Peka – White Necked Fruit Bat) is the most well known bat species.

Reptiles

Hepterofauna: 20 species of lizards and geckos exist on Tonga which includes the endangered iguanid species *Brachylophus fasciatus* (Table 5c). This includes nine gecko species and nine skink species.

Most of the scientific information on the terrestrial fauna in Tonga requires updating as a pre-requisite to effective long term conservation planning and management.

Table 5c: Reptile species commonly found in Tonga

Reptile species	Common name	Islands, Island							
		*Nf	Nt	V	L	H	T	E	A
<i>Brachylophus</i>	Sth Pacific Banded Iguana			+			o		
<i>Gehyra oceanica</i>	Common Gecko	+	+	+	+	+	o	+	
<i>Gehyra mutilate</i>	Pacific Gecko					+	+		
<i>Lepidodactylus</i>	Mourning gecko	+	+	+		+	+	+	
<i>Lepidodactylus</i>	-							+	
<i>Cyrtodactylus</i>	Polynesian gecko			+		+		+	
<i>Cryptoblepharus</i>	Green tree skink	+		+	+	+	+	+	+
<i>Lipinia noctua</i>	Moth skink	+	+	+			+	+	
<i>Emoia cyanura</i>	Blue tailed skink/	+	+	+	+	+	+	+	+
<i>Emoia pheonura</i>	-	+	+	+		+	+	+	+
<i>Emoia trossula</i>	-			+		o	o	+	
<i>Emoia nigra</i>	Black skink	+	+						
<i>Emoia Murphyi</i>	-	+	+	+					
No of Species re-		8	7	10	3	8	9	9	

*Nf- Niuafu'ou, Nt- Niuatoputapu, V- Vava'u, L- Late, H- Ha'apai, T- Tongatapu, E- Eua, A- Ata, + - voucher specimen (seen by B.J. Gill), o – sighting only by D. Rinke and/or B.J. Gill. [†] - endemic gecko species.

2.3.4 Marine Ecosystems

The marine ecosystem comprises of a number of different species inhabiting the pelagic and coastal areas. The number of different species are described and tabled below.

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Pelagic:

Species that are recorded to be found in the pelagic area are shown in Table 6a.

Table 6a: Pelagic species

Common name	Family name	No. of species recorded in Tonga
Finfishes		
1. Tuna, mackerel and horse mackerel	Scombridae	7
2. Mackerel	Carangidae	1
3. Barracuda	Sphyraenidae	3
4. Dolphin fish, mahimahi	Coryphaenidae	1
5. Flying fish	Exocoetidae	4
6. Garfish	Hemiramphidae	1
7. Anchovies	Engraulididae	1
8. Herring. Sprat. sardine	Lupeidae	8
9. Scad, trevally	Carangidae	6
10. Billfish, swordfish, wahoo, sailfish		6
Marine mammals		
Whales	Cetacea	12
Marine turtles		
Turtle		6
Mollusc		
Octopus and cuttlefish		Unknown species
Marine plants		
Marine microscopic algae (phytoplankton)		Unknown species
Crustaceans	Crustacea	Unknown species

Common name	Local name	Scientific name
Long-tailed snapper	Palu tavake	<i>Etelis coruscan</i>
Short-tailed snapper	Palu malau	<i>Etelis carbunculus</i>
Comet grouper	Ngatala pusi	<i>Epinephelus morrhua</i>
Convict grouper	Mohuafi	<i>Epinephelus octofaciatus</i>
Other important species		
Rusty jobfish	Palu polosi	<i>Aphareus rutilans</i>
Green jobfish	‘Utu	<i>Aprion viresces</i>
Sea bream	Palumutumutu	<i>Paracaesio kusakarii</i>
Emperjack	Palumoana/Paluvai	<i>Seriola sp</i>
Species recorded at shallow		
Golden eye jobfish	Palu sio’ata	<i>Pristopomoides flavipin-</i>
Crimson jobfish	Palu hina	<i>Pristopomoides filamen-</i>
Sweetlip emperor	Manga	<i>Lethrinus chrysostomus</i>

Endangered and Threatened Species

- Humpback and blue whale
- Hawksbill turtle is endangered in the South Pacific Island including Tonga,
- Bottlenose whale as highly threatened

Marine – Coastal Species

Coastal species include corals, reef fishes, shell fishes, crustaceans, sea slugs, star fishes, sea urchins, etc. Some of the commonly harvested species are shown in Table 6b.

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Table 6b: Corals

Common name	Group/Family/Species	Number of species recorded in Tonga
	<i>Corals</i>	
Hard coral	Scleractinian coral	192
	Soft coral	7
	Black coral	3
	Non-Scleractinian corals	
	<i>Scyphozoans</i>	
Jellyfish	Cassiopea spp	1
	<i>Reef fish</i>	
Fish	Finfish	300 plus
Sharks and Rays	Elasmobranch	17
Eel	Muraenidae	7
	<i>Common Reef Fish</i>	
Wrasses	Labridae	41
Damsel Fish	Pomacentridae	35
Butterfly Fish	Chaetodontidae	24
Parrotfish	Scaridae	19
Surgeon fish	Acanthuridae	12
Goatfish	Mullidae	10
Blennies	Blennidae	9
Gobies	Gobbiidae	8
	<i>Mollusc</i>	
Shellfish	Bivalve	57
Shellfish	Gastropoda	85
Squids, octopus, cuttlefish	Cephalopoda	7
Chitons	Polyplacophora	1

	<i>Echinoderms</i>	
Sea star or star fish	Asteroidea	5
Sea urchin	Echinoidea	4
Sea cucumber	Holothuroidea	19
Feather Star	Cronoidea	2
Brittle stars	Ophiuroidea	3
	<i>Crustacean</i>	
Crabs	Decapodia	20
Lobsters	Panularis	4
Prawn	Prawn	2

Sponges:

Sponges, which constitute the phylum Porifera, are the most primitive of the multi-cellular animals, and one of the most abundance organisms found in most coral reefs in Tonga. Several studies have described the abundance of sponges on coral reefs in terms of percentage coverage, but detail study on their richness is still vague.

Plankton:

Plankton richness in coral reefs in Tonga has not been well documented. Very little or no study has been conducted on this commodity although their ecological importance as a primary producer is very vital (Table 6c).

Table 6c: Major Class of planktonic organisms found in Tonga.

Major Class	Phytoplankton	Zooplankton
Ctenophore		1
Chaetonath		1
Copepods		1
Diatoms	1	
Plankton Larvae		4
Dinoflagellate	2	
Foraminifera	1	

Algae and Annelids:

Table 6d lists the number of algae species recorded to be found in Tonga.

Table 6d: Algae

Common name	Tongan name	Species/No.spp
Sea grapes	Limu fuofua	Caulerpa (4)
		Halimeda (5)
	Limu fetuu	Turbanaria (1)
	Limu fua	Sargassum(2)
	Limu teemoa	Podium (1)
	Limu telinga	Padina (1)
		Hypnea (1)
Turf algae	Limu	
	Limu tanga'u	Cladosiphon (1)

Annelids:

The number of polychaete worms found in Tonga is shown in Table 6e.

Table 6e: Number of polychaete worm species found in Tonga.

Species name	Number of species	Number of Family
Polychaete worms	54	19

Endemism

The only recorded endemic species that inhabits the coral reef in Tonga is the giant clam *Tridacna tevoroa* that is endemic to the Lau Groups and Tonga. However, coral species *Halimitra* was seen at one of the reef around Tongatapu, which is also endemic to Tonga.

Endangered and Threatened Species

Two giant clam species *Tridacna derasa* and *Hippopus hippopus* were considered and believed to be extinct from the Tongan water (Mckoy 1980). Three species of black corals (Genus *Antipathes*) were also depleted to such an extent that they are endangered in the Tongan waters (Chesher 1986). Two species of Marine turtle, green and hawksbill turtles were threatened in Tonga during the 70s (Braley 1973 a,b; 1974) and cited in Lovell and Palaki 2001. Sea-cucumber or Bech-de-mer had been over fished during the early 90s because of their high market value. This was considered a threat to sandfish, holothuria scabra and teatfish species. Threatened species are listed in Table 7.



Table 7: List of Rare or Endangered Coastal Species

Common name	Tongan	Scientific name
Black-spotted stingray	Fai pala	Taeniura melanospila
Tiger shark	Tenifa	Galeocerdo cuvier
Black-edged conger eel	Toketuna	Conger cinereus
Marbled moray eel	Toke pokulu	Uropterygius marmoratus
Damsel and angelfishes	Tukuku	Stegates spp
Rock cod	Ngatala	Cephalopholis, Epinephelus
Steephead parrotfish	Sikatoki	Scarus mocrorhinos
Mussels	Kuku	Modiolus
Smooth giant clam	Tridacnae	Tridacna derasa
Turban shells	Elili	Turbo spp
Black teatfish	Mokohunu	Holothuria nobilis
Greenfish	Holomumu	Stichopus choronotus
Deepwater redfish	Telehea	Actinopyga echinites
Brown sandfish	Matamata	Bohadschia argus
Cake sea urchin	Tukumisi	Tripneustes gratilla
Slipper lobster	Tapatapa	Scyllarides squamosas
Lobster	Uo	Panularis
Dark-finger coral crab	Veeuli	Etisus dentatus
Sea anemones	Umana	Actiniidae
	Limu tangau	Cladosiphon spp

3.0 VISION, GOALS, STRATEGY AND ACTIVITIES

3.1 VISION

Tonga’s biological diversity and natural resources are protected, conserved and enriched and are appreciated and enjoyed by her present and future generations and the rest of the world.

3.2 GOALS, STRATEGY AND ACTIVITIES

3.2.1 Forest Ecosystems

Goal

Tonga’s forest ecosystems and resources are sustainably managed with in-situ and ex-situ means and providing the full range of services and products essential for Tonga’s economic and social well-being, within a land management system that integrates all land uses in an optimal allocation.

Issues, Strategies and Activities

<p>Issue 1:</p> <p>Arresting Agro-deforestation</p> <p>To minimise the loss and degradation of forest ecosystems and habitats as a result of agricultural expansion.</p> <p>Strategy:</p> <p>Short-term planning to stem agro-deforestation while medium term plans and solutions are being developed for a comprehensive integrated land use, defining holistic allocation of land to all legitimate uses essential to Tonga’s sustainable development.</p>			
Activities	Partners	Schedule	Budget
1. More effectively enforce existing legislation to protect the remaining primary natural forests particularly the remaining primary forests on ‘Eua, Kao, Tofua, Niuatoputapu and Niufo’ou, and all water catchment areas.	MAFF/DO/ GR./MOPo/ DOE	5 years	200,000
2. Review Forest Act and legislations.	MoFo		

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3. Discourage the felling of native forest species in agricultural lands.	MAFF/DOE/ NGO's/DO/GR
4. Promote the replanting of trees along farm boundaries and the replanting with trees of degraded sites.	MAFF/DOE/ NGO's
5. Review existing land-use plans and resource maps of all the main islands of Tonga and identify forest areas essential for biodiversity conservation and water catchment areas.	MAFF/MLSNR/ DOE
6. Develop and implement management plans for areas identified for protection in (1) above.	MAFF/DOE, MLSNR
7. Promote the use of traditional and non-traditional agro-forestry systems of mixed species planting as buffer for protected and other sensitive areas including habitats for threatened species and water catchments.	MAFF/NGO's/ TWB
8. Promote the replanting of coconuts in appropriate and previously cleared areas	MAFF

Issue 2:

Integrated Land Use Planning

To ensure the optimal and sustainable allocation and use of Tonga's biodiversity and natural resources.

Strategy: Land use is reviewed within the framework of an integrated plan to ensure that all legitimate and priority uses are properly accommodated in a land use mix that is optimal and sustainable in order to minimise the impact of agro-deforestation and protect priority ecosystems in the interim.

Activities	Partners	Schedule	Budget
1. Develop and implement a national integrated land-use plan to ensure the sustainable allocation of land for all priority land uses including agriculture, watersheds, forestry, settlements, industries, waste disposal, infrastructure and the protection of key habitats and ecosystems.	MAFF /DOE/ MLSNR/ CPD/MOW/ PSC/NGO	5 years	100,000

2. Review existing legislation and where necessary enact new ones to support the development of an integrated land use plan and its subsequent implementation.	DOE/MAFF/ CLD
3. Establish a pilot project.	MLSNR/DOE/ MAFF// NGO' s/TO
4. Support the implementation of the Sustainable Land Management Project and where possible, influence its design to promote the integrated approach to land use planning and management.	DOE/MLSNR

Issue 3: Sustainable Forest Management

To ensure the sustainable management of Tonga's natural forest resources.

Strategy: Preserve remaining primary forests, promote sustainable utilisation of remaining forest ecosystems and ensure that policies developed define long-term goals and objectives for managing Tonga's forest resources, and compliments the objectives and strategies of the NBSAP.

Activities	Partners	Schedule	Budget
1. Formulate and implement a national forest policy taking into account the results of the national forest inventory, the strategies proposed in this NBSAP and based on principles of sustainable forest and land-use management.	MAFF/DOE/ MLSNR	5 years	200,000
2. Review and update forest legislation and effectively enforce it to support the implementation of the national forest policy and NBSAP.	MAFF/CLD/ DOE		
3. Encourage the replanting of trees for fuel wood and for raw material for cultural, social and economic purposes.	MAFF/DOE/ NGO/DO/TO		
4. Strengthen the Ministry of Forests' technical capacity in specialised areas of forest management and science.	MAFF		

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Issue 4: Conservation Areas

To improve the management of existing parks and reserves and, consistent with the integrated land use plan, to expand the conservation area network to cover a representative sample of all major terrestrial ecosystems.

Strategy: Identify, describe and map all existing ecosystems in Tonga, and use this information to determine areas of high conservation value and of priority for protection. Incorporate community involvement into protected area management.

Activities	Partners	Schedule	Budget
1. Conduct an ecological survey to identify, describe and map all the major terrestrial ecosystems comprising Tonga's terrestrial environment.	MAFF/DOE/ MLSNR	5 years	250,000
2. Identify ecosystems of high conservation value and promote their conservation within the framework of an integrated national planning exercise.	MAFF/DOE/ MLSNR		
3. Review the 'Eua National Park Management Plan as part of the proposed national ecosystem conservation program, to integrate conservation and sustainable use objectives.	MAFF/DOE/ MLSNR		
4. Facilitate the effective implementation of the 'Eua National Park Management Plan.	MAFF/DOE		
5. Encourage and facilitate the involvement of local communities and resource owners in the conservation of areas and resources under their direct control.	MAFF/DOE/ DO/TO		
6. Establish a national herbarium targeting threatened endemic and culturally important species to complement in-situ conservation initiatives.	MAFF/DOE		

Issue 5: Information, research and monitoring

To promote the effective and systematic collection and management of relevant information through scientifically designed research studies and surveys.

Strategy: A science-based and systematic approach to biodiversity conservation to ensure the correct targeting of conservation effort and resources, and the optimal allocation of land.

Activities	Partners	Schedule	Budget
1. Support the implementation of an ecological survey to identify, describe and map all major terrestrial ecosystems comprising Tonga's terrestrial biodiversity.	MAFF/DOE/MLSNR/MAF	5 years	50,000
2. Ensure the proper collation and storage of existing and new data on Tongan biodiversity in properly designed and managed databases for efficient access and retrieval to support conservation planning and decision-making.	MAFF/DOE		
3. Coordinate all environment-related scientific studies and investigations by private and government investigators to ensure non-duplication, legitimacy, relevance to Tonga's priority research needs, and to protect against the loss of sensitive biodiversity information.	DOE		
4. Initiate and maintain an on-going program of monitoring of key threats to terrestrial ecosystem health and ensure the regular reporting of monitoring results to appropriate stakeholders and decision-makers.	MAFF/DOE		

Issue 6: Public awareness and education

To increase public understanding of and support for the conservation and sustainable use of forest biodiversity.

Strategy: Increase public awareness by using media outlets such as TV, radio, and printed material.

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Activities	Partners	Schedule	Budget
1. Initiate a program of public awareness and education using all types of media outlets to promote <ul style="list-style-type: none"> • the importance of Tonga’s forest ecosystems to the ecological sustainability of Tonga’s socio-economic development; • public understanding of the adverse impacts of unplanned agricultural expansion on Tonga’s biodiversity, • understanding of the cultural and economic importance of threatened en- 	MAFF/DOE/ MOH	5 years	100,000
2. Conduct awareness activities targeting local farmers to promote tree planting and agroforestry systems.	MAFF/ MOH/ DOE		
3. Support on-going efforts to strengthen and or integrate conservation and sustainable development principles into school curricula.	MOE/DOE/ MAFF		

3.2.2 Marine Ecosystems

Goal

Priority ecosystems and habitats including coral reefs, slope fisheries areas, priority spawning and feeding sites are productive, healthy and sustainably managed.

Issue 1: Managing impacts of land-based activities

To minimise the adverse impact of land based activities on coastal and marine species and ecosystems.

Strategy: Enforce legislation, use economic incentives to discourage unsustainable practices and comply with the environment impact assessment (EIA) legislation

Activities	Partners	Schedule	Budget
1. Strengthen existing legislation and/or introduce new ones to support effective EIA procedures as a means of regulating sand mining, land reclamation, coral quarrying, mangrove destruction and waste disposal	MAFF/DOE/ MLSNR	Ongoing	20,000
2. Implement Environmental Impact Assessments procedures to assess and mitigate against adverse impacts of development activities on coastal environments.	DOE/CPD/ MLCI/ MLSNR/ MAFF/ MOW		
3. Discourage unsustainable agricultural practices including the use of inappropriate agricultural chemicals.	MAFF/DOE		
4. Reduce discharge of wastes to coastal areas from point source pollution.	MAFF/DOE/ MOH/MMP		

Issue 2: Marine conservation areas

To expand the existing network of protected areas to effectively conserve major coastal and marine ecosystems and habitats of biological and socio-economic value.

Strategy: Promote community-based sustainable management through education and awareness raising programmes and the use of economic incentives, the use of appropriate management tools such as marine reserves, parks, sanctuaries and community-based protected areas, and for conservation purposes, direct government intervention with legislative or enforceable policy instruments is, by necessity, critical for protecting priority marine sites, such as coral reefs, mangroves, seabed grass ecosystems, fish breeding areas, etc.

Activities	Partners	Schedule	Budget
1. Identify critical coastal and marine areas vital as habitats and for the spawning and breeding of species of high economic, conservation, and or cultural importance and promote their strict protection as managed marine parks, reserves and or sanctuary areas.	MAFF	Ongoing	100,000

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2. Explore the possibility of nominating select areas of global significance such as coral reefs and mangroves as World Heritage properties, or as Wetland Areas under the Ramsar Convention, or as MAB sites.	MAFF/ DOE/ MLSNR		
3. Promote and facilitate the setting up of community-based marine conservation areas involving local communities and resource users where there is local interest and commitment. This may include some of the protected area options referred to above.	MAFF/ DO/TO		
4. Draw on the experiences, lessons learned and best practices from the Ha'apai Marine Conservation Area Project, International Waters Project and other similar initiatives, and use these, where appropriate, to guide the design and management of new conservation areas.	MAFF/ DOE		
5. Formulate management plans for Tonga's existing five (5) marine parks where none currently exists, and ensure their effective implementation. Review, update and implement existing ones.	MAFF/ DOE/ MLSNR/ DO/ TO		

Issue 3: Sustainable management of marine biodiversity

To promote the use of environmentally sound practices in the management of marine resources.

Strategy: Current initiatives such as management plans, enforcement of legislation, public awareness and education activities, monitoring and effective adaptation measures are all approaches to achieving the conservation issue and ensure the sustainable utilisation of our marine resources.

Activities	Partners	Schedule	Budget
1. Develop and implement management plans to conserve Tonga's deep slope fishery with emphasis on the sustainable management of stocks of the following pelagic species – Palu tavake (Long ailed snapper), Palu malau (Short tailed snapper) and ¹ Mohuafi (Convict grouper).	MAFF	12 months	100,000
2. Support and reinvigorate action to more effectively enforce legislation to eliminate the use of destructive traditional fishing practices, and the use of modern and unsustainable fishing technologies (refer to Annex 4).	MAFF		
3. Enact and enforce legislation regulating the harvesting and sale of undersized catches	MAFF		
4. Support existing programs promoting the sustainable management of marine species including the South Pacific Whale Research Project and the Tuna Management Plan (2003).	MAFF		
5. Ensure the enforcement of existing Whale Watching Operators and Guides Guidelines to minimized negative impacts of whale watching activities, anchoring of yachts etc on whale populations and environments.	MAFF/ TVB		
6. Implement the PacPOL programme to protect native marine biodiversity against the threat of invasive alien species introduced through ballast water discharges from ships.	MAFF/ MMP		
7. Collaborate closely with local communities regarding the reporting and implementation of measures against algal bloom and outbreaks of crown-of-thorns.	MAFF/ DOE		
8. Review existing marine resources policies and plans and incorporate measures to address the impact of climate change on marine resources and environments.	MAFF/ DOE/ MLSNR		



Issue 4: Information, research and monitoring

To promote scientific research and regular monitoring of critical marine ecosystems, and the proper management of scientific data to support the conservation and sustainable management of marine ecosystems.

Strategy: Facilitate regular assessments of species and ecosystem health, and design/monitor research programmes. Proper Data collection, storage and analyses are also an important component of the assessments.

Activities	Partners	Schedule	Budget
1. Design and implement a monitoring programme targeting the deep-water slope fishery areas, to generate accurate data on the impact of fishing on the ecosystem and on priority species namely – Palu tavake (long tailed snapper), Palu malau (short tailed snapper) and Mohuafi (convict grouper)	MAFF	6 months	20,000
2. Initiate monitoring programs for sensitive and priority marine ecosystems to inform marine resource management planning and decision-making.	MAFFF/DOE	12 months	100,000
3. Ensure the proper storage and management of scientific data and their effective use to support planning and decision-making.	MAFF/DOE	6 months	20,000

Issue 5: Public awareness and education – To enhance public knowledge and understanding of Tonga’s marine ecosystems and of issues related to their conservation as a means of

Strategy: Increasing public awareness of conservation issues using choices of media outlets (TV, radio, printed media etc. At the same time, information needs to be properly packaged.

Activities	Partners	Schedule	Budget
Promote public awareness and understanding of <ol style="list-style-type: none"> a. the impacts of land-based activities on coastal environments and species, b. the ecological significance of mangroves for the breeding and spawning of marine species and for coastal protection, c. the destructive impacts of many traditional and modern fishing methods on Tonga's marine resources and environment, and d. existing legislation related to marine resource management. 	MAFF/ NGO'/ DOE	Ongoing	20,000
2. Use innovative approaches to delivering conservation messages including drama, TV and radio programs and the use of strategic gatekeepers such as local church leaders and high profile sports people.	MAFF/NGO/ DOE	Ongoing	20,000

3.2.3 Species Conservation

Goal

Tonga's priority species are protected and thriving in their natural habitats, and diversity of endemic, native and non-native species comprising Tonga's natural heritage is well documented, effectively conserved and managed sustainably

Issue 1: Protection of priority species

To ensure the protection of viable populations of all priority species of Tonga.

Strategy: Protect identified species highlighted under the 2003/04 IUCNs Red List of Endangered Species. Consolidate all information from recent studies and other sources to equip policy makers and planners to the development of conservation plans. Review and amend existing legislation that supports species conservation. Explore ex-situ approaches to management plans.

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Activities	Partners	Schedule	Budget
1. Conduct desk reviews of recent and on-going research in terrestrial fauna to consolidate information and to identify other priority	MAFF/DOE	12 months	50,000
2. Conduct rapid assessment surveys to provide up-to-date information on the 'critically endangered' and 'endangered species' of Tonga as classified by IUCN's 2003 Red List of Endangered Species (See Annex 1).	MAFF/DOE	12 months	50,000
3. Based on results and information from surveys proposed above, review and update existing plans, or develop new conservation/recovery plans and implement them effectively to protect viable populations of selected prior-	MAFF/DoE	6 months	20,000
4. Continue to enforce existing legislation promoting the conservation of endangered species including the Terrestrial and Fisheries (Conservation and Management) Regulation 1994 with regards to the conservation of	MAFF/DOE	12 months	20,000
5. Promote the sustainability of whale-watching activities in Vava'u by enforcing the use of sustainable management guidelines and best practices and by providing information, training and other assistance to tour operators.	MAFF/DOE/ TVB	12 months	20,000
6. Establish gene conservation stand/seed orchard or botanical gardens in the main island centers in Tonga for ex situ conservation of priority species including Heilala (<i>Garcinia cessilis</i>), Tava (<i>Pometia pinnata</i>), Moli (<i>Citrus spp</i>) and fekika (<i>Syzygium malaccense</i>).	MAFF	2 years	100,000
7. Collaborate with regional conservation programmes on species of regional and international significance found in Tonga.	MAF/DoE/ MoFo/MoF	Ongoing	
8. Integrate species conservation planning with conservation/protected area management to provide for the protection of other species including avifauna and hepterofauna.	MAFF/DOE	Ongoing	

Issue 2: Sustainable use and management of species

To ensure the sustainable use and management of species of economic and cultural significance.

Strategy: Increase replanting measures. Explore ex-situ measures including herbaria, gene banks or seed orchards for priority species are options that will preserve genetic resources for future replanting if it is nearing extinction in the wild. At the same time, encouraging local people to replant them by providing planting stocks.

Activities	Partners	Schedule	Budget
1. Promote and encourage the replanting of priority trees and crops species including the production of high quality seedlings for public sale and distribution.	MAFF	2years	50,000
2. Assist the public in tree planting by providing more information on how to propagate and care for priority species.	MAFF		
3. Ensure that all species of cultural significance are represented and protected in a national herbarium.	MAFF		
4. Support the application of tree improvement methods to improve the genetic make-up of selected species of forest plantation tree species.	MAFF		
5. Support the replanting of native forest species in Tonga’s plantation program.	MAFF		

Issue 3: Invasive species

Prevent the accidental introduction of known invasive alien species and reduce the adverse impact of invasive species on indigenous species and ecosystems and agricultural biodiversity.

Strategy: Collaboration amongst Pacific Island Countries. On the national level tight border control measures are essential to prevent accidental introductions. Where feasible direct measures should be taken to reduce or eradicate species. Support current initiatives such as the Pacific Islands Ecosystems at Risk and nationally executed MAF Quarantine Project.

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Activities	Partners	Schedule	Budget
1. Support the Pacific Islands Ecosystems at Risk (PIER) Project and border control operation of the MAF Quarantine Division particularly, those targeting high priority invasive species.	MAFFDOE/ MMP	Ongoing	50,000
2. Support regional invasive species programmes involving Tonga but ensure targeted invasive species are those of the highest priority	MAFF/ DOE/ MMP		

Issue 4: Research and Monitoring

To encourage basic scientific research and monitoring surveys to identify, document and monitor progress in the conservation of priority species and to support on-going planning and conservation efforts.

Strategy: A systematic and scientific approach to research and monitoring is needed. Baseline studies and research are essential to provide up-to-date information and to establish baselines for monitoring. Identify and address gaps in knowledge relevant to the conservation of selected priority species.

Activities	Partners	Schedule	Budget
1. Conduct a thorough review of the state of scientific knowledge of Tonga's biological diversity to determine gaps in information and priority areas for research including information related to species currently classified Critically Endangered in the 2003 <i>IUCN Red List of Endangered Species</i> .	DOE/MAFF	1 year	50,000
2. Develop and implement a systematic program of baseline surveys and basic research to address critical gaps.	DOE/MAF	Ongoing	50,000
3. Develop and implement a systematic program of monitoring critically threatened species of high conservation value including the megapode, hawksbill, and green turtles.	DOE/MAF	1 year	20,000

4. Establish and empower a multi-agency committee under the auspices of the DOE to screen, approve and coordinate the implementation of all conservation-related research activities for all fauna and flora to ensure non-duplication, proper targeting of approved priorities, and control the release of sensitive sci-	MAFF/DOE	3 months	10,000
5. Ensure the proper storage and collation of all existing datasets and new scientific data in	MAFF/DOE/ MOE	Ongoing	50,000
6. Need to enlarge current insect collections to include other terrestrial fauna which is with	MAF	Ongoing	50,000

Issue 5: Public Awareness and Education

To enhance public knowledge and understanding of priority species and their importance for conservation as part of Tonga's natural heritage, as a way of fostering public support for species conservation objectives.

Strategy: Promote public support for conservation objectives by engaging community participation together with public awareness and educational programmes by using a wide range of approaches and media options.

Activities	Partners	Schedule	Budget
1. Initiate public awareness and education programmes promoting the importance of biodiversity conservation to Tonga's sustainable development using a range of innovative approaches including, posters, leaflets and other printed materials, postage stamps, TV and radio spots, locally community workshops, drama, and others.	DOE	Ongoing	20,000
2. Cultivate national pride in rare species that are of global significance that are either endemic and unique to Tonga or which endemism is shared by Tonga and a few other countries. (MOE/NGO's)	MOE/NGOs	Ongoing	20,000

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3. Promote awareness of invasive species and their negative impacts on local biodiversity. (MAF/Forestry/MOF/NGO's)	MAFF/NGO	Ongoing	30,000
4. Promote awareness of and appreciation of Tonga's existing terrestrial and marine protected areas, including the Eua National Park.	MAFF/DOE		
5. Encourage public access to and use of available scientific information for educational, awareness raising and planning purposes.	MAFF/DOE/ MOE		

Issue 6: Capacity Building

To strengthen the technical, management and research knowledge and skills of local scientists and researchers, and the capacity of responsible agencies and organisations to effectively implement research programmes supporting the protection, conservation and sustainable management of Tonga's priority species.

Strategy: Promote and encourage short-term skills-transfer and participation in short-term specialised training courses. Explore and encourage pursuance of higher level specialised training in areas of priority need.

Activities	Partners	Schedule	Budget
1. Liaise with relevant regional organisations including SPC and SPREP to provide short specialised training in specific skills areas for local researchers and management staff.	MAFF/DOE	Ongoing	50,000
2. Encourage counterpart or mentoring arrangements for local staff with visiting experts and consultants.	MAFF/DOE		
3. For all scientific surveys and research projects, incorporate into project designs, formal and hands-on training opportunities for local staff.	MAFF/DOE		

4. Secure and make available graduate and post-graduate level training programs for interested and promising staff in areas most in need	MAFF/DOE/ MOE		
5. Provide field research equipment including computers to support local research initiatives.	MAFF/DOE		
6. Identify, and where necessary, establish three separate positions responsible for coordinating research in (a) marine biodiversity in MOF, (b) terrestrial flora in Forestry, and (c) terrestrial fauna and freshwater biodiversity in DOE.	MAFF/DOE		
7. Ensure the effective coordination and oversight of all conservation related research as a key responsibility of these positions in a multi-agency task force under the overall oversight of DOE.	DOE		

3.2.4 Agro-biodiversity

Goal

Tonga’s rich agro-biodiversity is protected, conserved and sustainably managed, supported by progressing science-based initiatives to enrich and enhance its diversity for greater productivity and genetic stability.

Issue 1: Conservation and sustainable use of threatened agro-biodiversity

To preserve the genetic variability of Tonga’s agro-biodiversity and promote the conservation and sustainable use of threatened agro-biodiversity species of economic and socio-cultural importance.

Strategy: Preserve genetic variability via ex situ means – gene banks for rare and endangered species, subsidized programs of replanting for rare and non-commercial traditional species. Eliminate unsustainable agricultural practices that reduce soil productivity. Promote ecologically stable mixed cropping and agroforestry systems.

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Activities	Partners	Schedule	Budget
1. Discourage and reduce the use of unsustainable farming practices. This includes excessive machine tillage of farming lands, misuse of inorganic fertilisers and agrochemicals.	MAFF/NGO	On-going	10,0000
2. Promote organic farming, mixed farming and agro-forestry farming systems wherever possible.	MAF/NGO	On-going	10,000
3. Encourage traditional and sustainable farming practices using incentive schemes including provision of free-seedlings and technical advice.	MAFF/NGO	On-going	10,0000
4. Encourage replanting programmes aimed at preserving and widening of the gene pools of rare and endangered agrobiodiversity including <i>Citrus spp.</i> , <i>Saccharum officinarum</i> , <i>Syzygium malaccense</i> , <i>Spondius cytherea</i> , <i>Broussonetia papyrifera</i> , <i>Xanthosoma spp.</i>	MAF	3 years	50,0000
5. Conduct desk reviews of recent and on-going research in forestry and agro-biodiversity to consolidate information and to identify other priority species.	MAF/NGO	3 years	10,000

Issue 2: Research and Development

To promote and support research initiatives that contribute to the conservation of threatened species and the sustainable use of commercial and traditional agrobiodiversity.

Strategy: Research activities should be threat-driven and priority species based. Target threats include invasive species and LMOs or GMOs. Establishment of gene banks/seed orchards of rare varieties is important to preserving the genetic variability.

Activities	Partners	Schedule	Budget
1. Develop programmes to develop priority agro-biodiversity species from the impact of alien and invasive species	MAFF	Ongoing	50,000
2. Establish herbaria to preserve specimens of native and ‘naturalised’ species of cultural and economic importance.	MAF	2 years	70,000
3. Establish gene banks or seed orchards of rare and or superior varieties of priority species to facilitate large-scale propagation. Encourage the use of high skilled propagation methods e.g. budding, grafting and breeding for new hybrids in these initiatives.	MAF/NGOs	2 years	30,000
4. Assess the impact of new biotechnologies (genetic impressions, Living or Genetically Modified Organisms and Genetically Engineered Organisms) on agrobiodiversity.	MAF/DOE	1 year	50,000
5. Conduct researches on different farming systems including; organic farming, traditional and sustainable farming systems, mixed farming and agro forestry farming.	MAFF	2 years	80,000

Issue 3: Public Awareness and Education

To foster public support for the conservation of threatened agro-biodiversity by enhancing awareness and understanding of their importance.

Strategy: Raising Public Awareness and understanding requires the engagement of high profile activities and individuals, and the use of different media outlets in innovative ways. The use of public media, like television, radio programs, newspaper, manuals, bulletins, newsletters, trainings, meetings, etc. should be targeted to raise public awareness about the conservation of threatened agro-biodiversity.

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Activities	Partners	Schedule	Budget
1. Provide relevant user-friendly instructions for growing and maintenance of plants to encourage planting of endangered agrobiodiversity species supplied with subsidised seedlings.	MAFF/DOE/ NGO	1 year	50,000
2. Use innovative media outlets to promote awareness of the threat of alien invasive species to Tonga's economic development and to educate the public on appropriate actions to take to contribute to their exclusion or containment.	MAFF/DOE		
3. Raise public awareness and understanding of biotechnology and the potential threat to agrobiodiversity pose by Living Modified Organisms through the use of all appropriate media.	MAFF/DOE		

Issue 4: Capacity Building

To strengthen the capacity of local farmers, agriculturalists and scientists to effectively implement programmes for the protection, conservation and sustainable management of Tonga's agrobiodiversity.

Strategy: The significance and sustainability of agro-biodiversity conservation requires an effective and efficient institutional capacity. Strengthening organizational capacities involve strategic refocusing on new shared vision, renewed organizational commitment to new goals and objectives with appropriate infrastructure and equipment support to facilitate the delivery of outputs in key divisions.

Activities	Partners	Schedule	Budget
1. Provide training to local farmers on appropriate conservation practices of agro-	MAFF	2 years	15,000
2. Strengthen technical and operational capacity of MAF to effectively execute border control bio-security functions internationally and inter-islands.	MAFF	3 years	50,000

3. Design and implement a program of long and short term training to systematically strengthen technical and management skills of MAF personnel and scientists in skills areas related to research, extension and crop produc-	MAF	3 years	150,000
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3.2.5 Local Community and Civil Society

Goal

Local communities and civil society have pride in Tonga’s natural heritage and are active advocates and participants in its protection and management.

<p>Issue 1: Local communities and resource owners - To empower local communities and resource owners to effectively participate in the conservation and sustainable use of biodiversity resources in areas under their control.</p> <p>Strategy: Improve access to information, promoting their involvement in participatory planning approaches, offering incentives and providing opportunities for engaging in conservation management are some of the ways of achieving this.</p>			
Activities	Partners	Schedule	Budget
1. Consult local communities and resource owners in all conservation planning affecting resources and areas of importance to them.	DOE/NGO	Ongoing	50,000
2. Ensure access of local communities and resource owners to up-to-date and relevant information relevant to decision-making.	All government ministries/NGO		
3. Provide opportunities for the participation of local community representatives in the management of conservation areas and in national coordination and planning mechanisms.	All government ministries/NGO		

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4. Encourage local communities to manage resources under their control in a sustainable manner and to use tools such as conservation areas and fisheries reserves.	MAFF/NGO		
5. Collaborate closely with local communities regarding the reporting and implementation of measures against algae bloom and outbreaks of crown-of-thorns.	MAFF/NGO		

Issue 2: Civil Society

To empower civil society organizations and groups to be effective advocates of biodiversity conservation.

Strategy: Improve access to sound and up-to-date information on all issues for local conservation NGOs, church organisations and other civil society groups. Include civil society groups in development planning and decision-making processes, and to benefit from govt. and donor funded initiatives for capacity building.

Activities	Partners	Schedule	Budget
1. Encourage the formation of new local conservation groups and strengthen existing groups.	DOE/NGO/MLCI	Ongoing	50,000
2. Encourage the involvement of local NGOs including Youth Groups' in conservation activities.	DOE and relevant organisations		
3. Create formal mechanisms and opportunities for ensuring the participation of civil society organisations in national policy and development planning exercises. (All government ministries).	All government ministries		

4. Provide membership opportunities for the participation of civil society representatives in the Board of Directors of government corporations involved in resource exploitation.	All Government ministries/NGO		
5. Make technical information on environmental issues including those related to multi-lateral environmental agreements wherein Tonga is a party, accessible to interested NGOs.	All Government ministries/NGO		
6. Encourage the involvement of churches and church leaders as advocates of environment conservation and sustainable resource use by involving them in awareness raising and public education programs, and by improving their access to relevant information.	All Government ministries/NGO		

Issue 3: Schools

To ensure the full integration of biodiversity conservation concepts into school curricula at all levels.

Strategy: Collaboration with the Ministry of Education and educators of church organisations is necessary to ensure conservation themes and principles are integrated into science curriculum at primary and secondary school levels. Engage schools as they are a strategic target for all awareness raising campaigns on specific issues and a vehicle for delivering conservation messages into homes.

Activities	Partners	Schedule	Budget
1. Strengthen and update school curriculum at primary and secondary schools to incorporate relevant biodiversity conservation issues.	MOE/relevant Government ministries	Ongoing	50,000
2. Encourage and support activities aim at re-packaging technical conservation information for educational and awareness raising purposes for schools, local communities and the public at large.	DOE/MOE/relevant government ministries		

3. Develop a core set of educational materials that can distributed to all schools to support their environmental curriculum activities.	DOE/MOE/ relevant gov- ernment minis- tries		
4. Encourage and facilitate the participation of schools in national events promoting conserva- tion objectives.	DOE/MOE / relevant gov- ernment minis- tries		

3.2.6 Access & Benefit Sharing from the use of Genetic Resources & Traditional Ecological Knowledge

Goal

Tonga’s genetic resources and traditional ecological knowledge are fully protected from unlawful exploitation, documented and profitably used with benefits equitably distributed and shared.

<p>Issue 1: Access to genetic resources</p> <p>To prevent illegal access to and unlawful exploitation of Tonga’s genetic resources.</p> <p>Strategy: It has become obvious that without a legal framework and adequate organisational capacity to regulate the access to genetic resources, it will lead to illegal and unlawful exploitation of these resources. Several legislations currently exists relating to the protection of intellectual property however protection of the use of genetic resources of the biodiversity of Tonga is not clearly stated.</p>			
Activities	Partners	Schedule	Budget
1. Enact legislation to regulate access to Tonga’s genetic resources for bioprospecting, research and other forms of exploitation.	DOE/CLD/ MLCI	3 years	100,000

Develop and implement strict procedures to support bioprospecting regulation.	DOE/CLD/MLCI		
Review and strengthen existing arrangements governing the review and approval of all re-search proposals, including bioprospecting ac-	DOE/MLCI/MAFF		
Explore opportunities for repossessing Tonga's endemic biodiversity in the form of botanical and museum collections, gene banks and other forms where these are held in collec-tions outside of Tonga.	DOE		

Issue 2: Fair and equitable sharing of benefits

To ensure the fair and equitable sharing of benefits generated from the use of genetic re-sources.

Strategy: Development and implementation of mechanisms used for negotiating between holders of traditional knowledge and resource owners and the bioprospectors as ensure fair and equitable sharing of benefits. Presently, no mechanism exists and no involvement of a legal representative occurs during such a negotiation.

Activities	Partners	Schedule	Budget
1. Develop benefit-sharing mechanisms for holders of knowledge and owners of resources utilized in bioprospecting.	DOE/MLCI	1 year	7,0000
2. Put in place appropriate mechanisms and procedures to ensure fair and equitable out-comes of negotiations with bioprospectors for all local parties involved.	DOE/CLD/MAF/MLCI	2 years	8,0000
3. Actively encourage and assess bio-prospecting in Tonga.	DOE	2 years	10,0000

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Issue 3: Traditional practices and ecological knowledge

To prevent the loss of traditional ecological knowledge.

Strategy: Documentation of Traditional Ecological Knowledge

Activities	Partners	Schedule	Budget
1. Systematically identify and document traditional ecological knowledge including cultivation practices, fishing methods, names of local plants of medicinal value, methods used for their preparation and application, methods of predicting harvesting, fishing seasons etc.	DOE	6 months	6,2000
2. Promote awareness of and the use of traditional ecological knowledge and practices that are environmentally friendly and sustainable.	DOE	Ongoing	3,0000
3. Enact legislation and take other appropriate measures to protect and safeguard ownership of traditional ecological knowledge and other intellectual property rights associated with them, and to ensure equitable benefit sharing resulting from their commercial use.	DOE/CLD/ MLCI	3 years	16,0000
4. Preserve traditional artifacts and other forms of expressions of traditional ecological knowledge in local museums and other secured collections and promote their existence for educational and awareness raising purposes.	DOE/TTC/ NGO's/TVB	Ongoing	30000

Issue 4: Public Awareness and Education

To raise public awareness and understanding of the importance of Tonga's genetic biodiversity resources and traditional ecological knowledge.

Strategy: Use modern media programs and success stories to encourage and raise the understanding of the importance of genetic biodiversity and traditional ecological knowledge

Activities	Partners	Schedule	Budget
1. Raise awareness of the importance of Tonga's biodiversity and their value as a source of traditional medicine and potentially other pharmaceutical products.	DOE/MOE/TVB	3 years	60,000
2. Stimulate local interest by widely disseminating information on the successful experiences of other Pacific Island countries in the use of their genetic resources and the access and benefit sharing arrangements involved.	DOE	3 years	60,000
3. Make readily accessible and available to the general public relevant information on Tonga's biodiversity using modern computer/internet technology.	DOE	Ongoing	25,000
4. Explore and implement innovative ways to promote awareness of Tonga's biogenetic resources.	DOE	3 months	12,000
5. Encourage and support programmes utilising traditional ecological knowledge.	DOE	5 years	3,5000

3.2.7 Mainstreaming Biodiversity Conservation

Goal

Biological diversity is recognized, respected and integrated into all social and economic sectors strategies and plans for its economic, ecological, social, cultural and spiritual values.

Issue 1: Legislation policies and plans

To integrate concepts of conservation and sustainable use of biodiversity into all relevant sectoral policies programmes and plans.

Strategy: Review and amend legislation where necessary. New legislation enacted to ensure the principle of environmental sustainability is integrated into economic development planning. Ensure environmental sustainability is reflected in national strategic development plans. A participatory planning process is used. Mechanisms for ensuring integration need to be put in place.

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Activities	Partners	Schedule	Budget
1. Review and enact legislation to give effect to Tonga's obligations under multilateral environmental agreements.	DOE	Ongoing	50,000
2. Ensure the integration of biodiversity conservation priorities in national sustainable development policies and plans and into sector plans of key sectors including agriculture, forests, fisheries, tourism and works.	DOE		
3. Encourage and support the effective enforcement of the EIA and other environmental regulations.	DOE		
4. Strengthen the Environment section in the Sustainable Development Plan, where it is a collaboration of international projects and DoE point of view.	DOE/CPD		
5. Review Environment's Corporate Plan to appropriately address the priorities for biodiversity conservation in this NBSAP.	DOE		
6. Encourage the active participation of the Department of Environment in all national planning exercises.	DOE		
7. Provide relevant biodiversity reports and technical information on new technologies accessible through various MEA secretariats to other sectors.	DOE		

Issue 2: Multi-sectoral collaboration

To improve and strengthen multisectoral collaboration amongst all relevant sectors and stakeholders in support of biodiversity conservation and natural resources management.

Strategy: Multi-sectoral and multi-agency coordinating mechanisms are the most common means of ensuring multi-sectoral coordination and collaboration.

Activities	Partners	Schedule	Budget
1. Formally establish a NBSAP National Coordinating Group to have overall coordination and oversight of NBSAP implementation under the	DOE/relevant stakeholders	Ongoing	50,000
2. Set up different inter-agency task groups to have lead responsibility for promoting and leading the implementation of each of the different	DOE		
3. Ensure regular communication between inter-agency task forces and the NCG on progress in implementation and issues/constraints	DOE		
4. Encourage and facilitate public dialogue and discussion forums engaging expert-representatives from different sectors to share perspectives on major environmental issues facing the country.	DOE		

Issue 3: Environmental Impact Assessment

To ensure that environmental and social impacts of all proposed major projects and activities are thoroughly assessed using approved EIA guidelines and standards prior to their implementation.

Strategy: The EIA legislation needs political commitment and the strengthening of the DoE with adequate expertise and resources to ensure its effective implementation.

Activities	Partners	Schedule	Budget
1. Enact supportive regulation and policies to ensure the effective implementation of the EIA legislation.	DOE and other relevant organisations	Ongoing	50,000
2. Provide training for DoE staff to ensure thorough and sound administration of the EIAs.	DOE		

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3. Regularly review and, where necessary, update EIA procedures.	DOE		
4. Actively promote and raise awareness amongst the private sector and the public sector about the EIA legislation and its requirements.	DOE		

Issue 4: Economic valuation

To encourage the quantification of benefits derived from the use of biodiversity and from other ecosystem services to support the full integration of biodiversity conservation into sustainable development planning and decision-making.

Strategy: A programme of economic valuation of biodiversity benefits should be initiated. At the same time, the capacity of DoE should be strengthened in the methods for economic valuations of different biodiversity as well as other ecosystem services.

Activities	Partners	Schedule	Budget
Initiate a program of valuing benefits derived from the use of different biodiversity services.	DOE	Ongoing	50,000
Provide training for staff of appropriate agencies needing skills in this area, and encourage consultants to mentor counterpart staff in the use of different methodologies.	DOE		
Collect and collate baseline data related to economic valuation such as number of visitors to parks and reserves, travel and other costs associated with visits to protected areas; local income generated from tourists to protected areas and others.	DOE		
Encourage the use of income data collected above in national and sector reports.			

DOE

Design and pilot an income generating projects in association with conservation areas to monitor and measure income flow and other useful data.			
Encourage the use of income data collected above in national and sector reports.			

3.2.8 Financial Resources and Mechanisms

Goal

Tonga’s NBSAP is financed from resources generated from a diversified and reliable mix of local and external funding sources.

Issue 1: Assessment of Biodiversity Conservation Capacities			
To ensure a thorough and comprehensive assessment of the technical, managerial and administrative capacity for implementing biodiversity conservation within Tonga’s relevant line ministries and all conservation organizations.			
Strategy: A national capacity self assessment is needed to identify existing capacity needs for implementing the NBSAP. A GEF-funded UNDP initiative is currently under-way for national capacity self assessment that should be tapped into.			
Activities	Partners	Schedule	Budget
1. Implement a National Capacity Self Assessment project to identify areas of capacity needs.	DOE	18 months	200,000
2. Develop a capacity building programme based on the result of the NCSA to build capacity across all sectors involved in the NBSAP implementation.	DOE		

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Issue 2: Collation and dissemination of donor-related information

To inform all interested organizations of potential funding sources for biodiversity conservation and of donors funding requirements.

Strategy: Information on current and potential funding sources and their requirements for assistance should be readily accessible to all potential implementers of the NBSAP to facilitate access and solicitation of funds and other forms of assistance.

Activities	Partners	Schedule	Budget
1. Develop a database listing all donor organizations active in environmental projects in Tonga and other Pacific Islands, their areas of funding interests, requirements for eligibility, contact details etc and make this database accessible to all potential implementers of the Tongan NBSAP.	DOE		
2. Coordinate proposal formulation and fund raising activities with regional implementing agencies including FFA, SPTO, SPREP, SPC and SOPAC to ensure inclusion of Tonga in relevant regional projects or regionally disbursed technical and financial assistances.	DOE		
3. Organize public meetings and workshops to explain different funding mechanisms and applications/eligibility requirements.	DOE		

Issue 3: Capacity Building in Conservation Fund Raising and Management

To strengthen the capacity of key stakeholders in planning and implementing fund raising strategies and in the management of conservation funds.

Strategy: Formal training in proposal writing, and fund-raise planning should be provided for all local implementing organisations including NGOs to enhance their capacity to attract donor funding to biodiversity conservation in Tonga.

Activities	Partners	Schedule	Budget
1. Organise formal short training in proposal writing and fund raising planning for NGOs and government agencies.	DOE	Ongoing	20,000

2. Facilitate opportunities for major donor organizations to meet and promote conservation funding programmes with local implementing organizations.	DOE	Ongoing	10,000
3. Update implementing organizations and other local NGOs with up-to-date information on available opportunities for funding biodiver-	DOE	Ongoing	10,000
4. Conduct workshops to explain to local NGOs and other eligible implementing agencies different donors eligibility requirements and	DOE	Ongoing	10,000

Issue 4: Economic tools and instruments for Conservation Funding

To generate local funding sources for biodiversity conservation.

Strategy: Local funding should be encouraged to support biodiversity conservation, and investigate mechanisms for their feasibility to generate conservation funds.

Activities	Partners	Schedule	Budget
1. Explore the feasibility of setting up a national funding mechanism for biodiversity conservation.	DOE	2 years	50,000
2. Promote the use of economic instruments such as permit and access fees for bioprospecting, eco-tourism fees, EIA related levies, national lotteries and other gaming revenues to fund a national funding mechanism for biodiversity.	DOE		

Issue 5: Partnerships

To build effective partnerships with key local and international organisations to support the implementation of biodiversity conservation programmes.

Strategy: Encourage close collaboration of relevant stakeholders, both nationally and internationally, to support biodiversity conservation.

Activities	Partners	Schedule	Budget
1. Establish an official ‘environment conservation’ award to recognize outstanding contributions to the conservation of Tonga’s environment and biodiversity by members of the public, civil organisations and private sector companies.	DOE	Ongoing	50,000
2. Create opportunities for representatives of the private sector and conservation NGOs to sit on national coordinating committees dealing with different environmental issues.	DOE		
3. Encourage regular consultations with representatives of civil society and the private sector on issues of national policies. (All government ministries)	All government ministries		
4. Use every opportunity to advance formal partnerships with private sector and civil society organizations to collaborate and complement conservation initiatives.	All government ministries		
5. Encourage contact with international conservation NGOs and where possible, provide them with reports on work carried out in Tonga.	All government ministries		
6. Develop a website for DOE as a tool for making access to Tongan conservation information easier for local and in particular, international conservation organisations.	DOE		

4.0 MONITORING AND EVALUATION

4.1 NBSAP Monitoring Matrix

NBSAP Vision	Tonga's biodiversity and genetic resources are protected, conserved and sustainably managed		
Theme Area 1	Forest Ecosystems		
Objective 1.1	To minimize the loss and degradation of forest ecosystems and habitats as a result of agricultural expansion.		
Intended Outcomes	Indicators	Means of measurement	Assumption
The expansion of agriculture is minimized and contained.	Total area of pristine and established secondary forests remaining at 2005 levels.	Aerial photos, satellite images. MoFo reports.	Logging of native forests is limited to current areas or reducing. No severe natural disaster (cyclones, fires) occurring.
Objective 1.2	To ensure the optimal and sustainable allocation and use of Tonga's and natural resources.		
Intended Outcomes	Indicators	Means of measurement	Assumption
Forest ecosystems and ecosystem services are protected.	An integrated land use plan is adopted & implemented. Legislation and policies adopted & enforced.	MLSNR reports & maps MoFo reports	Political and public support exist. Funding and capacity is not constraining.
Agricultural expansion is managed within pre-determined areas.	1. Reducing loss of forest cover.	Aerial photos & GIS maps Forest boundary surveys.	Political and public support exist.
Objective 1.3	To ensure the sustainable management of Tonga's natural resources.		
Intended Outcomes	Indicators	Means of measurement	Assumption
Reduction in the annual area of forest lost.	National Forest Policy is adopted and implemented. Forest legislation is updated MoFo staff and budget increases.	GIS maps MoFo Annual reports MoFo approved budgets.	Political support exists.

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Objective 1.4 Conservation Areas	To improve the management of existing parks and reserves and, consistent with the integrated land use plan, to expand the conservation area network to cover representative samples of all major terrestrial ecosystems.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
Improved management of parks and reserves	No. of management plans developed & implemented; Increasing trend in funding Increase in visitations.	Existence of management plans. Visitors book from parks etc.	Increasing funding correlates to increasing no. of PA staff and investment in PA development.
More ecosystems under conservation management.	No. of new conservation areas; No. of previously unrepresented or underrepresented ecosystems under conservation management.	GIS maps No. of CA management plans. Aerial photos & satellite pictures.	No drastic natural disaster or environmental event happening.
Objective 1.5 Information, research and monitoring	To promote the effective and systematic collection and management of relevant information through scientifically designed research and surveys.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
Knowledge of the status of forest biodiversity is up-to-date and verifiable.	Regular and up-to-date information available. Ecosystem survey completed. Data available on databases	No. of technical survey reports. Amount of data stored on databases.	Technical capacity exists.
Objective 1.6 – Public awareness and education	To increase public understanding of and support for the conservation and sustainable use of forest biodiversity.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
Supportive public of forest conservation actions.	No. of people participating in forest activities e.g. tree planting; No. of people surveyed with supportive responses.	Polls and attitude surveys	Positive attitude translates to positive actions.

Theme Area 2		Marine ecosystems		
Objective 2.1 – Minimize the impact of Land based activities.		To minimise the adverse impact of land based activities on coastal and marine species and ecosystems.		
Intended Outcomes	Indicators	Means of measurement	Assumptions	
Healthy coastal ecosystems and habitats for priority species.	Reducing no. of algae bloom outbreaks. Reducing trends of eutrophication. Evidence of good coral growth.	Coastal, coral reefs & marine surveys	No significant El Nino event.	
Objective 2.2 – Marine conservation areas		To expand the existing network of protected areas to effectively conserve major coastal and marine ecosystems and habitats of biological and socio-economic value.		
Intended Outcomes	Indicators	Means of measurement	Assumptions	
A 50% increase in the total area of marine ecosystems under conservation management in 10 years.	No. of new marine areas under conservation management.	GIS maps showing new marine areas Management plans approved and under implementation.	Supportive local communities.	
Objective 2.3 – Sustainable management of marine bio-		To promote the use of environmentally sound practices in the management of marine resources.		
Intended Outcomes	Indicators	Means of measurement	Assumptions	
Marine resources are managed sustainably.	No. of management plans developed & implemented. No. of fishing practices & technologies banned by legislation. Legislation banning undersized catches enacted and enforced. Declining no. of adverse reports of negative impacts of whale watching activities. Declining no. of incidences of algae bloom and COT. PacPOL implemented successfully.	Physical existence of management plans. Copies of legislation Reports of MoF. Reports of whale watching operators PacPOL reports	Legislation will be enforced. Cooperation of whale watching operators.	

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Obj. 2.4 – Information, research and monitoring	To promote scientific research and regular monitoring of critical marine ecosystems, and the proper management of scientific data to support the conservation and sustainable management of marine ecosystems.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
Knowledge of the state of health of critical marine ecosystems is current and regularly updated.	No. of marine survey reports of critical ecosystems and species; Amt of data on database.	Reports of marine surveys Database & amt of data stored.	Technical expertise is not a constraint.
Obj. 2.5 – Public awareness and education	To enhance public knowledge and understanding of Tonga’s marine ecosystems and of issues related to their conservation as a means of fostering public support for marine conservation objectives.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
A general public that is well informed of marine conservation issues and supportive of marine conservation objectives.	No. of local initiatives supporting marine conservation; No. of local communities, schools, organisations etc interested and are involved in community conservation work.	Polls and questionnaire surveys. Count of supportive communities or local initiatives.	Locals are willing to express support and participate in polling and questionnaire surveys.

Theme Area 3	Species Conservation		
Obj. 3.1 – Protection of priority species	To ensure the protection of viable populations of all priority conservation species of Tonga		
Intended Outcomes	Indicators	Means of measurement	Assumptions
Priority species are well protected & their populations are increasing.	Populations of priority species increasing. Associated habitats are healthy	Species survey reports Aerial photos and satellite pictures	No drastic natural disaster or environmental event happening.
Obj. 3.2 – Sustainable use and management of species	To ensure the sustainable use and management of species of economic and cultural significance.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
Targeted species are managed sustainably.	Populations of targeted species are increasing ex situ and or in-situ	Regular population count. MAF and MoFo reports	No drastic natural disaster or environmental event happening
Obj. 3.3 – Invasive Species	Prevent the accidental introduction of known invasive species and reduce the adverse impact of invasive species on indigenous species and ecosystems, and agricultural biodiversity.		

Intended Outcomes	Indicators	Means of measurement	Assumptions
Local biodiversity is free of the threat of invasive alien species.	<p>No new accidental introductions.</p> <p>No. of seizures of threatening biological specimens made at borders.</p> <p>Populations and spread of known declining.</p>	<p>MAF (Quarantine) reports.</p> <p>SPREP reports on PIER</p>	Data on seizures at border control operations are made and reported.
Obj. 3.4 – Research and Monitoring	To encourage basic scientific research and monitoring surveys to identify, document and monitor progress in the conservation of priority species and to support on-going planning and conservation efforts.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
Better understanding of what is known and not known about Tonga’s priority species ecological requirements for conservation management.	<p>Completed review of existing information about priority species.</p> <p>Monitoring programs initiated and maintained.</p>	Reports of MAF, MoF, MoFo and DoE.	Technical capacity is not a constraint.
Obj. 3.5 – Public awareness and education	To enhance public knowledge and understanding of priority species and their importance for conservation as part of Tonga’s natural heritage, as a way of fostering public support for species conservation objectives.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
A general public that is well informed of Tonga’s natural heritage and priority species, and supportive of species conservation work.	<p>No. of local initiatives supporting species conservation;</p> <p>No. of local communities, schools, organizations etc interested and are involved in species conservation work.</p>	<p>Polls and questionnaire surveys.</p> <p>Count of supportive communities or local initiatives.</p>	Locals are willing to express support and participate in polling and questionnaire surveys.
Obj. 3.6 – Capacity Building	To strengthen the technical, management and research knowledge and skills of local scientists and researchers, and the capacity of responsible agencies and organizations to effectively implement research programmes supporting the protection, conservation and sustainable management of Tonga’s priority species.		

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Intended Outcomes	Indicators	Means of measurement	Assumptions
Adequate expertise and capacity exists locally to independently address Tonga's priority research needs.	<p>No. of graduates returning.</p> <p>No. of staff attending specialized training;</p> <p>National herbarium is established.</p> <p>Specialized equipment procured;</p> <p>Increasing trend in research funding.</p> <p>No. of research papers</p>	Reports of MAF, MoFo, MoF, DoE.	Appropriate overseas education and research institutions are supportive and appropriate training courses are on offer.
Theme Area 4			
AGRO-BIODIVERSITY			
Obj. 4.1 – Conservation and sustainable use of threatened	To preserve the genetic variability of Tonga's agrobiodiversity and promote the conservation and sustainable use of threatened agrobiodiversity species of economic and socio-cultural importance.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
Populations of all targeted priority species are increasing in the wild and ex-situ.	<p>No. of seedlings of priority species planted.</p> <p>No. of mixed planting and agroforestry farms established.</p> <p>No. of ex-situ initiatives established.</p> <p>Decline in the use of unsustainable farming practices.</p>	<p>MoFo reports</p> <p>MAF reports</p>	No drastic natural disaster or environmental event happening.
Obj. 4.2 – Research and development	To promote and support research initiatives that contribute to the conservation of threatened species and the sustainable use of commercial and traditional agrobiodiversity.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
Improved understanding of the conservation requirements of targeted species and their habitats and of associated threats.	<p>No. of research initiatives implemented.</p> <p>No. of scientific research papers/reports published.</p>	<p>MAF reports</p> <p>Scientific journals.</p>	All research projects are relevant and targeting approved NBSAP priorities.



Obj. 4.3 – Public awareness and education	To foster public support for the conservation of threatened agro-biodiversity by enhancing awareness and understanding of their importance.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
Tongan public is well informed about the importance of protecting threatened agro-biodiversity and supportive of agro-biodiversity related initiatives.	No. of local farmers participating in replanting programmes; No. of local communities, schools, organizations etc interested and are involved in species conservation work.	Polls and questionnaire surveys.	Locals are willing to express support and participate in polling and questionnaire surveys.
Obj. 4.4 – Capacity Building	To strengthen the capacity of local farmers, agriculturalists and scientists to effectively implement programmes for the protection, conservation and sustainable management of Tonga’s agro-biodiversity.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
Technical and management capacity are strengthened at all levels.	No. of successful privately managed agro-forestry or mixed planting farms. Level of innovation demonstrated by farmers. No. of scientists, farmers, biosecurity officers trained.	MAF extension reports Site assessment of innovation. MAF training reports	MAF extension reports cover privately managed farms.



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Theme Area 5		Local Community and Civil Society		
Obj. 5.1 – Local communities and resource owners.		To empower local communities and resource owners to effectively participate in the conservation and sustainable management of biodiversity resources in areas under their control.		
Intended Outcomes	Indicators	Means of measurement	Assumptions	
Local communities and resource owners are active and effective contributors to biodiversity conservation and resource management.	<p>No. of national level planning processes involving local communities and resource owners.</p> <p>Amt. and quality of conservation and resource related information accessed by locals.</p> <p>No. of community-based conservation area projects initiated.</p> <p>No. of multi-sectoral project task teams with local NGO, civil society representation.</p>	<p>Polling of planning processes & multi-sectoral task teams;</p> <p>No. & type of requests received for technical information from local people.</p> <p>MoFo, DoE and MLSNR reports.</p>	<p>National level planning processes are participatory and accessible to local people.</p> <p>Local people are interested and available to participate.</p>	
Obj. 5.2 – Civil Society		To empower civil society organisations and groups to be effective advocates of biodiversity conservation & sustainable resource management.		
Intended Outcomes	Indicators	Means of measurement	Assumptions	
Civil society organizations and groups are active advocates of biodiversity conservation.	<p>No. of civil society advocacy initiatives.</p> <p>No. of new environmental groups established.</p> <p>No. of government multisectoral committees with civil society reps.</p>	<p>Polling</p>	<p>No political restriction on formation of and activities of civil society groups.</p>	
Obj. 5.3 - Schools		To ensure the full integration of biodiversity conservation concepts into school curricula at all levels.		
Intended Outcomes	Indicators	Means of measurement	Assumptions	
School children understand and are supportive of conservation objectives early in life.	<p>No. of schools with environmental conservation projects;</p> <p>No. of students supportive of conservation initiatives.</p>	<p>Polling and questionnaire surveys</p>	<p>Increase in understanding will result in positive changes in behaviour.</p>	



Theme Area 6 -		Access & Benefit Sharing from the Use of Genetic Resources and TEK		
Obj. 6.1 – Access to Genetic resources	To prevent illegal access to and unlawful exploitation of Tonga’s genetic resources.			
Intended Outcomes	Indicators	Means of measurement	Assumptions	
Tonga’s genetic resources are fully protected from unlawful exploitation.	No. of illegal access cases prosecuted. No. of applications received, and legally approved.	Polling MoJ reports.	Legal framework is in place and enforced.	
Obj. 6.2 – Fair and Equitable Sharing of Benefits	To ensure the fair and equitable sharing of benefits generated from the use of genetic resources.			
Intended Outcomes	Indicators	Means of measurement	Assumptions	
Local owners of resources and TEK are receiving equitable share of benefits.	No. legally binding agreements signed benefiting local owners of resources and TEK.	Polling	Information on benefits sharing are accessible	
Obj. 6.3 – Traditional practices & ecological knowledge	To prevent the loss of traditional ecological knowledge.			
Intended Outcomes	Indicators	Means of measurement	Assumptions	
Traditional ecological knowledge is documented, protected from unlawful use and where appropriate, promoted.	Reports, database etc capturing TEK. Legislation enacted and enforced. Appropriate TEK applied in conservation management.	DOE reports and databases. Crown Law Office reports. MLC reports.	Holders and custodians of traditional knowledge willing and able to share TEK.	
Obj. 6.4 – Public Awareness and Education	To raise public awareness and understanding of the importance of Tonga’s genetic biodiversity resources and traditional ecological knowledge.			
Intended Outcomes	Indicators	Means of measurement	Assumptions	
Tongans have pride in their natural heritage, are well informed about their TEK and supportive of efforts to	Increasing use of traditional healing methods, and other TEK.	Polling and questionnaire surveys.	Pride and improved awareness of natural heritage will result in support for conservation efforts.	



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Theme Area 7		Mainstreaming Biodiversity Conservation		
Obj. 7.1 – Legislation, policies and plans		To integrate concepts of conservation and sustainable use of biodiversity into all relevant sectoral policies, programmes and plans.		
Intended Outcomes	Indicators	Means of measurement	Assumptions	
Concepts of conservation and sustainable use of biodiversity are integrated into sectoral policies, programmes and plans.	<p>No. of sector plans, policies & legislation that specifically integrate conservation and sustainable use of biodiversity.</p> <p>No. of projects & programs implemented by Government agencies integrating conservation and sustainable use of biodiversity.</p> <p>The NBSAP is recognized as a authoritative reference for economic planning purposes.</p> <p>No. of projects redesigned to comply with EIA recommendations.</p>	DoE reports.	<p>Greater integration of conservation and sustainable use concepts will result if NBSAP is recognized in national planning as the source document for national environmental issues and priorities.</p> <p>EIA is consistently enforced.</p>	
Obj. 7.2 – Multi-sectoral collaboration		To improve and strengthen multi-sectoral collaboration amongst all relevant sectors and stakeholders in support of biodiversity conservation and sustainable development.		
Intended Outcomes	Indicators	Means of measurement	Assumptions	
Agencies and organizations of varied interests and areas of specialisation work collaborate regularly on conservation work.	<p>No. of conservation projects involving organisations from different sectors.</p> <p>No. of environmental initiatives initiated by non-conservation organisations and companies.</p>	DoE Reports	Collaboration indicates shared concern and commitment to conservation objectives.	
Obj. 7.3 – Environmental Impact Assessment		To ensure that environmental and social impacts of all proposed major projects and activities are thoroughly assessed using approved EIA guidelines and standards prior to implementation.		
Intended Outcomes	Indicators	Means of measurement	Assumptions	

EIA is an accepted planning requirement for all development activities.	No. of development projects redesigned to take into account EIA recommendations. No. of major projects with EIA reviewed and approved by DoE.	DoE reports.	There is political commitment to enforce EIA legislation without discrimination.
Obj. 7.4 – Economic valuation	To encourage the quantification of benefits derived from the use of biodiversity and other ecosystem services to support the full integration of biodiversity conservation into sustainable development planning and decision-making.		
Intended Outcomes	Indicators	Means of measurement	Assumptions
Biodiversity valuation results are accepted and incorporated into cost-benefit analyses of development proposals.	No. of conservation with biodiversity benefits fully quantified and built into cost-benefit analyses.	DoE reports.	Biodiversity valuation results are accepted by Central Planning officials when reviewing economic analyses of development proposals and projects.

5.0 SHARING OF NATIONAL EXPERIENCE

A Biodiversity Technical and Consultancy Group was established to be responsible for stocktaking review and assessment and to take their findings to the community through a participatory process to identify gaps and to identify strategies for biodiversity conservation.

Thirty-five villages were consulted around Tongatapu, ‘Eua, Ha’apai and Vava’u Islands with three rounds of visitations for reporting on the findings from the community participatory process, further consultations and feedback, and to prioritise NBSAP on thematic areas of Agrobiodiversity, Terrestrial Fauna, Forestry, and Marine Biodiversity that covers Coastal and Oceanic biodiversity.