

Purpose of this assessment

For the Ninth Pacific Islands Conference on Nature Conservation and Protected Areas December 2013, the Secretariat of the Pacific Regional Environment Programme (SPREP) commissioned an assessment of the status of biodiversity and conservation in Oceania. For the purposes of this report, Oceania refers to the 21 countries and territories of the SPREP region. Pitcairn Island is also included in many analyses because the UK is a member of SPREP, although Pitcairn is not formally included as a SPREP territory. The assessment was produced as a comprehensive report, *State of Conservation in Oceania 2013*, along with separate individual country assessments for the countries and territories of the Pacific Regional Environment Programme region.

About this assessment

This Tonga Country assessment provides key findings for Tonga that contributed to the development of the comprehensive *State of Conservation in Oceania 2013* report.

This report assesses the overall state of conservation in Tonga using 16 indicators. The indicators provide information not only about the state of conservation in Tonga but also about what pressures and threats it is facing and what action is being taken to halt further loss or degradation and improve its long-term sustainability.

Each indicator aims to provide a measure of the current situation and demonstrate whether it is getting better or worse. Because the amount and quality of available information varies among the indicators, a measure of confidence in the data is also provided.

Approach to reporting on the key findings from the review of the state of conservation in Tonga

The assessment is structured in two related parts:

- State, Pressures and Threats considers the current health of key habitat types and resources across Tonga as well as the factors and drivers of environmental change affecting Tonga's biodiversity.
- Response details action being taken to improve the health and sustainability of Tonga's biodiversity considering two key aspects: environmental governance and conservation initiatives.

In each case, a mixture of habitat-related (for example, forest or mangroves) and biodiversity-related (for example, endangered species) indicators have been used to present a picture of how biodiversity is threatened and where action is needed to protect it.

A summary table of indicators assessments is provided. A table is also provided mapping the relevant Strategic Plan for Biodiversity 2011–2020 Aichi Biodiversity Targets against the indicators used in this assessment.

The indicators encompass:

I ecosystems including

- terrestrial ecosystems
 - forest cover
- freshwater ecosystems
- coastal ecosystems
 - coral reefs
 - mangrove forests
 - seagrass beds
- marine ecosystems
 - ocean health
 - utilised species

II species including

- endemic species
- endangered species
- migratory marine species of conservation concern

III response including

- environmental governance
 - ratification and implementation of Multilateral Environment Agreements
 - national legislation relating to environmental and species protection
 - traditional governance
 - National Biodiversity Strategy and Action Plans (NBSAPs) and other reports to the Convention on Biological Diversity
- conservation initiatives
 - establishment of protected areas for preservation of ecosystems and species, and protected area coverage.

State of Conservation in Tonga

The ecosystem and biodiversity indicators on which this assessment focuses were chosen in consultation with SPREP and were those considered to best provide an overview of the key issues facing conservation in Tonga, taking into account the need to use indicators for which a reasonable amount of information was thought to be available.

STATUS

For Pressures and Threats, status represents the assessed level of threat, from minimal to high (Good > Fair > Poor).

For State of conservation, status represents the current condition of biodiversity, habitats and ecosystems (Good > Fair > Poor).

For Responses to safeguard biodiversity, status represents the assessed level and effectiveness of activity to protect biodiversity (Good > Fair > Poor).

TREND

For each indicator, this factor assesses whether things are getting better or worse or are staying about the same. For some indicators, there was insufficient information to judge the trend or even to determine the current state at the regional level.



MIXED: Some aspects have improved, and some have worsened

DETERIORATING: The state of biodiversity related to this indicator has worsened

IMPROVING: The state of biodiversity related to this indicator has improved

UNDETERMINED: Not enough information was available to determine a baseline

UNKNOWN:

DATA CONFIDENCE

This term provides an estimate of the amount and quality of data available that were used to assess the trend for each indicator.

HIGH: A large amount of recent data available

MEDIUM: A moderate amount of recent and relatively recent data available

LOW: Not enough information was available to determine a baseline

Table of contents

- Introduction Country 8

- STATE, PRESSURE AND THREATS**
- 1. Ecosystems 11
 - 1.1. Terrestrial ecosystems – Forest cover 11
 - 1.2. Freshwater ecosystems..... 14
 - 1.3. Coastal ecosystems 16
 - 1.4. Marine ecosystems..... 25
- 2. Native species 34
 - 2.1. Threatened species 35
 - 2.2. Endemic species 39
 - 2.3. Threatened migratory marine species 41

- RESPONSE**
- 3. Environmental governance 45
- 4. Conservation initiatives 53

- Bibliography 65
- Appendix A: International agreements Tonga 69
- Appendix B: Governance of terrestrial and marine ecosystems in Tonga 73
- Appendix C: Participating in non-governmental conservation initiatives..... 74
- Appendix D: How key threats to habitat are addressed in Tonga 76
- Appendix E: Legal frameworks, institutional arrangements and strategies in place related to species conservation 79

Index of tables

Table 1: Tonga 8

Table 2: Summary of population and economic factors in Tonga 9

Table 3: Extent of terrestrial ecosystems in Tonga 12

Table 4: State of Tonga’s coral reefs 17

Table 5: Species of sea grass found in Tonga 23

Table 6: Pacific Climate Change Science Programme Countries Report for Tonga..... 27

Table 7: Tongan species included on the IUCN Red List (version 2013.1) 36

Table 8: Threats faced by extant IUCN Red Listed threatened species (CR, EN, VU) in Tonga 37

Table 9: Total number and percentage of extant IUCN Red List single country endemic species in Tonga..... 40

Table 10: Marine species of conservation concern in Tonga 42

Table 11: Tonga and MEAs..... 46

Table 12: Summary of reporting by Tonga to the CBD up to 2013 52

Table 13: Protected area cover in Tonga 54

Table 14: Protected marine and terrestrial areas in Tonga 54

Table 15: Proposed IBAs in Tonga 55

Table 16: EBAs in Tonga 56

Table 17: Ecologically or Biologically Significant Areas (EBSAs) in Tonga 57

Table 18: Objectives and Actions related to invasive species contained in Section F of the National Biodiversity Strategy and Action Plan of the Kingdom of Tonga 59

DRAFT

Index of figures

Figure 1: Map of Tonga..... 8
Figure 2: Monitoring of Tonga’s reefs 17
Figure 3: Number of assessed species in each IUCN category in Tonga 37
Figure 4: Assessed threats to migratory species in Tonga based on MTSG data for the Pacific South Central RMU for the Green Turtle and Hawksbill Turtle and mean values for cetaceans based IUCN Red List 2008 global species assessments 43

DRAFT

Key acronyms

ACRONYM	DEFINITION
AFD	Agence Française de Développement
AUSAID	Australia Aid
CBD	Convention on Biological Diversity
CCCPIR	Coping with Climate Change in the Pacific Island Region
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
FAO	Food and Agriculture Organization
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IOSEA	Indian Ocean South East Asia (Marine Turtle MoU)
IUCN	International Union for Conservation of Nature
MEA	Multilateral Environmental Agreement
MoU	Memorandum of Understanding
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-Governmental Organization
PACC	Pacific Adaptation to Climate Change
PAS	Pacific Alliance for Sustainability
PIGGAREP	Pacific Islands Greenhouse Gas Abatement through Renewable Energy project
Ramsar	Convention on Wetlands of International Importance
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
UNCCD	United Nations Convention to Combat Desertification
UNCLOS	United Nations Convention on Law of the Sea
UNDP	United Nations Development Program
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USP	University of the South Pacific
WCPFC	Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean
WHC	World Heritage Convention

State of Conservation in Tonga

Introduction: Country

Tonga remains the only monarchy in the Pacific and is part of the Commonwealth of Nations. The Tongan archipelago is in the South Pacific Ocean about a third of the way from New Zealand to Hawaii. It consists of 169 islands (of which 36 are inhabited) and covers almost 750 square kilometres of land with 420 kilometres of coastline. According to an estimate projected for July 2014, the population of Tonga is expected to be around 106,000. Its capital is Nuku'alofa on the island of Tongatapu.

Most islands are limestone in origin formed from an uplifted coral formation, whereas some have limestone overlying a volcanic base. The highest point is on Kao Island, which reaches 1,033 metres. Tonga's tropical weather is characterised by a warm season (December to May) and a cool season (May to December).

Figure 1: Map of Tonga

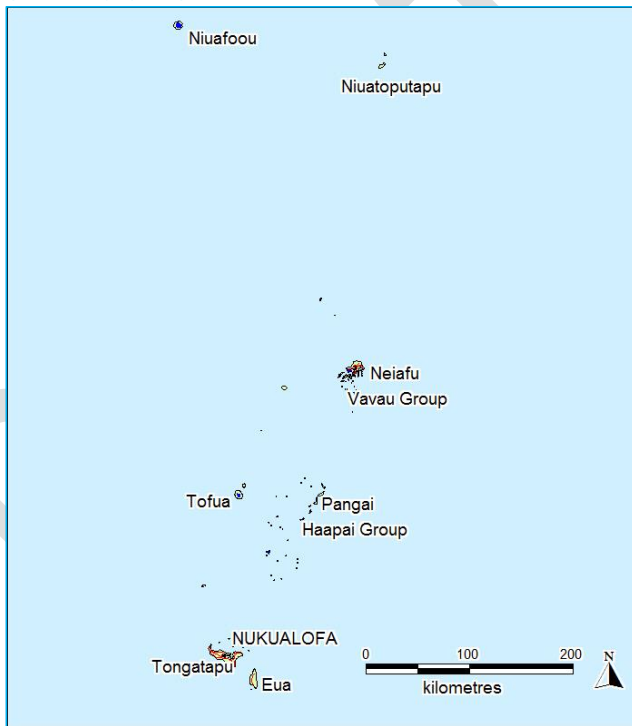


Table 1: Tonga

Tonga		
Land area	747	km ²
Agricultural land (2011)	310	km ²
Coastline	419	km
Territorial sea	12	naut. miles

State of Conservation in Tonga

Exclusive Economic Zone	200	naut. miles
-------------------------	-----	-------------

ECONOMY

Tourism is a vital sector of the Tongan economy, with almost 40,000 tourists visiting the archipelago in 2006. The country has a narrow export base of fish and crops (mainly squash, vanilla and yams) and remains dependent on imports from New Zealand and external aid and remittances. Limited renewable resources are available in Tonga, including agriculture and seafood, and no reserves of non-renewable energy or minerals are known.

Table 2: Summary of population and economic factors in Tonga

Population	106,400	(2014)
Population growth rate	0.09%	(2014)
Labour force	39,960	(2007)
Unemployment rate	1.1%	(2006)
Employment by sector		
Agriculture	31.8%	
Industry	30.6%	
Services	37.6%	(2003)
Export commodities	Squash, fish, vanilla beans, root crops	
International tourism arrivals	46,000	(2011)
Yearly tourist arrivals to residents ratio	43.4%	(2011)
GDP growth rate	1.0%	(2013)
Inflation rate	2.0%	(2013)
GDP per capita (Purchasing Power Parity [PPP])	USD 8,200	(2013)
GDP by sector		
Agriculture	20.9%	
Industry	21.9%	
Services	57.2%	(2013)

ENVIRONMENTAL ISSUES

Limited natural resources (especially forests) are showing signs of depletion due to mounting commercial pressure from agriculture and subsistence cultivation.



State, Pressures and Threats

The many and significant pressures and threats affecting Tonga's biodiversity have undoubtedly had a serious effect on many terrestrial, freshwater and marine ecosystems and species.

There is an urgent need to take stock of the current state of the natural systems and resources of Tonga, so the greatest risks can be identified and mitigation and recovery actions developed.

The greatest current threats to biodiversity conservation result from human activities. These threats are habitat loss; invasive alien species; urban, agricultural and industrial pollution; and over-exploitation. The direct effects of climate change and their interactions with the current threats will only exacerbate the risks to biodiversity. These pressures work singly or in tandem with each other in complex ways, and the actual magnitude of each pressure varies from country to country.

This section looks at the state of Tonga's natural systems and the species that inhabit them as well as the effects of these pressures and threats on biodiversity.

1. Ecosystems

1.1. Terrestrial ecosystems – Forest cover

KEY POINTS

- Most countries and territories of Oceania have relatively high forest cover, with an average of 61% of land area covered in forest in 2010, higher than the global average of 31%.
- Across Oceania, the 0.4% of forest cover area lost per year between 2005 and 2010 is significantly higher than the global deforestation average for the same period of 0.14%. Most of the loss in Oceania is accounted for by Papua New Guinea.
- Rates of deforestation vary widely across the countries and territories of the SPREP region, but they have risen in the larger countries such as the Solomon Islands and Papua New Guinea in recent years.
- Forest habitat loss in the Pacific is mostly due to economic activities, such as logging and agriculture, and to a lesser extent to mining and infrastructure development, such as roads and settlements. Forest degradation is also caused by natural disasters, such as cyclones and fire, and the spread of invasive species.
- Future projected increases in the human population are likely to intensify pressure on the Pacific's forest resources. Climate change is also expected to have a significant, but as yet unpredictable, effect on the health, vitality and biodiversity of Pacific forests.
- Most countries only have low percentages of their land area protected.

BACKGROUND AND RELEVANCE OF INDICATOR

This indicator considers the extent of terrestrial ecosystems in Tonga. It measures the rates of forest cover change and identifies key pressures and threats to forest cover.

Forest is defined as land area greater than 0.5 hectares with trees over 5 metres high and/or canopy cover of more than 10%. Forest habitat conversion and loss directly impoverish biodiversity and may facilitate other pressures, such as the influx of weeds and browsing animals, increased soil erosion, reduced water quality and the sedimentation of lagoon areas.

HOW THE INDICATOR WAS ASSESSED

Data for this indicator come primarily from the FAO Forest Resource Assessment, the most comprehensive five to ten yearly global assessment of forest status and trends (Food and Agriculture Organisation of the United Nations (FAO) 2000b, a, 2010).

STATE

Tonga consists of 170 islands, of which 37 are inhabited. The islands are divided into three main groups: Tongatapu, Ha'apai and Vava'u, with a total land area of approximately 750 square kilometres. The

Commented [E11]: In the Introduction: Country, these facts were stated as follows: Tonga consists of 169 islands, of which 36 are inhabited. Please revise to consistency.

State of Conservation in Tonga

western islands are of volcanic origin, while the eastern islands are of coral origin. Volcanic ash creates fertile soil (even on the limestone islands), and the islands are well vegetated. Cyclones occur every few years during the rainy season and can be quite destructive. Large tracts of land are cultivated or consist of fallow/secondary growth. Forested areas include mangrove and coastal swamp forest, coastal and littoral forest, lowland and upland rainforest (especially on 'Eua) and lowland and secondary disturbed forest (Food and Agriculture Organisation of the United Nations (FAO) 2000b).

Tonga's very limited forest resources consist of natural hardwood forests, exotic plantations (mainly *Pinus caribea*) and coconut plantations.

PRESSURES AND THREATS

Remaining natural hardwood forests cover only 4,000 hectares of land and have been over-exploited and depleted by clearing for shifting cultivation. There is pressure to protect remaining indigenous forest for biodiversity/conservation reasons (Food and Agriculture Organisation of the United Nations (FAO) 2000a).

Food crops (predominantly coconut) are traditionally cultivated under the canopy of other trees, but the traditional agroforestry system is undergoing changes toward the commercialisation of farming, which reduces the number of standing trees compared with traditional methods.

Loss of coastal forest on atolls and smaller islands is also a serious conservation priority in Oceania. Coastal forests are, along with agroforests, the only forests on atolls and most small, heavily inhabited islands. Little effort has been directed toward protecting and enriching coastal littoral forests and vegetation on small low-lying islands and atolls, which constitute 'biodiversity cool spots' that have few, if any, endemic plants and animals but where the very limited biodiversity inheritance is among the most threatened on Earth (Thaman 2008).

An increasing number of formerly common coastal trees are threatened with local extinction and require protection and replanting in Oceania. In Tonga, beach gardenia (*Guettarda speciosa*), an important soil-enriching multipurpose tree, has declined in Tongan villages. The coral tree or dadap (*Erythrina variegata* var. *variegata*), an important nitrogen-fixing and cultural tree, has disappeared in Fiji, Samoa and Tonga over the past decade due to infestation by an African beach wasp.

Commented [E12]: Please ensure that the intended meaning has been maintained in this edit. Please consider adding a citation to support this sentence.

Table 3: Extent of terrestrial ecosystems in Tonga

Country/area	Land area						Inland water (1,000 ha)	Country area (1,000 ha)
	Forest		Other wooded land		Other land (1,000 ha)			
	1,000 ha	% of land area	1,000 ha	% of land area	Total	Amount of which with tree cover		
Tonga	9	0.1	0	0	63	57	3	75
Oceania	33,816	61	5,553	10	14,725	306	1,157	55,248
World	4,033,060	31	1,144,687	9	7,832,762	79,110	423,723	13,434,232

* A table for change in forest cover over time in Tonga is unavailable because forest cover has only been measured for one data point (in 1998), and therefore, a time series cannot be established

State of Conservation in Tonga



Forest in Eua (Photo credit: Duncan Wright Wikipedia Commons)

STATUS	PRESSURES & THREATS
Status Poor	Status Poor
Trend Deteriorating	Trend Deteriorating
Data Confidence Medium	Data Confidence Medium

1.2. Freshwater ecosystems

KEY POINTS

- Some of the most isolated and inaccessible freshwater lakes in the world are in Oceania. Most of these lakes infill old volcanic craters.
- Oceania rivers contain high levels of endemic species, and these species exhibit behaviours and life-history traits that are fostered by a number of environmental factors such as, unmodified flows, free passage, natural vegetation cover, quality estuaries or the absence of introduced species.
- Freshwater ecosystem baseline assessment, mapping and classification is lacking. In many islands, more and better meteorological, hydrological, hydrogeological and water quality data are being gathered, but more data are still needed to generate adequate water resource assessments.
- Assessment of inland wetlands in Oceania shows a reduction from 36 million to 28 million hectares between 1999 and 2004.
- Owing to ecological connectivity, cloud forest, riparian forest, groundwater systems and subterranean flows, forest, agricultural wetlands and estuaries are considered of critical importance for freshwater wetland management, and a 'mountain to the sea' approach to monitoring is required.
- Threats affecting river, lake and wetland systems are increasing rapidly and are already leading to reduced freshwater species richness (from flow alteration, barriers, habitat and water quality degradation, introduction of invasive species and overharvesting).
- The cumulative effects of these threats are exacerbating the risk of extinctions, with several endemic fish species reported in the IUCN Red List as threatened, and are compromising the sustainable use of freshwater ecosystems by local communities.

BACKGROUND AND RELEVANCE OF INDICATOR

Maintenance of freshwater and wetland ecosystems is vital for Oceania because many of these systems provide an important contribution to ecosystem services and subsistence livelihoods, especially river systems. On the larger volcanic islands, there are significant areas of riverine (rivers), lacustrine (lakes, ponds) and palustrine (non-tidal wetlands) habitats. The smaller atoll countries and territories of Oceania generally have few, if any, wetlands other than reef systems, although there may be small areas of mangrove or Pandanus swamp. Freshwater resources on atolls and coral and limestone islands are generally limited to groundwater. Nauru, Niue, Kiribati, Tonga, Tuvalu and the Republic of the Marshall Islands have no significant surface water resources.

This indicator assesses the threats to river, lake and wetland ecosystems. Availability and reliability of water resources limit economic and social development, especially in countries that rely almost entirely on a single source of supply, such as groundwater (Kiribati), rainwater (Tuvalu, northern Cook Islands), surface reservoirs, or rivers and other surface flows.

HOW THE INDICATOR WAS ASSESSED

Threat assessments and other relevant information were sourced from recent reviews, reports and

State of Conservation in Tonga

scientific publications (Ramsar Wetlands undated).

STATE

Freshwater wetlands in Tonga are predominantly freshwater crater lakes. The total area of lakes and internal waters amounts to over 2,963 hectares. There are very few streams of any significance, and no permanent streams on any of the low-lying limestone islands (Ramsar Wetlands undated). The principal freshwater wetlands include:

- 1. volcanic crater lakes on Niuafu'ou, Tofua, Kao and possibly also Late;
- 2. an enclosed brackish lagoon on Nomuka and on 'Uta Vava'u; and
- 3. a freshwater marsh near Tu'anuku on 'Uta Vava'u.

PRESSURES AND THREATS

The wetlands are under threat from a variety of sources. Some wetland habitat has been reclaimed for urban development. Other hazards include increasing use of pesticides. The lake ecosystems of the Niuafu'ou crater lakes were reportedly disturbed by the introduction of tilapia (*Oreochromis* sp.) (Ramsar Wetlands undated).

STATUS	PRESSURES & THREATS
Status Fair	Status Fair
Trend Unknown	Trend Unknown
Data Confidence Low	Data Confidence Low

1.3. Coastal ecosystems

1.3.1. Coral reefs

KEY POINTS

- Coral reefs are vital to land protection and food security across Oceania. There are over 650,000 square kilometres of coral reefs within the Pacific. More than 60% of them are now at risk of environmental damage.
- Reefs are vulnerable to elevated sea temperature and acidity, cyclones, predation (by crown-of-thorns starfish [COTS], *Drupella* snails, etc.) and disease, increased water turbidity, overfishing and pollution as well as physical breakage from coastal developments.
- Most Pacific reefs have suffered some form of serious damaging event in the past decade, with climate change considered the major cause. Pacific reefs have shown strong recovery from many of these events, in part because levels of local threats from human activities are lower than in many other parts of the world.
- The extent of coral reef in the Oceania region is stable, but most reefs show declining quality around heavily populated areas.
- Although most coral reef fisheries have been sufficient for subsistence livelihoods, commercial exploitation has rarely been sustainable.
- As Pacific island populations and development levels increase, local man-made threats to reefs will increase unless policy makers take definitive actions to control them.
- By 2050, most reefs in the Pacific are predicted to be rated as threatened, with more than half rated at high, very high or critical levels as a result.

BACKGROUND AND RELEVANCE OF INDICATOR

Coral reefs and their associated ecosystems are fundamental to Pacific island life and cultural practices, providing goods and services such as food from fish, molluscs and algae, tourism benefits and shoreline protection. Oceania contains extensive coral reefs covering a huge area, with a multitude of reef types, including fringing, barrier, double barrier, submerged barrier, platform, patch, oceanic ribbon, mid-ocean, atolls, oceanic atolls and near-atolls.

The world has lost an estimated 19% of productive reef area, with another 15% under immediate threat of loss. This indicator assesses the state of and threats to coral reefs across Tonga.

HOW THE INDICATOR WAS ASSESSED

Data for the indicator were extracted predominantly from Reefs at Risk assessments and Global Coral Reef Monitoring Network (GCRMN) reports for the region and each specific country (Bryant et al. 1998, Wilkinson 2008, Spalding et al. 2010, Chin et al. 2011). High/Medium/Low threat level was taken from Reefs at Risk assessment within the GCRMN report (2011).

State of Conservation in Tonga

STATE

Tonga has 1,500 square kilometres (150,000 hectares) of coral reef, distributed as fringing, barrier and submerged patch reefs around 174 islands in four groups. Only 37 of these islands are inhabited. There has been little monitoring of Tonga’s reefs, and very little data over time are available. Coral cover appears low but may be slowly improving (see Figure 2).

Commented [E13]: Should this be 36?

In 1993, 192 species of coral and 229 species of fish were recorded around Tongatapu, but it is likely that overall marine biodiversity is much higher than this. It is projected that Tonga will have more than 300 species of coral and many more fish species once more comprehensive studies are done. (Wilkinson 2008, Chin et al. 2011).

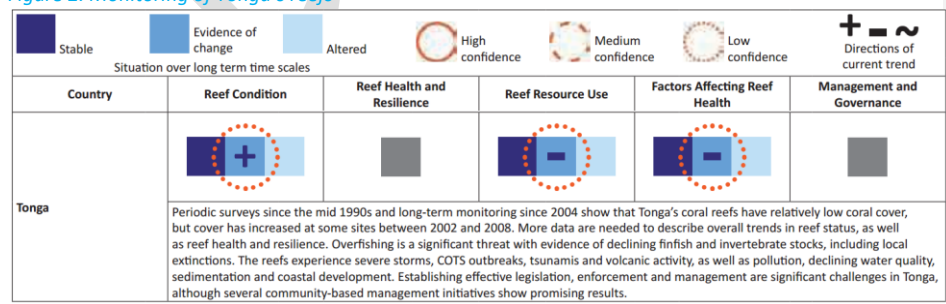
Tonga has 18 official Marine Protected Areas (MPAs), but they have failed to achieve their objectives due to lack of compliance (Government of Tonga 2010). Tonga does not have a system of customary marine tenure as is found in many other Pacific nations. However, in 2009, six new Special Management Areas (SMAs) were established, and a seventh is being developed. These SMAs directly empower island communities to carry out the management of individual areas, on a ‘close access’ basis, meaning only that particular community can access the area (Government of Tonga 2010, Chin et al. 2011).

Table 4: State of Tonga’s coral reefs

Reef condition and trend	Data confidence	2001/2002 reported coral cover	2008 reported coral cover	2009 reported coral cover	Most recent reported coral damaging events
Improving	Low	Tongatapu: 19.2% Ha’apai: 16%	Tongatapu: 28% Ha’apai: 32%	Tongatapu: 14% (plus 31% soft coral)	Temperature-related bleaching 2000 Tsunami 2009 Volcanic eruption 2009 Cyclones COTS outbreaks

(Wilkinson 2008 and Chin et al. 2011)

Figure 2: Monitoring of Tonga’s reefs



(Chin et al. 2011)

State of Conservation in Tonga

PRESSURES AND THREATS

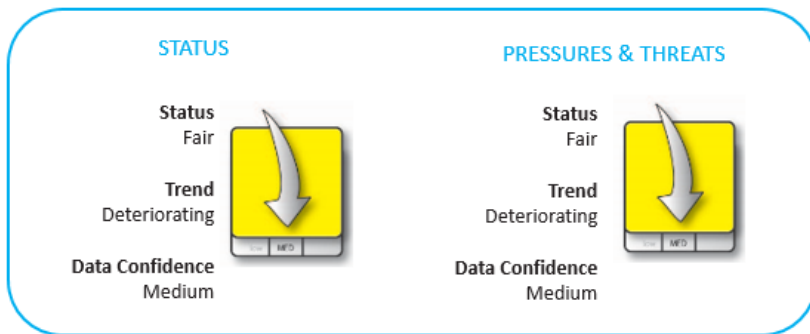
Pressures on Tonga’s coral reefs can be categorised into those arising from global factors, including climate change, and Tonga-specific local factors.

Globally, the largest pressures on coral reefs are factors such as increasing water temperature, ocean acidification, outbreaks of crown-of-thorns starfish (COTS), storms and cyclones. These same factors all potentially affect Tonga’s reefs.

At present, 37% of Tonga’s reefs are considered to be at Medium or higher threat level from local factors, including overfishing, destructive fishing, sedimentation from land-based sources and coastal development, which are considered the greatest pressures on Tonga’s coastal reefs (Chin et al. 2011).

Around the populated areas of Tonga, primarily Tongatapu, Vava’u and Nuiatoputapu, pollution from inadequately treated sewage, agricultural run-off and waste from ships and boats can damage reefs. Physical destruction has been caused by causeway and wharf construction, as well as land reclamation and sand and coral mining. Sedimentation from such activities, as well as muddy run-off from agricultural clearance, has further damaged corals.

Lack of attention to these local threats is likely to affect the coral reefs’ capability to resist and recover from global-level pressures and to put all of Tongatapu’s reefs at High to Critical Threat level by 2030.



1.3.2. Mangrove ecosystems

KEY POINTS

- The Pacific islands, while containing only 3.8% of the global mangrove area, support unique mangrove community structures and provide valuable site-specific services and products.
- Due to limited monitoring, there is little information available on pressure on mangroves or trends in the area and health of Pacific Island mangroves.
- Mangroves may experience serious problems due to rising sea level, and low-island mangroves may already be under stress. A reduction in area by 13% of the current 524,369 hectares of mangroves of the 16 Pacific island countries and territories where mangroves are indigenous is predicted using an Intergovernmental Panel on Climate Change (IPCC) upper projection for global sea level rise by the year 2100.
- In addition to climate change effects, mangroves and other coastal ecosystems face numerous other threats, ranging from filling for development to disease outbreaks.

BACKGROUND AND RELEVANCE OF INDICATOR

Mangroves are one of the vitally important coastal ecosystems of the region. Their complex root structures allow them to survive the roughest of weather and to protect coastal communities from coastal erosion. They also provide nursery and feeding grounds for fish and other marine animals that Pacific islanders rely on for food security and income. This indicator assesses key pressures and threats to mangrove ecosystems in Tonga.

HOW THE INDICATOR WAS ASSESSED

Information on mangrove area, diversity, threats and climate change predictions was sourced from various reports and publications (Scott 1993, Government of Tonga 2010, Spalding et al. 2010, Shunsuke and Hoifua 2012).

Many of the statistics and pressures cited are from studies done as part of the project Mangrove Ecosystems for Climate Change Adaptation and Livelihoods (MESCAL), which was implemented in Samoa, Tonga, Vanuatu, Fiji and Solomon islands from 2010 to 2013.

STATE

Mangroves have a scattered distribution in this large archipelago where there are three main types of wetlands: partially enclosed tidal lagoons with mangrove forest; totally enclosed brackish to saline lagoons with saltwater marshes and/or mangroves; and freshwater crater lakes (Scott 1993). The largest mangrove area occurs on Tongatapu, a low limestone island of rolling hill topography (Preston 1989). Mangrove swamps, dominated by *Rhizophora* spp., are well developed in the lagoon system on the main island of Tongatapu, in parts of the Vava'u Group and around the totally enclosed lagoon on Nomuka in the Ha'apai Group. Eight species of mangroves are known to occur in Tonga: *Rhizophora stylosa*, *R. samoensis*, *R. x selala*, *Xylocarpus granatum*, *Bruguiera gymnorrhiza*, *Lumnitzera littorea*, *Excoecaria agallocha* and *Heritiera littoralis* (Spalding et al. 2010, Waycott et al. 2011), but there is little

State of Conservation in Tonga

information describing the structure or productivity of these forests.

The total area of mangroves has been estimated at 1,000 to 1300 hectares (Scott 1993, Ellison 2009, Government of Tonga 2010, Waycott et al. 2011). However, a more recent mapping survey conducted by the Ministry of Environment and Climate Change and the Japanese International Cooperation Agency (JICA) showed that Tongatapu alone had an approximate area of 1450 hectares (around six percent of Tongatapu's total land area) (Shunsuke and Hoifua 2012). Differences in methodologies, classifications, mapping scales, referencing dated sources, etc. could have led to these discrepancies in some of the figures. These discrepancies will need to be addressed if the extent of damage to mangroves and area loss is to be determined so that appropriate management frameworks can be put in place. There are still significant gaps in data and knowledge on the mangrove ecosystems on the other main island groups, including 'Eua, Niua and the Ha'apai group.

PRESSURES AND THREATS

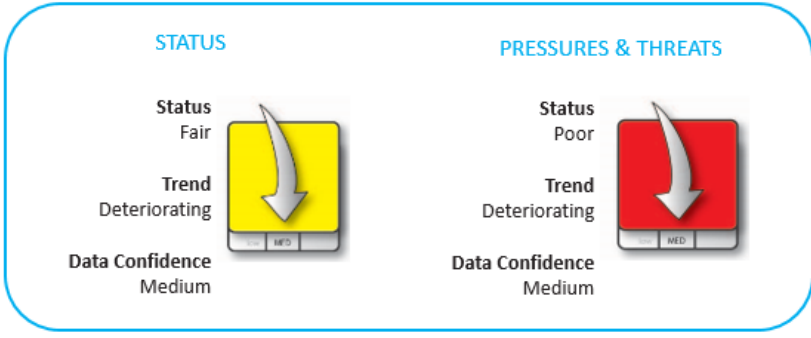
The major pressures of the mangroves in Tonga and wetland forests include forest conversion into residential areas, unsustainable removal for timber and firewood, town expansion and encroachment, and creation of direct access to the lagoon, which allows litter and sewage to leach directly into the lagoon (Government of Tonga 2010, Spalding et al. 2010). Prescott (1989) found that extinction was unavoidable if unplanned and unsustainable levels of exploitation continued. The situation has not improved, and unsustainable stripping of bark for dyeing tapa continues to occur, which, if it continues, is likely to cause the extinction of *Bruguiera gymnorhiza* (Shunsuke and Hoifua 2012). Continued land reclamation for town allotments from the shrinking mangroves forest in and around the Fanga'uta lagoon on the island of Tongatapu and the northern coast of Tongatapu poses a serious threat to the mangrove forests in these areas. Most of the reclamation is illegal and should be stopped. There was an observed decrease in mangrove area with 4.6% in 2006 and 2.6% in 2009 (Government of Tonga 2010).

Commented [E14]: If you mean that the rate of decline was 4.6% in 2006 and was 2.6% in 2009, please revise "with" to "of".

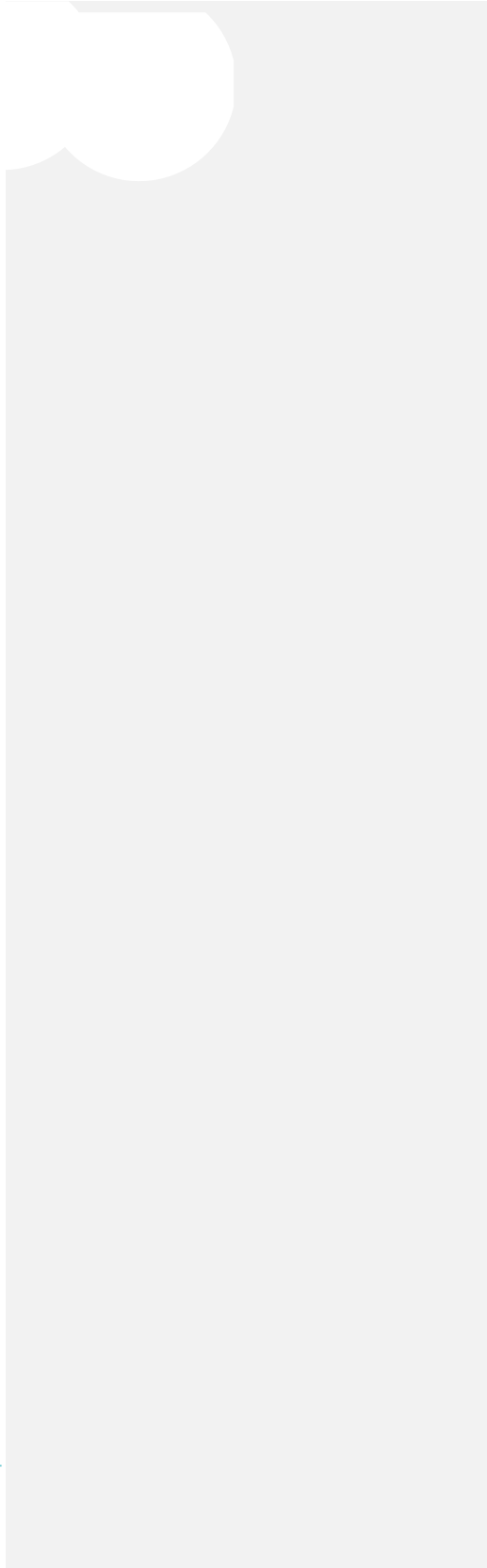


Mangrove species *Bruguiera gymnorhiza*
(Photo credit: U If Mehlig Wikipedia Commons)

State of Conservation in Tonga



DRAFT



1.3.3. Seagrasses

KEY POINTS

- Seagrass beds are important marine habitats and nursery and feeding grounds.
- They also have important sediment-stabilising and water-quality regulating functions.
- Species richness is greatest in the western Pacific, declining to the east, with no seagrass found in the far east of the region.
- Detailed data are available in some countries, but many have no or extremely limited data on location or state of seagrass beds.
- Many seagrass beds have been destroyed or severely affected by localised coastal development, but there are few data on large-scale state.

BACKGROUND AND RELEVANCE OF INDICATOR

The shallow subtidal and intertidal zones around the coasts of Pacific island countries and territories often support large areas of seagrass, extending long distances away from the shoreline in lagoons and sheltered bays and often adjoining coral reefs. Seagrasses are of special interest to coastal fisheries worldwide because of the role they play in providing nursery areas for commonly harvested fish and invertebrates.

In addition to their roles as nursery areas, seagrasses provide feeding habitats for many species of fish as well as endangered sea turtles. In some countries and territories of Oceania, such as Palau and the Solomon Islands, seagrass beds are vital feeding grounds for the endangered marine mammal, the dugong.

Seagrasses and intertidal flats are also permanent habitats for several species of sea cucumbers, the main group of invertebrates targeted as an export commodity in the region, and for a wide range of molluscs gleaned for subsistence. Movement of nutrients, detritus, prey and consumers between mangrove, seagrass and intertidal habitats can have major effects on the structure and productivity of food webs, with nutrients and detritus increasing primary and secondary productivity both directly and indirectly. Both mangroves and seagrasses improve water quality by trapping sediments, nutrients and other pollutants.

Most seagrasses in the tropical Pacific are found in waters shallower than 10 metres and usually close to island shores. Their growth and health is limited by several factors, including water clarity, nutrient availability and exposure to wave action. Changes in these factors, whether caused by climate change or local human activities, may quickly destroy seagrass beds. Seagrass is also the favoured food of the dugong, and changes in its availability are likely to affect dugong populations.

HOW THE INDICATOR WAS ASSESSED

Data for the indicator were extracted from a recent report (Waycott et al. 2011) as well as from a literature search of relevant papers and reports (Ellison et al. 1999, Coles et al. 2011).

State of Conservation in Tonga

High/Medium/Low threat level was based on projected percentage loss under three possible climate change scenarios, where less than 5% loss = Low threat, 6–20% = Medium, and 21–35% = High. Confidence levels were taken as 5–32% = Low, 33–66% = Medium, and 67–100% = High.

STATE

Tonga's seagrass is as yet unmapped, but four seagrass species have been recorded; see Table 5 (Ellison 2009, Waycott et al. 2011). In total, 16 species of seagrass including one endemic to Hawai'i, one found only in Papua New Guinea, Australia and New Zealand and one endemic to Australia and New Caledonia, are found throughout the South Pacific Region, plus one subspecies endemic to Fiji, Tonga and Samoa (Ellison 2009).

There has been very little seagrass monitoring in Tonga. Monitoring of water quality in Fanga'uta Lagoon between 1998 and 2000 included seagrass communities and found that seagrass cover tended to fluctuate, possibly seasonally, and that average cover of *Halodule uninervis* varied between 0 and 40%, whereas the cover of *Halophila ovalis* varied between 0 and 45% (Fakatava et al. 2000).

Table 5: Species of seagrass found in Tonga

Species	Present in Tonga	Status in Indo-Pacific Region	Normal habitat			
			Shallow flats	Deeper flats (>1.0 m)	Deep-water passages	Notes
			(<1.0 m)			
<i>Halophila ovalis</i>	X	Common	X	X	X	
<i>Halophila ovalis</i> spp. <i>bullosa</i>	X	Uncommon		X		Fiji, Samoa, Tonga only
<i>Halodule uninervis</i>	X	Common	X	X		
<i>Syringodium isoetifolium</i>	X	Common	X	X		

(Ellison 2009, Seagrass Recovery 2013, Tuiwawa et al. 2013)

PRESSURES AND THREATS

Seagrass beds are likely to be impacted by global pressures related to climate changes, such as increasing cyclone incidence, rainfall, temperature and light levels. Sea-level rise is expected to result in the loss of those seagrasses growing in deep water at their present depth limit. Such climate change issues may result in a 5 to 10% loss of Tonga's seagrass by the year 2035 and between 5 and 20% loss by 2100 (Waycott et al. 2011).

Local threats to seagrasses are similar to those affecting coral reefs, including coastal residential and tourism development, improper methods of disposal of solid waste, sewage pollution, depletion of fisheries, coral harvesting, coastal erosion, storm surge and flooding, and siltation of rivers and coastal

State of Conservation in Tonga

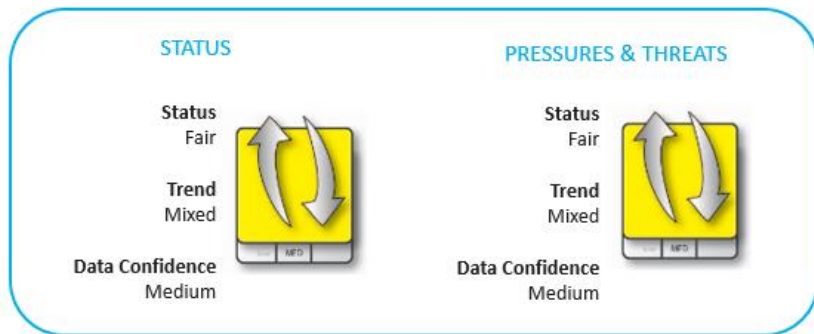
areas as a result of soil erosion due to inland agriculture and forestry and sand mining (McKenzie and Yoshida 2007).

At present, 37% of Tonga's coastal reefs are considered to be already at Medium or Higher threat level. Many reefs around the populated areas of Tongatapu, Vava'u and Nuiatoputapu are already at Very High threat level and are predicted to reach High to Critical Threat level by 2030 (Chin et al. 2011).

Many of the factors pressuring coral reefs also threaten coastal seagrass beds, including:

- pollution from inadequately treated sewage;
- agricultural run-off;
- waste from ships and boats;
- causeway and wharf construction;
- land reclamation; and
- sand and coral mining.

These local factors are likely to have a greater effect on seagrass areas in coastal areas near population centres than the global pressures, if the local factors remain uncontrolled or poorly controlled as at present. Stronger implementation of existing development and environmental guidelines and policies could assuage many of these pressures if there were sufficient resources and governmental will.



1.4. Marine ecosystems

1.4.1. Ocean health

KEY POINTS

- Oceania supports the world's largest tuna fisheries, yet stocks of the major species are declining or are overfished. Bigeye tuna stock is in a critical condition with fishing mortality well in excess of its Maximum Sustainable Yield level; yellowfin is also overfished.
- Six marine turtle species feed and migrate through Oceania, and the Pacific region supports the world's largest remaining nesting populations of green and hawksbill turtles.
- Over-exploitation has reduced many fish stocks throughout the Pacific, limited fish catches and caused ecological shifts that reduce biodiversity and productivity. By-catch during commercial fishing activities and live capture and harvesting for the aquarium trade contribute to these impacts.
- The biggest threats to ocean health are climate change, particularly through effects of rising sea temperatures, acidification and de-oxygenation, and over-exploitation, mainly over-fishing.
- The Pacific small island developing states are amongst the most vulnerable countries to climate change, especially to sea level rise and climate perturbation. Changes in oceanic circulation and precipitation patterns are already evident.
- Evidence is accumulating that ocean oxygen levels are declining while acidification is increasing.
- Habitat destruction, extractive activities, pollution and invasive species are also serious threats.
- Seabed mining has the potential to damage large areas of benthos, but detailed impacts are currently undetermined.
- Any further deterioration of the ocean could have a significant impact on the economic well-being of Pacific Islanders, primarily those residing in or near coastal areas.

BACKGROUND AND RELEVANCE OF INDICATOR

The Pacific Ocean covers half of the world's surface and is the largest ecosystem in the world. The coastal and marine environments of Oceania sustain numerous activities that fuel local, national and international economies and provide livelihoods and food security for millions of people. Evidence is mounting that this unique ecosystem is being adversely affected by overfishing, habitat destruction, pollution and climate change. Fishing of large predators (such as sharks, tunas and billfish) has a particularly negative effect on the ocean by, for example, allowing an increase in the abundance of their prey or influencing prey species by causing behavioural changes to their habitat use, activity level and diet.

Oceanic megafauna populations cannot support the massively increased fishing pressure to which they are currently subjected: for example, more than 5,645 commercial vessels alone were actively fishing in the Pacific Ocean in 2011.

State of Conservation in Tonga

The oceans are fundamental to the Earth's carbon cycle, climate and weather patterns, which ultimately maintain all life on the planet. Although generally described as separate oceans, with the Pacific being the largest at about 46% of the total hydrosphere, they are all interconnected, and ocean boundaries are arbitrary. Migratory species frequently cross these ocean boundaries. While ocean ecosystems are relatively low-production areas, their vast size means that their contribution to global production is relatively large.

The Pacific Ocean is larger than the Earth's total land mass, for example. The vast size also correlates with high biodiversity resources, although much of it is under-explored and relatively unknown, particularly the deeper ocean systems.

HOW THE INDICATOR WAS ASSESSED

Much of this information came from IUCN Oceania report 2010 (Siedel and Lal 2010, Chassot et al. 2012) with additional information from other sources (Secretariat of the Pacific Regional Environment programme (SPREP) 2007, Herr and Galland 2009, Morgan et al. 2009, Harley et al. 2012, Miller and Prideaux 2013).

Key findings from the recent International Program on State of the Ocean (IPSO) Center for Ocean Solutions reports (International Programme on the State of the Ocean 2013, Rogers and Laffoley 2013) and scientific papers and reports were used to identify key threats to ocean health.

STATE

GLOBAL FACTORS

A recent assessment of global factors affecting ocean health (Rogers and Laffoley 2013) identified the greatest causes for concern as acidification, warming and reduced oxygen levels.

These three factors will interactively affect ocean health and have cascading consequences for marine biology, including altered food web dynamics and increases in pathogen impacts.

Table 6 details data published in the Pacific Climate Change Science Program Countries Report showing projected change in the annual mean climate conditions and oceanic conditions for Tonga under low, medium and high greenhouse gas emissions scenarios (IPPC emissions scenarios B1, A1B and A2). The projections discussed are not specific to a city or state; they refer to an average change over the geographic region of the country of interest and the surrounding ocean.

The level of confidence associated with a given projection is described as high, moderate or low. The determination of an appropriate confidence level depends upon expert judgement by Pacific Climate Change Science Program scientists.

Acidification: If current levels of greenhouse gas release continue, extremely serious consequences are predicted for ocean life and, in turn, for food and coastal protection. At CO₂ concentrations projected for 2030–2050, erosion will exceed calcification in the coral reef-building process, resulting in the extinction of some coral species, significant effects on coral reefs and declines in biodiversity overall.

Ocean acidification is measured using aragonite saturation. Aragonite is a form of calcium carbonate used by marine animals to build structures and shells. Aragonite saturation is a ratio that compares the

State of Conservation in Tonga

amount of aragonite present with the total amount that the water could hold if it were completely saturated. The more negative the change in aragonite saturation, the larger the decrease in aragonite available in the water, and the harder it is for marine organisms to produce skeletons and shells.

In the case of Tonga, there is moderate confidence of a decline in aragonite saturation of approximately 0.4 by 2090 under a low emissions scenario (Table 8).

Warning: The ocean is undergoing significant warming, with direct and well-documented physical and biogeochemical consequences. The impacts of continued warming in the decades to 2050 are predicted to include increasing stratification of ocean layers, leading to oxygen depletion and increased incidence of anoxic and hypoxic (low oxygen) events, although the significance of these effects in the Pacific is unclear.

For Tonga, there is moderate confidence of a 1.3°C rise in sea surface temperature under a low emissions scenario (Table 6).

Reduced oxygen levels: There is increasing evidence that, in addition to the coastal hypoxia events that have increased in frequency globally due to eutrophication, there is a general trend for reduced oxygen levels in tropical oceans over the last 50 years (Pitcher and Cheung 2013). This trend is due to a number of climate change-related processes, principally increased sea surface temperatures. Estimates indicate a decline in the total mass oxygen content of the oceans of between 1 and 7% by 2100 (Pitcher and Cheung 2013).

Table 6: Pacific Climate Change Science Program Countries Report for Tonga

Variable	Emission Scenario	2030	2055	2090	Confidence
Surface air temperature (°C)	Low	+0.6 ± 0.4	+1.0 ± 0.5	+1.4 ± 0.6	Moderate
	Moderate	+0.7 ± 0.5	+1.3 ± 0.6	+2.1 ± 0.8	
	High	+0.7 ± 0.4	+1.4 ± 0.4	+2.6 ± 0.7	
Total rainfall (%)*	Low	+2 ± 13	+1 ± 10	+3 ± 14	Low
	Moderate	+1 ± 13	+3 ± 14	+3 ± 14	
	High	+3 ± 13	+5 ± 12	+9 ± 18	
Sea-surface temperature (°C)	Low	+0.6 ± 0.3	+0.9 ± 0.4	+1.3 ± 0.5	Moderate
	Moderate	+0.6 ± 0.3	+1.2 ± 0.4	+1.9 ± 0.6	
	High	+0.7 ± 0.4	+1.3 ± 0.4	+2.4 ± 0.6	
Aragonite saturation state (Ωar)	Low	+3.4 ± 0.1	+3.2 ± 0.1	+3.0 ± 0.1	Moderate
	Moderate	+3.4 ± 0.1	+3.0 ± 0.1	+2.6 ± 0.1	
	High	+3.4 ± 0.1	+3.0 ± 0.1	+2.4 ± 0.1	
Mean sea level (cm)	Low	+10 (5–16)	+19 (10–27)	+32 (16–47)	Moderate
	Moderate	+10 (4–16)	+21 (10–31)	+39 (20–59)	
	High	+10 (3–17)	+20 (9–31)	+41 (21–62)	

State of Conservation in Tonga

PRESSURES AND THREATS

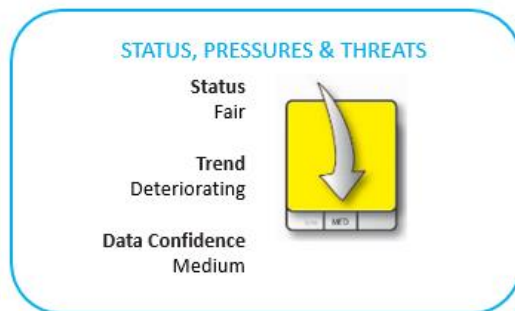
LOCAL FACTORS

Utilised species: Continued overfishing is further undermining the resilience of ocean systems, and in many cases, fisheries management is failing to halt the decline of key species and damage to marine ecosystems. A recent FAO report (Food and Agriculture Organisation of the United Nations (FAO) 2012) indicated that 70% of world fish populations are exploited unsustainably, of which 30% show population declines to less than 10% of unfished levels. A recent global assessment of compliance with Article 7 (fishery management) of the 1995 FAO Code of Conduct for Responsible Fisheries (Pitcher and Cheung 2013) awarded 60% of countries a 'fail' grade and saw no country identified as being overall 'good'. See below for an assessment of utilised species in Tonga.

Marine pollution: Human activities that change the marine environment by altering water quality, such as sedimentation from mining or agricultural practices, may make it unsuitable for marine animals with precise environmental requirements. Other than oil and gas extraction, most of the pollution in the ocean originates from industry, agriculture or domestic sources on land. Deep-sea mineral extraction is a potential future threat.

While ocean systems are generally less exposed to land-based sources of pollution, and the vast bulk of the oceans means that dilution is extreme, there are accumulations of persistent pollutants in the oceanic gyres, such as the South Pacific Subtropical Gyre (Eriksen et al. 2013). The most visible of these pollutants is plastic litter, but persistent organic pollutants have also been shown to accumulate in the gyres and may be bio-concentrated in the fish food chain (Gassel et al. 2013).

Marine bioinvasions: Marine ecosystems are also significantly threatened by invasive species. Shipping transports marine species and their larvae over huge distances and introduces them as invaders into new ecosystems. This transport can happen deliberately (for example, when ballast water taken aboard a ship in one region is dumped in another) or accidentally.



1.4.2. Utilised species

KEY POINTS

- Oceania waters provide food and livelihoods for peoples both within and outside the region. Fishing activities range from subsistence reef food gathering to foreign fishing vessels licensed to fish in national waters under quota, the fees secured providing valuable revenue for nations.
- In Oceania, 70–80% of the catch from inshore fisheries is used for subsistence purposes, with around 20% going to markets.
- Overfishing and the loss of marine biodiversity are negatively affecting coastal ecosystems throughout Oceania.
- Pelagic fish stocks are monitored to try to assure sustainability; however, each year, illegal fishing activity is detected.
- Locally managed marine areas have the potential to improve reef ecosystems, restore marine biodiversity and reverse the effects of overfishing on fish stocks.
- The main aquaculture industries in Oceania are pearls in French Polynesia and the Cook Islands, prawns in New Caledonia and seaweed in Kiribati.
- International markets for bêche-de-mer, trochus, live coral and live reef fish, coupled with the aquarium trade, in conjunction with fishing pressure from increasing human populations have reduced stocks of marine species generally in Oceania.

BACKGROUND AND RELEVANCE OF INDICATOR

Oceania waters provide food and livelihoods for peoples both within and outside the region. Fishing activities range from subsistence reef food gathering to foreign fishing vessels licensed to fish in national waters under quota, the fees secured providing valuable revenue for nations.

HOW THE INDICATOR WAS ASSESSED

Information for this indicator was sourced from several publications and reports (Petelo et al. 1995, Gillett et al. 1998, Lautaha and Cohen 2004, Gillett and Moy 2006, Gillett 2009, 2011, Pratchett et al. 2011, Anon 2013, Western and Central Pacific Fisheries Commission (WCPFC) 2013).

STATE

Coastal fisheries

Coastal fishing is primarily carried out for subsistence purposes and for sales in local markets. In addition, there are some coastal fisheries that are export-oriented: bêche-de-mer, aquarium fish and deepwater demersal fish.

Coastal commercial fishing in Tonga uses a wide variety of gear. A survey of fish arriving in Tongatapu from Vava'u and Ha'apai (Lautaha and Cohen 2004) showed that almost half of the fish that arrived was caught by diving, 34% from handlining and around 10% from droplining. The rest was caught using various other methods, including netting and gleaning. These results could be considered as indicative of the types of small-scale commercial fishing in the country.

State of Conservation in Tonga

Spear fishing is very important in Tonga. The report of an FAO survey in 2006 states that a bêche-de-mer boom in Tonga (roughly mid-1980s to mid-1990s) and its associated diving with hookah and SCUBA apparently increased the skills and interest of individuals in this gear, while a bêche-de-mer ban in the mid-1990s created a pool of unemployed divers. There are several types of spear fishing in Tonga: predominantly subsistence, small-scale commercial, recreational and operations that involve many divers on a large vessel.

Tonga is the leading producer of deep-slope demersal fish in the Pacific Islands region. This fishery has its origins in the exploratory fishing carried out in the 1970s by the Food and Agriculture Organization of the United Nations and the South Pacific Commission, which was followed up by a comprehensive fisheries development programme by the government and the United Nations Development Program.

Estimates of catches from the coastal fisheries vary widely. Indications are that in the first part of the new millennium, annual catches were of the order of 3,000 tonnes. In 2008, the Asian Development Bank examined a large number of studies on coastal fishing in Tonga and made catch estimates by extrapolating earlier estimates on the basis of population and fish-prices changes as per the Tonga Statistics Department. The study determined that a crude estimate of the recent annual production from Tonga's coastal commercial fisheries is 3,700 tonnes (of which about 700 tonnes was exported), worth about USD 11.3 million to the producer (of which about USD 2.4 million were for products that were exported). Similarly, the study estimated that the production from coastal subsistence fisheries in Tonga in 2007 was about 2,800 tonnes, worth USD 6.2 million.

A study by the Secretariat of the Pacific Community in 2010 partitioned the above coastal catches into categories: demersal fish 80.7%, nearshore pelagics 10.0%, and invertebrates 9.3%. In a World Bank study, residents of six coastal communities in Tonga were asked to name the three subsistence fishery resources of most importance to them. Seven resources were most often cited: finfish, octopus, lobster, bêche-de-mer, turbo, giant clams, seaweed and *Anadara*.

The catch from small-scale commercial fishing is delivered to several locations on Tongatapu (especially in the Nuku'alofa urban area), to Neiafu in Vava'u and to Lifuka in Ha'apai. Much of the landings at the latter location is for onward shipment to markets in the Nuku'alofa urban area. Deep-slope bottom fishing vessels deliver their catch to Nuku'alofa and, to a smaller degree, to Neiafu in Vava'u. Subsistence fishery landings occur at coastal villages throughout the country, roughly in proportion to the distribution of the population.

Up to the early 1960s, domestic demand for fish was almost wholly met through catches from the country's reefs and lagoons. However, increases in population and fishing effort and the growth of the cash economy have led to overfishing in many inshore areas. Some traditionally important fish, especially mullet, have been reduced to a small fraction of their earlier abundance, and inshore invertebrates such as bêche-de-mer, lobsters and giant clams have undergone severe declines, some quite recently. These problems are found throughout Tonga but are most acute close to population centres or in easily accessible fishing areas.

Insufficient production from coastal fisheries led to several strategies to increase fish production. These strategies mostly started in the 1970s and included outer-islands fish collection schemes, promotion of offshore tuna fishing and deep-slope demersal fish fishing, and attempts to develop aquaculture.

State of Conservation in Tonga

The management of the offshore fishery, deep-slope bottom fishery, aquarium fish and bêche-de-mer is undertaken through the framework of official management plans. The management of other coastal fisheries is less formalised; the management framework consists of the Fisheries Act, various regulations and the policies of the ministry responsible for fisheries.

A major feature of resource management in Tonga is the open access nature of Tonga's inshore fisheries. Basically, all Tongans can fish anytime/anywhere, with few restrictions on participation. Petelo et al. (1995) summarise the situation; see [Box](#).

Open Access in Tonga's Inshore Fisheries

Tonga's sea areas were defined by Royal Proclamation in 1887 to be all islands, rocks, reefs, foreshores and water lying between 15 and 23.5 degrees south latitude and between 173 and 177 degrees west longitude. In other words, Tonga was defined as being all that was inside a boxed area, and all geographic features were owned by the King. The Land Act of 1927 further reinforced this ownership. With respect to fishing, this definition has resulted in two consequences: (1) all Tongans have equal fishing access to all Tongan waters, and (2) any traditional claim of local control or management authority over fishing areas was abolished. Although Tonga is the only Pacific Island country not to have been colonised, it is the only country in the region to have done away entirely with any traditional fisheries management which may have existed. It should be noted that in the Tongan context, this is not incongruous: the King is the maker of traditions in Tonga.

The open access nature of fisheries in Tonga is in some respects compatible with the sharing nature of Tongan society. Nobody would refuse to give food to a hungry person or discourage somebody from fishing in an area regardless of the purpose or the distance from a village. This system may have worked reasonably well in the era of subsistence fisheries, but it has fairly recently collided with commercial realities and the carrying capacity of inshore resources. A recent survey team visited 11 villages in Ha'apai to discuss development issues (land, marine, health, environment, etc.). In many of the villages, the primary concern was the fact that Tongans from anywhere, especially commercial operators from Tongatapu, could harvest the food resources adjacent to villages, thereby affecting the village's food security. One frequent comment from villagers in Ha'apai is that, even if a community conserves and manages its adjacent marine resources, it may be a useless exercise because outsiders can, and have, moved in to over-harvest.

Commented [E15]: I have edited the box assuming that it was written based on Petelo et al. 1995. If this material is a direct quotation, please reject my edits within the box.

PRESSURES AND THREATS

The open access nature of inshore fishing areas in Tonga creates problems for fisheries management. The net effect of open access and associated lack of community control is that the conditions do not encourage a long-term relationship with the resource. The first-come, first-served regime now prevailing is an incentive to harvest as much as possible, as fast as possible. A pilot project is underway in which selected communities are given some degree of management control in their inshore fishing areas. In section 13 of the Fisheries Management Act 2002, the Minister may declare any area of the fisheries waters and corresponding subjacent area to be a Special Management Area. Additionally, section 14 of the Act states that the Minister may designate any local community in Tonga to be a coastal community for the purposes of community-based fisheries management.

Gillett et al. (1998) reviewed past fisheries research in Tonga and assessed the status of Tonga's major

State of Conservation in Tonga

fishery resources (Gillett et al. 1998):

The three categories of fisheries resources in Tonga (offshore, bottomfish and inshore resources) vary in magnitude and are subjected to very different levels of exploitation through fishing.

- Inshore resources, including lobsters, bêche-de-mer, and giant clams, are mostly over-exploited. Any increase in benefits from Tonga's inshore resources will probably derive from post-harvest improvements, rather than increased landings, although there are opportunities to improve the lot of those who rely on them for their food security or livelihood.
- The bottomfish found on the deep reef-slopes and seamounts are the target of what is presently the most important commercial fishery in Tonga. The resource is considered to be fully or near-fully exploited, and it is unlikely that catches could be substantially expanded on a sustained basis.
- The offshore resources, primarily four species of tuna, are only lightly exploited and form part of a large regional resource that for the most part is considered to be in a healthy state of abundance. The increased use of these resources should be considered Tonga's main opportunity for deriving greater benefit from fisheries (Gillett et al. 1998).

The main trends in Tonga coastal fisheries include:

- increasing exploitation of the coastal resources, especially those close to urban markets;
- growing recognition that (a) for effective coastal fisheries resource management to occur, (a) coastal communities need to be more involved in the management process; and (b) for this involvement to occur, some form of preferential access to adjacent resources by those communities is required;
- a gradual increase in the present decade of stakeholder input into the government fisheries agency;
- greater use of fisheries management plans to manage the major fisheries in the country; and
- a continuing dominance of Tonga as the leading exporter of deep-slope demersal fish in the Pacific Islands.

Offshore fisheries

Information supplied to the Western and Central Pacific Fisheries Commission (WCPFC) by the Tonga government shows that:

- in recent years, the annual tuna catch by Tongan long-line vessels ranged between 166 and 649 tonnes;
- the current fleet consists of three domestic vessels and one locally-based foreign vessel; and
- toward the end of 2011, Tonga reopened its waters to locally foreign fishing vessels, and in 2012, six foreign vessels fished Tonga waters, catching about 1,500 tonnes of tuna during that year.

The WCPFC yearbook shows that albacore dominates, accounting for 34 to 56% of the total tuna and tuna-like species catch, followed by yellowfin at 24 to 45% and bigeye at 8 to 27%. An Asian Development Bank report, based on its review of the catch composition of the locally based long-line fleet in the period 2003 to 2007, indicated that the amount of by-catch is about 26 to 32% of the total catch. Dolphinfish and moonfish accounted for more than 50% of this by-catch.

Some the trends and issues in Tonga's offshore fisheries include the following:

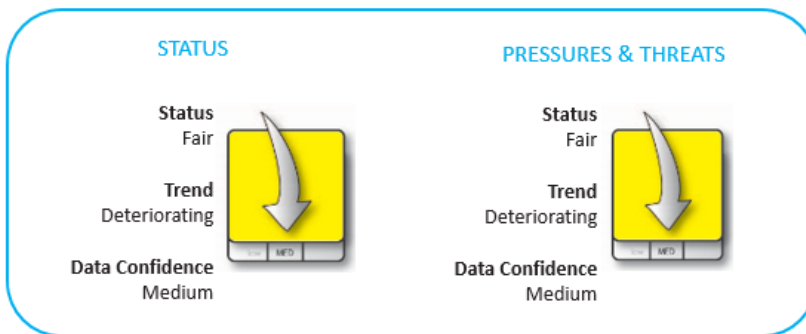
State of Conservation in Tonga

- there has been a decreasing number of locally based long-line vessels and associated employment in the present decade;
- in recent years, there has been a perception on the part of the tuna industry of high rates of taxation and high charges for government services;
- although there is a large desire on the part of the government for development of a domestic tuna industry, there are considerable difficulties of operating such an industry from a high-cost location such as Tonga; and
- it is important to attain an appropriate balance between regional/international and domestic aspects of fisheries.

Tonga is a member of the Western and Central Pacific Fisheries Commission that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. The Convention entered into force in June 2004.

Because the tuna are a regional resource, their assessment is most appropriately carried out across the western and central Pacific Ocean. Recent assessments by the Secretariat of the Pacific Community indicate concern over tuna stock condition of bigeye and to a lesser degree yellowfin. Numerous attempts in recent years within the Western and Central Pacific Fisheries Commission to prevent an increase in bigeye and yellowfin catches have not been successful. The total catch of bigeye in the region in 2012 was 161,679 metric tons, which was a 7% increase over the average of 2007–2011. The yellowfin catch in 2012 was 655,668 metric tons, which was a 22% increase over 2007–2011.

The three types of offshore fishing result in by-catch, with long-lining producing the most and pole and line fishing the least. Relatively good data are available on the by-catch in the Tonga zone and are published by the WCPFC. On a regional basis, there is concern over the condition of some shark species taken as by-catch, most notably the silky shark and the oceanic whitetip shark.



2. Native species

Much of biodiversity conservation in the countries and territories of the SPREP region is focussed on individual species. This set of indicators focuses on pressures on individual species using three different measures. First, pressures on those species currently classified as 'Threatened' in the IUCN Red List of Threatened Species (International Union for Conservation of Nature (IUCN) 2013) are assessed. Second, because of their additional vulnerability, pressures on species found only in one of the countries and territories (single-country endemic species) are assessed. Third, recognising that over half of the world's known species of cetaceans are found in the region along with the world's largest remaining populations of dugongs and green, hawksbill and loggerhead turtles, the pressures those species face are assessed.

Marine and coastal species

Marine diversity in Tonga is quite high, with an estimated 1,139 species of fish and 218 species of hard corals.

Terrestrial and freshwater

About 770 species of vascular plants have been recorded, including 70 ferns (three endemic species), three gymnosperms (one endemic species) and 698 angiosperms (nine endemic species) (Dahl 1986). Tonga's terrestrial fauna includes 12 reptiles (including one endemic species of skink which is probably extinct), 18 birds (two endemic species) and two bats, the only native mammals on the islands. Sea turtles breed on many of the islands, and there are several large seabird colonies, the most important including those on 'Ata and Nuku (Hay 1985).

2.1. Threatened species

KEY POINTS

- Of the 3,166 threatened species (2013) in the 22 Pacific Island nations assessed in the State of Conservation in Oceania 2013 report, most occur in the marine (59%) biome, followed by the terrestrial biome (33%).
- Invasive species have the greatest impact on the largest numbers of terrestrial threatened endemic and non-endemic species and Critically Endangered species, followed by impacts of land-use change due to agriculture, farming and forestry activities, and exploitation.

BACKGROUND AND RELEVANCE OF INDICATOR

Extinction rates are disproportionately high on islands, with approximately 80% of all known species extinctions occurring on islands. This indicator focuses on the pressures on endemic and non-endemic species that face the greatest risk of extinction: those species classified as 'Threatened' (species belonging to the top three classifications of Critically Endangered, Endangered and Vulnerable: CR+EN+VU) in the IUCN Red List of Threatened Species. Cnidaria (for example, corals, jellyfish and sea anemones) were excluded from the much of the analysis because specific threats are not identified in the Red List database. Non-coral marine species that were retained and analysed included sharks, rays and skates, sea birds, shore fish, marine mammals, sea turtles and sea snakes.

HOW THE INDICATOR WAS ASSESSED

Data for this indicator were compiled from the IUCN Red List of Threatened Species online public database (Version 2013.1). Information was extracted from the text by identifying threat categories that were relevant in the assessment and interpreting the absolute estimated threat level. For each species, a High/Medium, Low or Potential threat level was assigned to each threat category. Threats were categorised as follows: Residential and commercial development and transport (Development); Agriculture, farming and forestry (Agriculture); Energy production and mining (Mining); Biological resource use (Exploitation); Anthropogenic otherwise uncategorised habitat loss/degradation (Habitat loss); Invasive species (Invasives); Genetic (hybridisation/inbreeding) (Genetic); Pollution; Geological events; Extreme weather and climate change (Climate); Fire, unclear whether natural or anthropogenic (Fires); and Other, such as disease (Other). Only the ten worst threats were graphed.

STATE

As of August 2013, 794 species in Tonga were assessed according to the IUCN Categories and Criteria for inclusion in the Red List of Threatened Species. Table 7 provides a summary of these species, and Figure 3 shows the assessed species by Category. While the majority of assessed species are found in marine habitats, a greater percentage of terrestrial species are threatened. This pattern can be explained by the more restricted range of many terrestrial species and the extent of human impact on terrestrial ecosystems.

Of the 73 threatened flora and fauna (CR, EN or VU; IUCN 2013) of Tonga, 33 (45%) are corals (Phylum:

State of Conservation in Tonga

Cnidaria), with the majority in the order Scleractinia. These species have been excluded from the following threat analysis and are discussed separately in the Regional State of Conservation report.

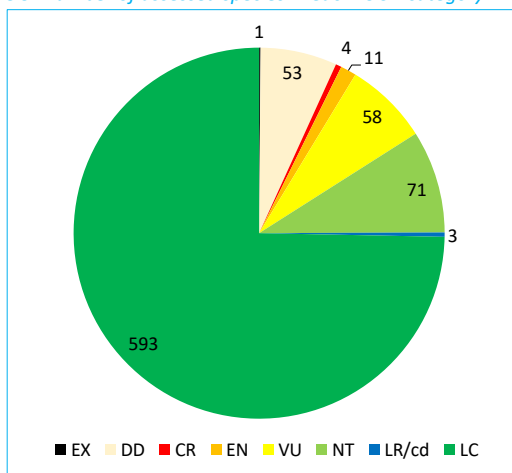
The Tongan ground skink (*Tachygyia microlepis*) is the only recorded extinction for Tonga in the IUCN Red List of Threatened Species. Extinction drivers include habitat loss and predation by dogs (*Canis lupus*), rats (*Rattus* sp.) and pigs (*Sus scrofa*).

Table 7: Tongan species included on the IUCN Red List (version 2013.1)

Taxonomic group	Sub-group	Number of species assessed	No. of species assessed as Threatened (CR, EN, VU)	No. of species assessed as Data Deficient	Estimated number of species described*
Plants	Bryophytes	0			6
	Ferns and allies	2	0	0	35
	Cycads	1	1	0	4
	Conifers	1	1	0	1
	Magnoliopsida (Dicotyledons)	13	2	0	128
	Liliopsida (Monocotyledons)	18	0	0	137
	Algae	0			51
Vertebrates	Birds	49	5	0	49
	Mammals	22	2	10	22
	Reptiles	12	3	0	15
	Amphibians	0			0
	Bony fish (freshwater and marine)	316	9	20	1,133
	Cartilaginous fish	9	3	1	9
Invertebrates	Insects	3	0	0	125
	Arachnids	0			16
	Hard corals (Anthozoa)	218	33	5	218
	Molluscs (bivalves and gastropods)	75	2	0	98
	Molluscs (cephalopods)	2	0	0	unknown
	Crustaceans	9	0	2	unknown
	Holothuroidea (sea cucumbers)	40	10	13	unknown
	Hydrozoa	4	0	0	unknown
Other invertebrates	0			unknown	
Fungi		0			219
Totals		794	71	51	2,266

State of Conservation in Tonga

Figure 3: Number of assessed species in each IUCN category in Tonga



PRESSURES AND THREATS

Exploitation is the leading threat to threatened species in Tonga, affecting 60% of species (see Table 8). Marine species including marine reptiles, marine mammals, fish, echinoderms (sea cucumbers), sharks and rays under fisheries pressure account for the high number of species impacted by exploitation.



Non-marine species include the Pacific sheath-tailed bat (*Emballonura semicaudata*), which is affected by invasive species, including monitor lizards (*Varanus indicus*), cockroaches, and rats (*Rattus* sp.)—all of which may limit the selection of roosting sites available on Aguiguan. Cave visitation, guano mining of limestone caves and pesticides are potential threats.

Table 8: Threats faced by extant IUCN Red Listed threatened species (CR, EN, VU) in Tonga (excluding Cnidaria species)

Relative ranking	Threat type**	No. of species	% of species
1	Exploitation	24	60
2	Invasives	7	18
2	Human disturbance	7	18
2	Habitat loss	7	18
3	Agriculture	6	15
4	Climate	1	3
4	Development	1	3
4	Pollution	1	3

**Agriculture refers to agriculture, farming and forestry. Habitat loss refers to anthropogenic un-categorised habitat loss, degradation or fragmentation. Development includes transport. Climate refers to extreme weather and climate change

State of Conservation in Tonga

STATUS		PRESSURES & THREATS	
Status Poor		Status Poor	
Trend Deteriorating		Trend Deteriorating	
Data Confidence Medium		Data Confidence Medium	

DRAFT

2.2. Endemic species

KEY POINTS

- Of the 2,189 single-country endemic species recorded across Oceania, 115 (5.3%) are already extinct, and 12 (0.5%) now exist only in captivity.
- At present, 930 of the 2,062 extant single-country endemic species (nearly 45%) are at a risk of extinction.
- Land-use change due to agriculture, the spread of invasive species, fires, habitat degradation and alteration, mining activities, and over-exploitation are the main threats to all single-country endemic species.
- The biggest threats to single-country endemic species classified as Threatened are the spread of invasive species followed by land-use change due to agriculture, fires and habitat loss.

BACKGROUND AND RELEVANCE OF INDICATOR

Endemic species once extinct are lost forever. Endemic species found only on one island or group of islands in Oceania are particularly vulnerable to the consequences of increasing human activity. This indicator identifies the key pressures and threats to single-country endemic species and the extent to which these species have already been impacted. Most of these species are terrestrial, as information about marine endemic species is lacking generally. Species extinction or species decline disrupt ecological processes and may also lead to cascading and catastrophic co-extinctions.

HOW THE INDICATOR WAS ASSESSED

Data for the indicator were extracted from the IUCN Red List of Threatened Species Version 2013.11.

A High/Medium, Low or Potential threat level was assigned to each pressure in order to compare actual and potential threats as well as their relative estimated level of severity. The relative importance of different pressures was also analysed in relation to current conservation status using the IUCN Red List categories (CR/EN/VU = Critically Endangered/Endangered/Vulnerable; LR/LC/NT = Low Risk/Least Concern/Near Threatened; DD = Data Deficient).

STATE

There are 11 endemic species present in Tonga, which represent 1.4% of all Red List flora and fauna listed for these islands. Six of these species (55%) are threatened, with a total of four Critically Endangered single-country endemic species.

PRESSURES AND THREATS

Single-country endemics in Tonga are under threat from a range of different threat types, with the most frequent being invasive species (see Table 9). The Critically Endangered Eua forest gecko (*Lepidodactylus euaensis*) is affected by agricultural land-use change resulting in habitat loss and possibly through competition with introduced skinks. The Endangered Neva fou megapode (*Megapodius pritchardii*) has

State of Conservation in Tonga

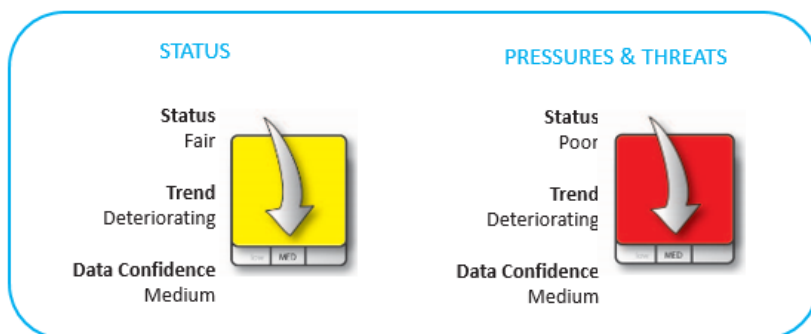
been hunted and exploited via egg collection in the past. Additionally, it faces predation pressure from cats (*Felis catus*) and dogs and destruction of suitable foraging ground habitat by pig rooting.

Table 9: Total number and percentage of extant IUCN Red List single-country endemic species in Tonga impacted by each threat type** with relative ranking given

Relative ranking	Threat type	No. of endemic species	% endemic species
1	Invasives	3	27
2	Habitat loss	2	18
2	Agriculture	2	18
3	Exploitation	1	9
3	Development	1	9

(Source: IUCN 2013)

**Habitat loss refers to anthropogenic un-categorised habitat loss, degradation or fragmentation. Agriculture refers to agriculture, farming and forestry. Climate refers to extreme weather and climate change. Development includes development of transportation links



2.3. Threatened migratory marine species

KEY POINTS

- The key threats to cetaceans are from fisheries operations, boat strikes, habitat degradation and pollution, anthropogenic noise, climate change and unregulated tourism.
- The major threat to marine turtle populations remains the direct harvest and illegal poaching of eggs and adults of all species. Climate change is predicted to be an increasing threat.
- The population status of many species of cetaceans is poorly known. The ability to quantify and address threats is hampered by the absence of regular research and monitoring of species distributions and abundance globally and in the Pacific region.

Commented [E16]: Should this be “cetaceans and turtles”?

BACKGROUND AND RELEVANCE OF INDICATOR

Over half of the world’s known species of cetaceans are found in the Pacific region, and the Pacific also supports the world’s largest remaining populations of dugongs and green, hawksbill and loggerhead turtles. These species are vulnerable to a wide range of threats including fisheries by-catch; human harvest; habitat loss and degradation from coastal development; pollution and pathogens; and climate change.

HOW THE INDICATOR WAS ASSESSED

Data for the indicator were extracted from the IUCN Red List of Threatened Species (International Union for Conservation of Nature (IUCN) 2013) for dugong, migratory marine turtles and cetaceans. Key sources of information on population status and threats to marine species included species assessments, peer-reviewed journal articles and regional and global reports on marine species (Olavarría et al. 2003, SPWRC 2004, Miller 2007, Wallace et al. 2011, Miller and Prideaux 2013).

Threats were ranked from 0 (data deficient) to 3, with threat levels of 1 (low), 2 (medium) and 3 (high).

STATE

Cetaceans

Tonga is a signatory to the Pacific Cetaceans MoU, which aims to conserve cetaceans and their habitats in the Pacific Islands Region with full protection of species listed in CMS Appendix 1.

Much of the research effort on cetaceans in Tonga has been focused on humpback whales, which are present on a seasonal basis, primarily between August and October (Table 10). Tongan waters are well known for their yearly humpback migration (Olavarría et al. 2003, SPWRC 2004, Eriksen et al. 2005). Researchers have documented additional cetacean species within these waters (SPWRC 2004).

Marine turtles

The IUCN Marine Turtle Specialist Group (MTSG) conducts regular Red List assessments of each marine turtle species on a global scale (Wallace et al. 2011). The green turtle (*Chelonia mydas*) is the only species recorded from Tonga. Population trends of green turtles are unknown. Regional Management

State of Conservation in Tonga

Units (RMUs) have been established based on bio-geographical data for each species, providing a framework for defining populations for assessment (Wallace et al. 2011). Tonga is located within the Pacific South Central RMU for the green turtle (Wallace et al. 2011).

Table 10: Marine species of conservation concern in Tonga

Species	Common name	IUCN Red List status 2008	Population trend worldwide	Tongan population
Marine turtles				
<i>Chelonia mydas</i>	Green turtle	EN A2bd	Decreasing	Unknown
Cetaceans – confirmed sightings				
<i>Balaenoptera borealis</i>	Sei whale	EN A1ad	Unknown	Unknown
<i>Physeter macrocephalus</i>	Sperm whale	VU A1d	Stable	Unknown
<i>Balaenoptera acutorostrata</i> subsp.	Dwarf minke whale	LC	Unknown	Unknown
<i>Delphinus</i> sp.	Common dolphin	LC	Increasing	Unknown
<i>Grampus griseus</i>	Risso's dolphin	LC	Unknown	Unknown
<i>Megaptera novaeangliae</i>	Humpback whale	LC	Unknown	Unknown
<i>Peponocephala electra</i>	Melon-headed whale	LC	Unknown	Unknown
<i>Stenella attenuata</i>	Pantropical spotted dolphin	LC	Unknown	Unknown
<i>Tursiops</i> sp.	Bottlenose dolphin	LC	Unknown	Unknown
<i>Balaenoptera bonaerensis</i>	Antarctic minke whale	DD	Unknown	Unknown
<i>Feresa attenuata</i>	Pygmy killer whale	DD	Unknown	Unknown
<i>Globicephala macrorhynchus</i>	Short-finned pilot Whale	DD	Unknown	Unknown
<i>Orcinus orca</i>	Orca, killer whale	DD	Unknown	Unknown
<i>Pseudorca crassidens</i>	False killer whale	DD	Unknown	Unknown
<i>Stenella longirostris</i>	Spinner dolphin	DD	Unknown	Unknown

PRESSURES AND THREATS

Cetaceans

The main threats to cetaceans in the Pacific Islands are by-catch in fishing operations (including purse seines and gill nets); vessel strikes (particularly if marine mammal watching operations are poorly managed); entanglement in marine debris and ingestion of discarded plastic; anthropogenic noise (including seismic surveys and military sonar); and climate change, which may not only result in changes of distribution of ocean currents and prey species but may also lead to some key prey species, such as squid, declining in abundance. In most cases, the ability to further quantify and address these threats is hampered by gaps in species knowledge as well as lack of monitoring or assessment in the region (Miller 2007).

Marine turtles

Threats to marine turtles include:

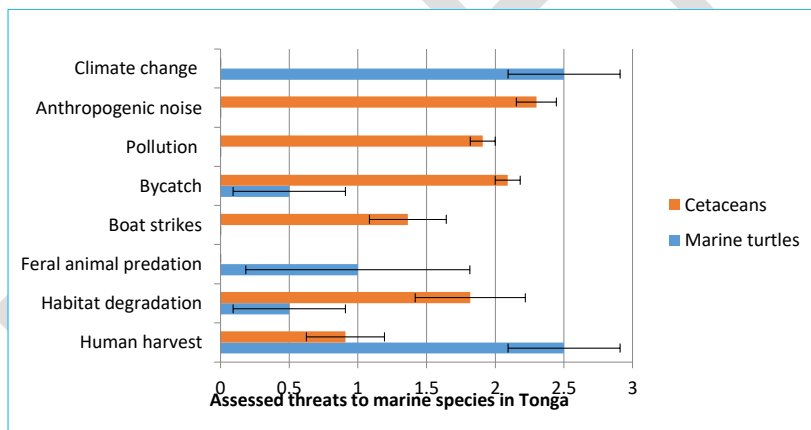
- fisheries impacts due to by-catch mortality, habitat destruction and food web impacts;

State of Conservation in Tonga

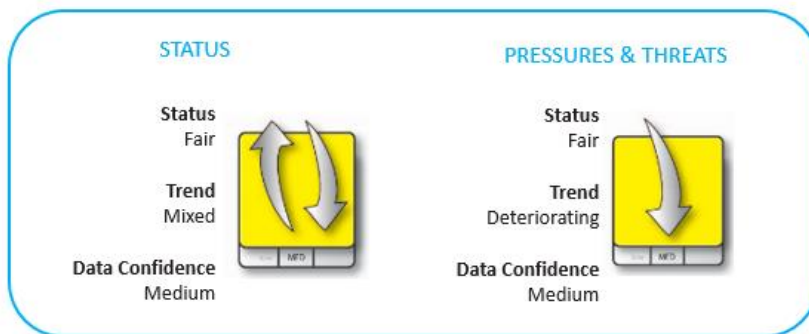
- harvest, including the taking of turtles and eggs. Green turtles continue to face exploitation, as they are traditionally hunted for food throughout Tonga;
- habitat degradation via coastal development, nesting beach degradation, seafloor dredging, vessel traffic, construction and changes to vegetation and dune systems;
- pollution and pathogens, including plastics and other marine debris affecting cetaceans and marine turtles and light pollution disrupting turtle nesting and hatchling behaviour;
- boat strikes and ecotourism; and
- global climate change, which may impact sex ratios of turtle hatchlings and cause loss of nesting beaches.

Green turtle populations in the Pacific South Central RMU have been assessed as being Low Risk-Low Threat (LR-LT), implying that these populations have high, increasing or stable abundance and high genetic diversity and are under low to moderate threat levels (Wallace et al. 2011).

Figure 4: Assessed threats to migratory species in Tonga based on MTSG data for the Pacific South Central RMU for the green turtle and hawksbill turtle and mean values for cetaceans based on IUCN Red List 2008 global species assessments (www.iucnredlist.org). Threat levels are 0 (data deficient), 1 (low), 2 (medium) and 3 (high)



(Wallace et al. 2011)





Response

Responses to protect and conserve Oceania's terrestrial and aquatic biodiversity must be built on a sound platform of national and international legislation and traditional governance mechanisms. The establishment of protected areas is a key component of national biodiversity programmes, as is direct action to mitigate impacts of invasive species, over-exploitation, habitat loss and climate change guided by appropriate national action plans, such as National Biodiversity Strategy and Action Plans.

This section examines the extent of Tonga's protected areas, participation in and national implementation of international biodiversity agreements and specific policy and management actions to deal with invasive species.

3. Environmental governance

3.1. Multilateral Environment Agreements

KEY POINTS

Most of the Pacific island countries have made commitments to the main biodiversity Multilateral Environmental Agreements (MEAs), in particular the Convention on Biological Diversity.

Pacific island territories of France, New Zealand, the United Kingdom and the United States are non-parties to MEAs but have, to various degrees, delegated authority for environmental governance, and some may be party to regional agreements.

BACKGROUND AND RELEVANCE OF INDICATOR

This indicator identifies the status of ratification of environment-related MEAs for Tonga and shows the extent of commitment of Tonga to international cooperation for the good of all mankind and its natural habitats. The MEAs considered in this assessment include the following:

- (a) Cartagena Protocol on Biosafety
- (b) Convention on Biological Diversity (CBD)
- (c) Convention on the Conservation of Migratory Species of Wild Animals (CMS) and relevant Memoranda of Understanding
 - i. The Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MoU)
 - ii. The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtle MoU)
 - iii. Pacific Islands Cetaceans
 - iv. The Memorandum of Understanding (MoU) on the Conservation of Migratory Sharks
- (d) Convention on Wetlands of International Importance (Ramsar)
- (e) Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- (f) Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (Nagoya Protocol)
- (g) United Nations Convention on the Law of the Sea (UNCLOS)
- (h) United Nations Framework Convention on Climate Change (UNFCCC)
- (i) Convention Concerning the Protection of the World Cultural and Natural Heritage (WHC)

HOW THE INDICATOR WAS ASSESSED

The data for each Pacific island country's status of commitment to the MEAs were extracted from the InforMEA country profile and relevant MEA Country profiles (InforMEA 2014).

State of Conservation in Tonga

STATE

The Kingdom of Tonga is a sovereign state that recently became a functioning constitutional monarchy after legislative reforms paved the way for its first partial representative elections. It has acceded to most MEAs relevant to biodiversity conservation, including the CBD, UNCCD, UNFCCC and UNCLOS and has accepted the WHC. Although not a party to the CMS, Tonga has signed an MOU on Pacific Island Cetaceans. Appendix A below provides a summary of Tonga’s status in relation to selected MEAs most relevant to biodiversity conservation and of their implementation by Tonga through regional and national legal instruments.

Table 11: Tonga and MEAs


Cartagena Protocol on Biosafety	√
Convention on Biological Diversity (CBD)	√
Convention on the Conservation of Migratory Species of Wild Animals (CMS) and relevant Memoranda of Understanding	
The Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MoU)	
The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtle MOU)	
Pacific Islands Cetaceans	√
The Memorandum of Understanding (MoU) on the Conservation of Migratory Sharks	
Convention on Wetlands of International Importance (Ramsar)	√
Convention on International Trade in in Endangered Species of Wild Fauna and Flora (CITES)	
Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (Nagoya Protocol)	√
United Nations Convention on the Law of the Sea (UNCLOS)	√
United Nations Framework Convention on Climate Change (UNFCCC)	√
Convention Concerning the Protection of the World Cultural and Natural Heritage (WHC)	√

STATUS

Status
Good

Trend
Improving

Data Confidence
High



3.2. National policies and legislation

KEY POINTS

- Most Pacific island countries have enacted legislation relating to environmental protection or have enacted sectoral legislation containing environmental protection provisions.
- Also, most Pacific island countries have not enacted specific or comprehensive legislation to address the obligations of State parties under the MEAs.
- Updating environmental legislation is urgently needed in the region but is hindered by the lack of capacity and resources to develop, monitor and enforce environmental legislation and is delayed by bureaucratic processes.

BACKGROUND AND RELEVANCE OF INDICATOR

This indicator identifies the status of national implementation of the biodiversity conservation MEAs that Tonga has signed or ratified. It focuses on identifying the specific legislations that Tonga has developed and enforced. For the purpose of this report, 'legislation' refers to statutory law enacted by legislature or a governing body in the Pacific island countries and territories. Where no specific legislation is available, the indicator focuses on related legislation that has aspects relevant to the objectives of the biodiversity conservation MEAs.

HOW THE INDICATOR WAS ASSESSED

The data for Tonga's status of national implementation commitment to the MEAs were assessed through research and extracted from various sources (ECOLEX 2013, Pacific Islands Legal Information Institute (PACLI) 2013, Secretariat of the Pacific Regional Environmental Programme (SPREP) 2013), relevant government websites, published reports and various articles. Whilst every endeavour was made to obtain the current legislation, policies, strategies and action plans, consultation with relevant government departments is needed to ensure more recent developments have been considered.

STATE

Effective institutional arrangements or regimes are important for environmental management and conservation, in particular the implementation and enforcement of national legislations and policies that support the conservation of biodiversity.


Appendix B indicates both governmental and inter-governmental institutions set up in Tonga to govern the conservation and management of terrestrial and marine ecosystems.

STATUS

Status
Fair

Trend
Improving

Data Confidence
Medium



DRAFT

3.3. Traditional governance

KEY POINTS

- Traditional governance has an essential role in land and natural resources management in Pacific island countries and territories.
- The majority of land in the Pacific islands is customarily owned and is held in customary tenure. State lands or freehold lands represent only a comparatively small percentage of lands.
- Customary definition of land in most of the Pacific islands extends to the foreshore and inshore waters, although in some countries, the national law vests ownership of foreshore lands to the State, while recognising customary rights of access and use by traditional landowners.

BACKGROUND AND RELEVANCE OF INDICATOR

This indicator assesses the recognition of customary land ownership and customary rights of access and use of land and marine resources in each country. It identifies the percentage of land owned customarily and whether customary land ownership extends to foreshores and beyond. It also briefly covers the impact of customary ownership on environmental governance.

HOW THE INDICATOR WAS ASSESSED

The data for Tonga's status of traditional governance were assessed through desktop research and extracted from the country profile on the Pacific Environment Information Network (PIEN) website (Secretariat of the Pacific Regional Environmental Programme (SPREP) 2013), government websites, published reports and various articles (Clarke et al. 2008).

STATE

Under the Constitution, the ownership of all land is vested in the King, who may grant hereditary estates to nobles and titular chiefs. However, these lands cannot be sold and are subject to allotment. Every male child over the age of 16 years is entitled to two allotments of land, which can be allowed out of these hereditary estates or Crown land (see also the *Land Act*).

All lands in the Kingdom belong to the Crown with four tenure categories:

- (i) Hereditary Estates of the King;
- (ii) Hereditary Estates of the Royal Family;
- (iii) Hereditary Estates of the Nobles and Matapule; and
- (iv) government land.

Land from any of the four categories can be leased, but no land in Tonga can ever be sold. The King, with the consent of the Privy Council, has the power to retrieve land from any holder for public purposes, in which case the dispossessed may be compensated with replacement land, money or both. All the beach frontage of the Kingdom belongs to the Crown from 50 feet above high-water mark, and it

State of Conservation in Tonga

shall be lawful for the Government to lease any portion of the beach frontage for erecting a store jetty or wharf, and the Minister of Lands, with the consent of the Cabinet, shall have power to grant such leases.

STATUS

Status	Poor
Trend	Unknown
Data Confidence	Medium



DRAFT

3.4. National Biodiversity Strategy and Action Plans and national reporting to the Convention on Biological Diversity

KEY POINTS

- Fourteen of the countries of the SPREP region are Parties to the Convention on Biological Diversity (CBD), and 12 have National Biodiversity Strategies and Action Plans (NBSAPs).
- National reporting to the CBD includes submission of national reports and thematic reports on various themes, such as alien species, protected areas, etc. Parties to the CBD have also submitted Action Plans for Implementing the Convention on Biological Diversity's Programme of Work on Protected Areas, known as PoWPA Action Plans.

BACKGROUND AND RELEVANCE OF INDICATOR

NBSAPs are the principal instruments for implementing the CBD at the national level. The Convention requires parties to prepare a National Biodiversity Strategy (or equivalent instrument) and to ensure that this strategy is mainstreamed into the planning and activities of all those sectors whose activities may have an effect (positive and negative) on biodiversity.

HOW THE INDICATOR WAS ASSESSED

The Goals and Targets of the CBD Strategic Plan 2001–2010 were used to assess current NBSAPs (Government of Tonga 2010) because Parties were required to report progress against them in their Fourth National Reports to the Secretariat of the CBD. Scores were then given to Targets within each Goal for each country.

Note: The Strategic Plan on Biodiversity 2011–2020 and the Aichi Biodiversity Targets were adopted by the Parties to the CBD during the Tenth Conference of the Parties (COP10) in Nagoya, Japan.

The fifth national report (scheduled for submission in early 2014) is to provide a mid-term review of progress towards the implementation of the Strategic Plan for Biodiversity 2011–2020 and progress towards the Aichi Biodiversity Targets. The fifth national report has not been considered for this assessment.

STATE

The NBSAP addresses the goals of the CBD Strategic Plan 2001–2010 and was adopted by government in 2006. It addresses many of the Thematic Areas and Cross-cutting Issues but has not been updated since its initial production and does not clearly address the Aichi Biodiversity Targets of the CBD Strategic Plan 2011–2020. Tonga has recently completed a National Invasive Species Strategy and Action Plan, which is awaiting endorsement by Government.

Progress has been made towards meeting some goals of the CBD Strategic Plan 2001–2010. The Fourth National Report described the overall level of achievement of NBSAP's objectives as 'below

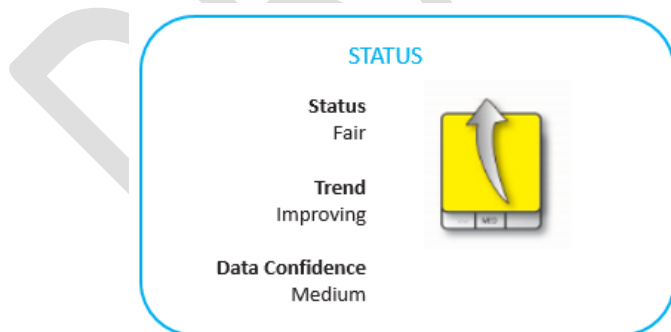
State of Conservation in Tonga

average'. Only 27% of the 37 NBSAP objectives achieved over 50% of the desired indicators. Much of the work against other targets is very clearly focused on primary production, which has resulted in a reduction in forested area (Goal 5: Pressures from habitat loss, land-use change and degradation, and unsustainable water use reduced). No work on threatened species (Goal 2: Promote the conservation of species diversity) was reported, and the lack of financial support from the government when this should be a priority area was raised as a concern.

The NBSAP records 8 declared parks and 10 reserves (Goal 1: Promote the conservation of the biological diversity of ecosystems, habitats and biomes), but monitoring of these parks and reserves is reported as minimal. Other progress has undoubtedly been made, but there is a need to improve monitoring and evaluation systems with priorities, appropriate targets, indicators and timescales in order to identify and report on progress.

Table 12: Summary of reporting by Tonga to the CBD up to 2013

NBSAP developed	yes
NBSAP with measurable targets	yes
NBSAP with Indicators	yes
NBSAP updated Post-Nagoya	no
First National Report to the CBD	yes
Second National Report to the CBD	no
Third National Report to the CBD	no
Fourth National Report to the CBD	yes
Fifth National Report to the CBD	no
National Action Plan for the Programme of Work on Protected Areas	yes



4. Conservation initiatives

4.1. Protected areas

KEY POINTS

- Coverage of the land and seas of Oceania by protected areas is low. Only four countries appear to have met the Aichi Target 11 commitment made through the CBD for terrestrial coverage, and just one has met the commitment for marine coverage.
- There are no protected areas in international waters within the region.
- Locally Managed Marine Areas (LMMAs) contribute to biodiversity conservation, and their implementation by over 500 communities represents a unique achievement.
- Across Oceania, protection of both terrestrial and marine Important Bird Areas (IBAs) is very poor, with only 10% of the area of marine IBAs and 20% of the area of terrestrial IBAs encompassed within protected areas.
- Similarly, of the Alliance for Zero Extinction sites (AZEs), which hold the last remaining populations of Critically Endangered or Endangered species, only three (8.1%) are completely protected, and eight (22%) are partially protected by inclusion in protected areas.

BACKGROUND AND RELEVANCE OF INDICATOR

Protected areas are a key mechanism for conserving biodiversity. This indicator assesses the extent to which nationally designated protected areas, including Locally Managed Marine Community Areas (LMMAs), and other sites of global significance for the conservation of biodiversity, such as Important Bird Areas (IBAs), Endemic Bird Areas (EBAs), Key Biodiversity Areas (KBAs) and Alliance of Zero Extinction Sites (AZE), provide terrestrial and marine coverage.

Note: Gaps in information and listing of protected areas have been noted in the WDPA.

HOW THE INDICATOR WAS ASSESSED

The analysis presented here relies on the official data supplied by the Government of Tonga and data held in the World Database on Protected Areas (World Database on Protected Areas (WDPA) 2013), Birdlife International database (BirdLife International 2013) and Alliance for Zero Extinction Sites database (Alliance for Zero Extinction Sites (AZE) 2013, Integrated Biodiversity Assessment Tool (IBAT) 2013).

STATE

Terrestrial Protected Areas

Protected terrestrial and inland waters comprise 120 square kilometres or 15.6% of the total land area

State of Conservation in Tonga

of Tonga (Integrated Biodiversity Assessment Tool (IBAT) 2013)

Marine Protected Areas

Currently 8,457 square kilometres (9.4%) of coastal and marine areas are covered by some form of Protected Area.

Table 13: Protected area cover in Tonga

Country	Terrestrial area covered by PAs (km ²)	% terrestrial area covered by PAs	Marine area covered by PAs (km ²)	% marine area covered by PAs	Total extent PAs (km ²)
Tonga	120	15.6	8,457	9.4	8,577
Region (excl. international waters)	27,805	4.97	548,052	1.91	575,857
Region (incl. international waters)	27,805	4.97	x	x	x

There are currently 19 designated terrestrial and marine protected areas listed in the WDPA for Tonga see Table 14.

Table 14: Protected marine and terrestrial areas in Tonga

Name	Designation	Designation type	IUCN category	Marine	Marine area (km ²)	Total area (km ²)	Status	Status year
Eua	National Park	National	II	1	2.25	4.5	Designated	1992
Tofua	National Park	National	II	0	0	49.9	Designated	2001
Kao	National Park	National	II	1	12.5	12.5	Designated	2001
Pangaimotu Reef	Reserve	National	IV	1	0.35	0.49	Designated	1979
Ha'atafu Beach	Reserve	National	IV	1	0.71	0.71	Designated	1979
Hakaumama'o Reef	Reserve	National	IV	1	1.28	2.6	Designated	1979
Malinoa Island Park and Reef	Reserve	National	IV	1	0.91	0.91	Designated	1979
Monuafe Island Park and Reef	Reserve	National	IV	1	0.50	0.50	Designated	1979
Mui Hopo Hoponga Coastal Reserve	Reserve	National	V	1	0.89	0.89	Designated	1972
Ha'apai	Multi/Multiple Use Conservation Area	National	V	1		10000	Designated	1994
Falevai	Not Reported	National	VI	1		5	Designated	
Fanga'uta and Fanga Kakau Lagoons	Marine Reserve	National	VI	1	28.35	28.35	Designated	1974
O'ua	Multi/Multiple Use Conservation Area	National	VI	1	47.41	48.75	Designated	2006
Mounu Reef	Sanctuary	National	NR	1	0.2	0.2	Designated	
Nukuhetulu	Not Reported	National	NR	1		3	NR	
Vaomopa	Nature Reserve	National	NR	0	0	0.2	NR	
Atata	Multi/Multiple Use Conservation Area	National	NR	1	6.18	6.18	Designated	2008
Eueiki	Multi/Multiple Use Conservation Area	National	NR	1	2.18	2.18	Designated	2008
Ovaka	Multi/Multiple Use Conservation Area	National	NR	1	9.56	9.56	Designated	2008
Felemea	Multi/Multiple Use Conservation Area	National	NR	1	16.27	16.27	Designated	2008
Ha'afeva	Multi/Multiple Use Conservation Area	National	NR	1	11.28	11.28	Designated	2007

State of Conservation in Tonga

Neiafu Harbour Wreck	Other Area	National	NR	0	0	0	Proposed
----------------------	------------	----------	----	---	---	---	----------

Community Conserved Areas, such as LMMAs

The South Pacific has experienced a proliferation of Marine Managed Areas (MMAs) in the last decade. The approaches being developed at national levels are built on a unique feature of the region—customary tenure and resource access—and make use of existing community strengths in traditional knowledge and governance, combined with a local awareness of the need for action.

The imposition of traditional systems of taboo to assist in conservation efforts along with efforts made by the National Environmental Service to create awareness and acceptance by the public is a significant governance feature in Tonga. In addition, there are concerted efforts to reform legislation in Tonga to align with international treaties and conventions.

Tonga does not have a system of customary marine tenure as is found in many other Pacific nations. However, in 2009, six new Special Management Areas (SMAs) were established, and a seventh is being developed. These SMAs directly empower island communities to carry out the management of individual areas, on a 'close access' basis, meaning only that particular community can access the area (Government of Tonga 2010, Chin et al. 2011).

Commented [E17]: Should this be "closed"?

Important Bird Areas (IBAs) and Endemic Bird Areas (EBAs)

Important Bird Areas (IBAs) are sites of global biodiversity conservation importance that are chosen using internationally agreed, objective, quantitative and scientifically defensible criteria. IBAs are selected because they may hold threatened birds, birds restricted to particular regions or biomes or significantly large populations of congregatory water birds. Through this process, sites directly important for bird conservation are identified and prioritised for conservation actions. In addition, birds have been shown to be extremely good indicators of overall biodiversity, and throughout the world, IBAs themselves protect a high percentage of many nations' total biodiversity (Stattersfield et al. 1998).

There are currently six proposed IBAs in Tonga (BirdLife International 2014); see Table 15.

Table 15: Proposed IBAs in Tonga

Site name	IBA status
Fonualei	Proposed
Late	Proposed
Maninita, Taula, Lualoli	Proposed
Tofua	Proposed
Hunga Ha'apa, Hunga Tonga Islands	Proposed
Ata Island	Proposed

(BirdLife International 2014)

Over 2,500 bird species are restricted to an area smaller than 50,000 square kilometres, and they are said to be endemic to it. BirdLife has identified regions of the world where the distributions of two or more of these restricted-range species overlap to form Endemic Bird Areas (EBAs).

State of Conservation in Tonga

Two EBAs are recognised in Tonga. The Tongan Secondary Area includes all the islands that make up the political unit of Tonga apart from Niufo'ou, which is treated as a Secondary Area in its own right (see Table 16) (BirdLife International 2014).

Table 16: EBAs in Tonga

Site name	Common and species names	IUCN category
Niufo'ou	Polynesian Megapode (<i>Megapodius pritchardii</i>)	EN
	Purple-capped Fruit-dove (<i>Ptilinopus porphyraceus</i>)	LC
	Blue-crowned Lorikeet (<i>Vini australis</i>)	LC
	Polynesian Starling (<i>Aplonis tabuensis</i>)	LC
Tonga	Shy Ground-dove (<i>Gallicolumba stairi</i>)	VU
	Many-coloured Fruit-dove (<i>Ptilinopus perousii</i>)	LC
	Purple-capped Fruit-dove (<i>Ptilinopus porphyraceus</i>)	LC
	Blue-crowned Lorikeet (<i>Vini australis</i>)	LC
	Wattled Honeyeater (<i>Foulehaio carunculatus</i>)	LC
	Polynesian Triller (<i>Lalage maculosa</i>)	LC
	Tongan Whistler (<i>Pachycephala jacquinoti</i>)	NT
	Fiji Shrikebill (<i>Clytorhynchus vitiensis</i>)	LC
	Polynesian Starling (<i>Aplonis tabuensis</i>)	LC

(BirdLife International 2014)

Alliance for Zero Extinction Sites (AZEs)

The Alliance for Zero Extinction (AZE), a joint initiative of biodiversity conservation organisations from around the world, aims to prevent extinctions by identifying and safeguarding key sites, each one of which is the last remaining refuge of one or more Endangered or Critically Endangered species. AZE is first focusing on species that face extinction either because their last remaining habitat is being degraded at a local level or because their tiny global ranges make them especially vulnerable to external threats. To be designated as an AZE site, a site must meet all 3 criteria: it must contain at least one Endangered (EN) or Critically Endangered (CR) species, as listed on the IUCN Red List; it must be the only area where an EN or CR species occurs and contain the overwhelmingly significant known resident population (more than 95%) of the EN or CR species; and it must have a definable boundary.

There are currently no recognised AZEs in Tonga.

Key Biodiversity Areas (KBAs)

The KBA approach builds on and complements other conservation priority setting approaches by extending to all taxonomic groups the methodology employed by Bird Life International and Plant life International to identify Important Bird Areas (IBAs) and Important Plant Areas (IPAs), respectively. KBAs can be used as a tool by governments, inter-governmental organisations, NGOs, the private sector and other stakeholders to expand protected area networks and, more generally, for targeting conservation action. Additionally, KBAs provide the building blocks for landscape-level conservation planning and for maintaining effective ecological networks aimed at preventing biodiversity loss. In the Pacific, KBAs have been identified in three biodiversity hotspots, namely the Polynesia-Micronesia hotspot, the East Melanesia Islands hotspot and the New Caledonia hotspot, which collectively include all Pacific island countries and territories except for mainland PNG.

Tonga lies within the Polynesia-Micronesian Biodiversity Hotspot. Three KBAs have been identified in

State of Conservation in Tonga

Tonga: Eua, Kao and Tofua National Parks and Niuafoa Freshwater Lake. Eua is also a proposed AZE, and both Eua and Niuafoa Freshwater Lake have been highlighted as priority sites under the Critical Ecosystem Partnership Fund (CEPF) (Conservation International 2007).

Ecologically or Biologically Significant Areas

Ecologically or Biologically Significant Areas (EBSAs) in the global marine realm are classified based on seven scientific criteria: 1. Uniqueness or rarity, 2. Special importance for life history of species, 3. Importance for threatened, endangered or declining species and/or habitats, 4. Vulnerability, fragility, sensitivity, slow recovery (fragile), 5. Biological productivity, 6. Biological diversity and 7. Naturalness.

EBSAs recognised in Tongan marine waters are shown in Table 17 below.

Table 17: Ecologically or Biologically Significant Areas (EBSAs) in Tonga

Name of area meeting EBSA criteria	Country	Area (km ²)
6. Kermadec-Tonga-Louisville Junction	Tonga/International waters	73,007
7. Monowai Seamount	Tonga/International waters	11,049
26. Tonga Archipelago	Tonga/International waters	93,165

Protected Area coverage

In summary, 15.6% of terrestrial and 9.4% of coastal and marine areas in Tonga are covered by some form of protected area, as shown in the World Database of Protected Areas (Integrated Biodiversity Assessment Tool (IBAT) 2013).

Priority Sites including 3 KBAs and 6 IBAs have been proposed in Tonga but are not yet confirmed.

State of Conservation in Tonga



Eua National Park (Photo credit: Duncan Wright Wikipedia Commons)

STATUS

Status
Good

Trend
Improving

Data Confidence
Medium

4.2. Conservation initiatives

Participation in non-governmental conservation initiatives

Non-governmental organisations (NGOs), both local and international, participate effectively in conservation initiatives throughout the Pacific. Their activities in Tonga are important in supporting the Government’s role in biodiversity conservation. Appendix C attached below outlines the conservation initiatives of NGOs in Tonga.

Conservation of species and sites

Tonga has taken steps toward better species governance by ratifying several MEAs (see Table 11). With the increase of commercial infrastructural developments in Tonga, habitats and species living in these habitats are threatened with extinction or change in status from resident to migratory species. These threats may be mitigated through better land-use planning, proper environment impact-assessment processes, proper management of waste and pollution, sustainable forestry and mining activities and better mitigation of climate change and disaster impacts. Appendix D attached indicates the specific legal framework, institutional arrangement and strategy or action plans, if any, by which these mitigating factors are governed in Tonga.

Appendix E summarises the provisions in place in Tonga for the conservation of species.

Invasive alien species management

Over 430 introduced species are recorded in Tonga, 191 of which are known to be invasive. Plants represent the majority (93%) of invasive species, with around 177 species, and there are 13 invasive animals. The majority (190) of invasive species are associated with terrestrial and freshwater ecosystems, with only one marine species documented.

The National Biodiversity Strategy and Action Plan addresses invasive species in three Themes in Section F (Table 14). The NBSAP Monitoring Matrix has an Outcome and Indicators for invasive species in Objective 3.3 of Theme Area 3. A National Invasive Species Strategy and Action Plan has been prepared and is awaiting endorsement by the government.

Table 18: Objectives and Actions related to invasive species contained in Section F of the National Biodiversity Strategy and Action Plan of the Kingdom of Tonga


Theme Area 2 – Marine Ecosystems	
Objective 2.3: Sustainable management of marine biodiversity	Action 6 Implement the PacPOL programme to protect native marine biodiversity against the threat of invasive alien species introduced through ballast water discharges from ships
Theme Area 3 – Species Conservation	
Objective 3.3: Invasive species	Action 1 Support the Pacific Islands Ecosystems at Risk (PIER) Project and border control operation of the MAFFF Quarantine Service, particularly those targeting high-priority invasive species Action 2 Support regional invasive species programmes involving Tonga but ensure targeted invasive species are those of the highest priority to Tonga
Objective 3.5: Public Awareness and Education	Action 3 Promote awareness of invasive species and their negative impacts on local biodiversity
Theme Area 4 – Agrobiodiversity	
Objective 4.2: Research and development	Action 1 Protect priority agro-biodiversity species from the impact of alien and invasive species by supporting research for resistant varieties
Objective 4.3: Public Awareness and Education	Action 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

State of Conservation in Tonga

Some of the nine Thematic Areas of the three Sections of the Guidelines for Invasive Species Management in the Pacific (A. Foundations, B. Problem Definition, Prioritisation and Decision-Making, C. Management Action) are being addressed. The Biosecurity act is being reviewed based on the Harmonised Biosecurity Bill, which has a strong production focus, and as with other Pacific nations, it is not clear how the legislation will provide protection for the natural environment.

A survey of invasive plants of environmental concern has been completed, and a survey of invasive mosquito species included analysis of blood samples for pathogens, including avian malaria and arboviruses. Rodent eradications have been attempted on small islands in the Vava`u Group, but results are not certain. New invasive species continue to arrive, and giant sensitive plant (*Mimosa diplotricha*) was recently found on Vava`u. Recently completed training courses include rodent and cat eradication, island biosecurity.

STATUS

Status Fair	
Trend Improving	
Data Confidence Medium	

DRH

State of Conservation in Tonga

5. Summary and conclusions

Summary of Indicator Assessments

Details	Reference	Indicator	Tonga		
			Status	Trend	Data quality
STATE, PRESSURES AND THREATS					
ECOSYSTEMS					
TERRESTRIAL ECOSYSTEMS	1.1.	Forest cover	State: Poor	Deteriorating	Medium
			Pressures and Threats: Poor		
FRESHWATER ECOSYSTEMS	1.2.	Freshwater ecosystems	State: Fair	Unknown	Low
			Pressures and Threats: Fair		
COASTAL ECOSYSTEMS	1.3.1.	Coral reefs	State: Fair	Deteriorating	Medium
			Pressures and Threats: Fair		
	1.3.2.	Mangrove ecosystems	State: Fair	Deteriorating	Medium
			Pressures and Threats: Poor		
	1.3.2.	Seagrass beds	State: Fair	Mixed	Medium
			Pressures and Threats: Fair		
MARINE ECOSYSTEM	1.4.1.	Ocean health	State, Pressures and Threats: Fair	Deteriorating	Medium
	1.4.2.	Utilised species	State: Fair	Deteriorating	Medium
			Pressures and Threats: Fair	Deteriorating	Medium

State of Conservation in Tonga

Summary of Indicator Assessments

Details	Reference	Indicator	Tonga		
			Status	Trend	Data quality
NATIVE SPECIES	2.1	Threatened species	State: Poor	Deteriorating	Medium
			Pressures and Threats: Poor	Deteriorating	Medium
	2.1	Endemic species	State: Fair	Deteriorating	Medium
			Pressures and Threats: Poor	Deteriorating	Medium
	2.3	Threatened marine migratory species	State: Fair	Mixed	Medium
			Pressures and Threats: Fair	Deteriorating	Medium
RESPONSE					
ENVIRONMENTAL GOVERNANCE	3.1	Multilateral Environmental Agreements	Good	Improving	High
	3.2	National policies and legislation	Fair	Improving	Medium
	3.3	Traditional governance	Poor	Unknown	Medium
	3.4	National Biodiversity Strategy and Action Plans	Fair	Improving	Medium
CONSERVATION INITIATIVES	4.1	Protected area coverage	Good	Improving	Medium
	4.2	Conservation initiatives	Fair	Improving	Medium

State of Conservation in Tonga

Mapping of Aichi Biodiversity targets with indicators in this assessment

Aichi Biodiversity Target	Target #	Indicator
By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	5	Terrestrial ecosystems: Forest cover
By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem-based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	6	Marine ecosystems: Ocean health and Utilised species Coastal ecosystems: Coral reefs, Mangrove ecosystems and Seagrass beds
By 2020, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	7	Terrestrial ecosystems: Forest cover Freshwater ecosystems
By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	8	Marine ecosystems: Ocean health and Utilised species Freshwater ecosystems
By 2020, invasive alien species and pathways are identified and prioritised, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	9	Conservation Initiatives: Invasive alien species management
By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimised, so as to maintain their integrity and functioning.	10	Marine ecosystems: Ocean health and Utilised species Coastal ecosystems: Coral reefs, Mangrove ecosystems and Seagrass beds
By 2020, at least 17% of terrestrial and inland water and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	11	Conservation initiatives: Protected area coverage

State of Conservation in Tonga

Mapping of Aichi Biodiversity targets with indicators in this assessment

Aichi Biodiversity Target	Target #	Indicator
By 2020, the extinction of known threatened species has been prevented, and their conservation status, particularly of those most in decline, has been improved and sustained.	12	Native species: Threatened species, Endemic species, Endangered marine migratory species
By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	14	Terrestrial ecosystems Freshwater ecosystems Marine ecosystems: Ocean health and Utilised species Coastal ecosystems: Coral reefs, Mangrove ecosystems and Seagrass beds
By 2015, each Party has developed, adopted as a policy instrument and commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	17	Environmental governance: National Biodiversity Strategy and Action Plans
By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	18	Environmental governance: Traditional governance

Bibliography

- Alliance for Zero Extinction Sites (AZE). 2013. Alliance for Zero Extinction Sites.
- Anon. 2013. Tonga Annual Report to the Commission - Part 1: Information on Fisheries, Research, and Statistics. Scientific Committee, Ninth Regular Session, Western and Central Fisheries Commission, Pohnpei.
- BirdLife International. 2013. BirdLife Datazone.
- BirdLife International. 2014. Endemic Bird Area factsheet: Samoan Islands.
- Bryant D., Burke L., McManus L. and Spalding M. 1998. Reefs at Risk: A Map-Based Indicator of Threats to the World's Coral Reefs. A joint publication by World Resources Institute (WRI), International Center for Living Aquatic Resources Management (ICLARM), World Conservation Monitoring Centre (WCMC), United Nations Environment Programme (UNEP). World Resources Institute.
- Chassot E., Dubroca L., Delgado de Molina A., Assan C., Soto M., Floch L. and Fonteneau A. 2012. Decomposing Purse Seine CPUEs to Estimate an Abundance Index for Yellowfin Free-swimming Schools in the Indian Ocean during 1981–2011. Victoria: IOTC.
- Chin A., Lison De Loma T., Reyntar K., Planes S., Gerhardt K., Clua E., Burke L. and Wilkinson C. 2011. Status of Coral Reefs of the Pacific and Outlook: 2011. Global Coral Reef Monitoring Network.
- Clarke P., Millar I. and Sollberger K. 2008. Capacity Building for Environmental Law in the South Pacific. Gland, Switzerland: IUCN.
- Coles R., Grech A., Rasheed M., McKenzie L., Unsworth R. and Short F. 2011. Seagrass Ecology and Threats in the Tropical Indo-Pacific Bioregion, Chapter 9. In: Pirog R (ed) Seagrass: Ecology, Uses and Threats. ISBN 978-1-612761-987-8.
- Conservation International. 2007. Key Biodiversity Areas in Polynesia and Micronesia. October 2007.
- Dahl A.L. 1986. Review of the Protected Areas System in Oceania. UNEP & IUCN Commission on National Parks and Protected Areas, Gland, Switzerland.
- ECOLEX. 2013. The Gateway to Environmental Law. Available at <http://www.ecolex.org>.
- Ellison A.M., Farnsworth E.J. and Merkt R.E. 1999. Origins of Mangrove Ecosystems and the Mangrove Biodiversity Anomaly. *Global Ecology and Biogeography* 8:95-115.
- Ellison J.C. 2009. Wetlands of the Pacific Island Region. *Wetlands Ecology and Management* 17:169-206.
- Eriksen M., Maximenko N., Thiel M., Cummins A., Lattin G., Wilson S., Hafner J., Zellers A. and Rifman S. 2013. Plastic Pollution in the South Pacific Subtropical Gyre. *Marine Pollution Bulletin* 68:71-76.
- Eriksen N., Miller L.A., Tougaard J. and Helweg D.A. 2005. Cultural Change in the Songs of Humpback Whales (*Megaptera novaeangliae*) from Tonga. *Behaviour* 142:305-328.
- Fakatava T., Tukia Lepa S., Matoto L., Fale Ngaluafe P., Palaki A. and Tupou S. 2000. Status of Fanga'uta Lagoon, Tonga: Monitoring of Water Quality and Seagrass Communities 1998 – 2000. Tonga National Monitoring Team, Scientific Monitoring Report #1 September 2000 available at http://www.reefbase.org/pacific/pub_B000000029.aspx.
- Food and Agriculture Organisation of the United Nations (FAO). 2000a. 29. Tonga. In *Asia and the Pacific National Forestry Programmes: Update 34*. Retrieved from: <http://www.fao.org/docrep/003/x6900e/x6900e00.htm#Contents>. Rome: FAO.
- Food and Agriculture Organisation of the United Nations (FAO). 2000b. Tonga. Resources. In *FAO Workshop Data Collection for the Pacific Region (Forest Resources Assessment - WP 51)*. Retrieved from: http://www.fao.org/docrep/006/ad672e/ad672e17.htm#P13935_495397. Rome: FAO.
- Food and Agriculture Organisation of the United Nations (FAO). 2010. *Global Forest Resources Assessment 2010 Country Report Tonga*. Rome: FAO.
- Food and Agriculture Organisation of the United Nations (FAO). 2012. *The State of World Fisheries and Aquaculture*. Rome: FAO.
- Gassel M., Harwani S., Park J.-S. and Jahn A. 2013. Detection of Nonylphenol and Persistent Organic

State of Conservation in Tonga

- Pollutants in Fish from the North Pacific Central Gyre. *Marine Pollution Bulletin* 73:231-242.
- Gillett R. 2009. Fisheries in the Economies of Pacific Island Countries and Territories. Pacific Studies Series, Asian Development Bank, World Bank, Forum Fisheries Agency, Secretariat of the Pacific Community, and Australian Agency for International Development.
- Gillett R. 2011. Fisheries of the Pacific Islands: Regional and National Information. Bangkok, Thailand: FAO Regional Office for Asia and the Pacific. RAP Publication 2011/01.290.
- Gillett R., Cusack P., Pintz W., Preston G., Kuemlengan B., Lightfoot C., Walton H. and James D. 1998. Tonga Fisheries Sector Review, Volume I: Main Report of the Consultants. Food and Agriculture Organization of the United Nations and Australian Agency for International Development, 132 pages.
- Gillett, R. and W. Moy. 2006. Spearfishing in the Pacific Islands: Current Status and Management Issues. Rome: FAO.
- Government of Tonga. 2010. Fourth report: review of Tonga National Biodiversity Strategy and Action Plan, Nuku'alofa:Ministry of Environment and Climate Change, Kingdom of Tonga, 157p. <http://www.sprep.org/att/IRC/eCOPIES/Countries/Tonga/63.pdf>
- Harley S.J., Berger A.M., Pilling G.M., Davies N. and Hampton J. 2012. Evaluation of Stock Status of South Pacific Albacore, Bigeye, Skipjack and Yellowfin Tunas and Southwest Pacific Striped Marlin against Potential Limit RPs. MOW1-IP-04. WCPFC Management Objectives Workshop report.
- Hay R. 1985. Bird Conservation in the Pacific Islands. SPREP Topic Review No. 25 (ICBP Study Report No. 7). Noumea, New Caledonia: South Pacific Commission. (Cambridge, UK: IBCP).
- Herr D. and Galland G.R. 2009. The Ocean and Climate Change. Tools and Guidelines for Action. Gland, Switzerland: IUCN.
- InforMEA. 2014. United Nations Information Portal on Multilateral Environmental Agreements (MEAs). Integrated Biodiversity Assessment Tool (IBAT). 2013. Protected Area and Key Biodiversity Area data downloaded from the Integrated Biodiversity Assessment Tool (IBAT) (<http://www.ibatforbusiness.org>). Provided by BirdLife International, Conservation International, IUCN and UNEP-WCMC. Please contact ibat@birdlife.org for further information.
- International Programme on the State of the Ocean. 2013. The State of the Ocean 2013: Perils, Prognoses and Proposals. Gland, Switzerland: IUCN.
- International Union for Conservation of Nature (IUCN). 2013. IUCN Red List of Threatened Species. Gland, Switzerland: IUCN.
- Lautaha T. and Cohen P. 2004. Sampling of Coolers Arriving on Ferries. Ministry of Fisheries, Tonga, unpublished manuscript.
- McKenzie L.J. and Yoshida R.L. 2007. Seagrasses of the Fiji Islands: Review of Current Knowledge Seagrass Habitats in the Fiji Islands. Proceedings of a training workshop, Corpus Christi Teachers College, Laucala Bay, Suva, Fiji, 16th June 2007.
- Seagrass-Watch: Guidelines for Monitoring (Seagrass-Watch HQ, Cairns). 42pp.
- Miller C. 2007. Current Knowledge of Cetacean Threats, Diversity and Habitats in the Pacific Islands Region. Whale and Dolphin Conservation Society Australasia. 98p.
- Miller C. and Prideaux M. 2013. Proactive Cetacean Conservation in the Midst of "Data Deficiency": Knowledge of Cetacean Threats, Diversity and Habitat in the Pacific Islands Region. Progress of the Convention on Migratory Species Cetacean Agreement in the Pacific Islands. Second Meeting of the Signatories, Auckland, NZ 28–29 July 2009. UN Doc. UNEP/CMS/PIC2/Inf.6-01 (15 July 2009).
- Morgan A., Carlson J., Ford T., Sicheloff L., Hale L., Allen M.S. and Burgess G. 2009. Temporal and Spatial Distribution of Fish Bycatch in the US Atlantic Bottom Longline Shark Fishery. *Marine Fisheries Review* 72:34-38.
- Olavarría C., Poole M.M., Hauser N.N., Garrigue C., Caballero S., Brasseur M., Martien K., Russell K., Oremus M., Dodemont R., Florez-Gonzalez L., Capella J., Rosenbaum H., Moro D., Jenner C., Jenner M.-N., Bannister J.J. and Baker C.S. 2003. Population differentiation of humpback whales

State of Conservation in Tonga

- from far Polynesia (Group F breeding grounds) based on mitochondrial DNA sequences. IWC Science Document SH/55/SH11.
- Pacific Islands Legal Information Institute (PACLI). 2013. Available at www.pacii.org.
- Petelo A., Matoto S. and Gillett R. 1995. The Case for Community-Based Fisheries Management in Tonga. Background Paper 61, Workshop on the Management of Pacific Island Inshore Fisheries, South Pacific Commission, Noumea.
- Pitcher T.J. and Cheung W.W.L. 2013. Fisheries: Hope or Despair. *Marine Pollution Bulletin* 74:505-516.
- Pratchett M.S., Munday P.L., Graham N.A.J., Kronen M., Pinca S., Friedman K., Brewer T.D., Bell J.D., Wilson S.K., Cinner J.E., Kinch J.P., Lawton R.J., Williams A.J., Chapman L., Magron F. and Webb A. 2011. Vulnerability of Coastal Fisheries in the Tropical Pacific to Climate Change. In: Bell J.D., Johnson J.E. and Hobday A.J. (eds). *Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change*, p. 493–576. Noumea, New Caledonia: Secretariat of the Pacific Community.
- Preston N. 1989. Tonga Country Report. Department of Environment, Tonga.
- Ramsar Wetlands. undated. Ramsar Wetlands - Country Profile Tonga. http://ramsar.wetlands.org/Portals/15/Kingdom_of_Tonga.pdf.
- Rogers A.D. and Laffoley D. 2013. Introduction to the Special Issue; Interactions between Stresses, Impacts and Some Potential Solutions. Synthesis papers from the International Programme on the State of the Ocean 2011 and 2012 workshops. *Marine Pollution Bulletin* 74:491-494.
- Scott D.A. 1993. Kingdom of Tonga. In: A Directory of Wetlands in Oceania. International Waterfowl and Wetlands Research Bureau (IWRB), Slimbridge, U.K.
- Seagrass Recovery. 2013. Seagrass database, 5858 Central Ave., Suite A, St Petersburg, FL33707, USA <http://www.seagrassrecovery.com/seagrass/seagrasses/>.
- Secretariat of the Pacific Regional Environment programme (SPREP). 2007. Secretariat of the Pacific Regional Environment programme: Pacific Islands Regional Marine Species Programme 2008-2012. Apia, Samoa: SPREP. 48p.
- Secretariat of the Pacific Regional Environmental Programme (SPREP). 2013. Pacific Environment Information Network (PEIN): Country Profiles- Tonga. Apia, Samoa: SPREP.
- Shunsuke Y. and Hoifua A. 2012. Mangroves Report 2: Distribution of Mangroves on the Island of Tongatapu. Palaki A. and McPherson K. (eds.) Ministry of Environment and Climate Change, Government of Tonga, PO Box 917, Nukualofa, Tonga.
- Siedel H. and Lal P.N. 2010. Economic Value of the Pacific Ocean to the Pacific Island Countries and Territories. IUCN Oceania, July 2010.
- Spalding M., Kainuma M. and Collins L. 2010. World Atlas of Mangroves. Earthscan.
- SPWRC. 2004. Current State of Knowledge of Cetacean Threats, Diversity, and Habitats in the Pacific Islands Region. Report of the fifth annual meeting of the South Pacific Whale Consortium. 89. Research Consortium, 2-6 April 2004, Byron Bay, NSW, Australia.
- Stattersfield A., Crosby M.J., Long A.J. and Wege D.C. 1998. Endemic Bird Areas of the World: Priorities for Biodiversity Conservation. Cambridge, UK: BirdLife International.
- Thaman R.R. 2008. Atolls – The “Biodiversity Cool Spots” vs “Hot Spots”: A Critical New Focus for Research and Conservation. *Micronesia* 40:33-61.
- Tuiwawa M.V., Tuiwawa S.H. and Skelton P.A. 2013. A Field Guide to the Mangrove and Seagrass Species of Fiji. Suva, Fiji: University of the South Pacific.
- Wallace B.P., DiMatteo A.D., Bolten A.B., Chaloupka M.Y., Hutchinson B.J., Abreu-Grobois F.A., Mortimer J.A., Seminoff J.A., Amorocho D., Bjørndal K.A., Bourjea J., Bowen B.W., Dueñas R.B., Casale P., Choudhury B.C., Costa A., Dutton P.H., Fallabrino A., Finkbeiner E.M., Girard A., Girardot M., Hamann M., Hurley B.J., López-Mendilaharsu M., Marcovaldi M.A., Musick J.A., Nel R., Pilcher N.J., Troëng S., Witherington B. and Mast R.B. 2011. Global Conservation Priorities for Marine Turtles. *PLoS ONE* 6:e24510.
- Waycott M., McKenzie L.J., Mellors J.E., Ellison J.C., Sheaves M.T., Collier C., Schwarz A.M., Webb A., Johnson J.E. and Payri C.E. 2011. Vulnerability of Mangroves, Seagrasses and Intertidal Flats in the Tropical Pacific to Climate Change. In: Bell J.D., Johnson J.E., Hobday A.J. (Eds.) *Vulnerability*

State of Conservation in Tonga

of Tropical Pacific Fisheries and Aquaculture to Climate Change. Noumea, New Caledonia: Secretariat of the Pacific Community.

Western and Central Pacific Fisheries Commission (WCPFC). 2013. Summary Report. Scientific Committee, Ninth Regular Session, Western and Central Pacific Fisheries Commission, Pohnpei.

Wilkinson C. 2008. Status of Coral Reefs of the World. Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre, Townsville, Australia. Global Coral Reef Monitoring Network.

World Database on Protected Areas (WDPA). 2013. Protected Planet.

DRAFT

State of Conservation in Tonga

Appendix A: International agreements Tonga

MEA	Protocol	Regional Agreement	National Policy	National Strategy and/or Action Plan	National Legislation	Subsidiary Legislation
CBD Acceded 19.05.1998	Cartagena Protocol Acceded 18.09.2003	Pacific Islands Cetaceans MOU, Niue Convention, Fish Stocks Convention, South Pacific Forum Fisheries Convention	<p>Aquaculture Commodity Development Plan 2010–2014, Climate Change Policy 2006, Disaster Risk Management and Climate Change Adaptation National Action Plan, Japan Technical Cooperation Project for promotion of regional waste initiative on Solid waste Management in Pacific Island Countries, Joint Country Strategy 2009–2013 in support of Tonga’s Strategic Development Plan 9 2009–2013, Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management 2010-2015, Marine Aquarium Fishery Management Plan</p> <p>MESCAL, National Infrastructure Investment Plan (NIIP), National Strategic Planning Framework (NSPF) 2011–2014, National Forest Policy (2009), National Disaster Management Plan 2007 PROCFish, POWPA Tonga Environmental Planning and Management Strengthening Project (TEMPP) Tonga National Tuna Fisheries Management Plan (2012–2015), Tonga Sustainable Land Management (SLM) Project</p>	NBSAP 2006	<p>Aquaculture Management Act, Birds and Fish Preservation Act, Environmental Impact Assessment Act, Environment Management Act, Fisheries Management Act, Forests Act, Marine Pollution Prevention Act, Park and Reserves Act, Waste Management Act</p>	<p>Aquaculture Regulations,</p> <p>Environmental Impact Assessment Regulations, Fisheries Regulations, Fisheries Management (Conservation) (Amendment) Regulations 2013, Forest Produce Regulations, Land Timber Regulations Land (Removal of Sand) Regulations, Land (Quarry) Regulations, Petroleum Mining Regulations</p>

State of Conservation in Tonga

MEA	Protocol	Regional Agreement	National Policy	National Strategy and/or Action Plan	National Legislation	Subsidiary Legislation
UNCCD				NBSAP 2006	Biosafety Act, Environment Management Act, Environmental Impact Assessment Act Environmental Impact Assessment Regulations Land Act Emergency Management Act 2007	Environmental Impact Assessment Regulations, Fisheries Regulations 2013, Forest Produce Regulations, Land Timber Regulations, Land (Removal of Sand) Regulations, Land (Quarry) Regulations
Acceded 25.09.1998						

State of Conservation in Tonga

MEA	Protocol	Regional Agreement	National Policy	National Strategy and/or Action Plan	National Legislation	Subsidiary Legislation
WHC Acceptance 03.06.200				NBSAP 2006	Polynesian Heritage Trust Act, Preservation of Objects of Archaeological Interest Act, Environment Management Act 2010	EIA Regulations
CMS MOU Signatory on Pacific Island Cetaceans. Not a Party to CMS						
UNFCCC Acceded 20.07.1998	Kyoto Protocol Acceded 14.01. 2008			NBSAP	Environment Management Act 2010, Environmental Impact Assessment Act 2003, Environmental Impact Assessment Regulations, Forests Act, Forest Produce Regulations, Hazardous Wastes and Chemicals Act, Waste Management Act, Ozone Layer Protection Act	Forest Produce Regulations, Land Timber Regulations, Petroleum Mining Regulations, EIA Regulations

State of Conservation in Tonga

MEA	Protocol	Regional Agreement	National Policy	National Strategy and/or Action Plan	National Legislation	Subsidiary Legislation
UNCLOS						
Acceded 02.08.1995						
Provisions relating to the conservation and management of straddling fish stocks and highly migratory fish stocks					Continental Shelf Act Cap 63, Bird and Fish Preservation Act 1915	Fisheries (Conservation and Management) Regulations 1994
31.07.1996						

State of Conservation in Tonga

Appendix B: Governance of terrestrial and marine ecosystems in Tonga

Institutional Arrangement	Framework that sets up the Institutional Arrangement	Function of the Institutional Arrangement and Status	Brief Comments/Status
Special Management Area	Section 13(1) of the Fisheries Management Act 2002	Established for the purposes of coastal community management, application of certain conservation and management measures, subsistence fishing operations or other specified purpose	Current
Environment and Climate Change Committee	Part IV Section 13 of the Environment Management Act	To work towards achieving the objects of the Environment Management Act via functions as per delegated by the Minister with the consent of the Cabinet	Current
Environmental Assessment Committee	Section 13 of Part III of the Environmental Impact Assessment Act 2003	To review and assess proposed development plans and recommend to the determining authority, conditions to be attached to major projects and means by which they should be implemented in the EIA process	Current
Aquaculture Advisory Committee	Section 11 of Part II of the Aquaculture Management Act 2003	To advise the Minister on any matters relating to policy, aquaculture management and any related matters	Current
Fisheries Management Advisory Committee	Section 8 of Part II of the Fisheries Management Act 2002	To advise the Minister concerned on matters relating to the conservation, management, sustainable utilisation and development of fisheries in Tonga	Current
National Biosafety Advisory Committee	Section 5 (1) Part II of the Biosafety Act 2009	To devise and implement policies consistent with this Act and the Cartagena Protocol, monitor the development, use, handling and trans-boundary movement of living modified organisms, deal with matters related to the application of modern biotechnology and assess appropriate and cost-effective means for risk assessments to be undertaken in a scientifically sound manner	Current
Trust Board	Section 4 of the Polynesian Heritage Trust Act	To carry out and to perform the objects and purposes of the Trust and control, administer and manage the affairs of the Trust and the Trust Fund including its objects	Current
Waste Management Authority	Section 5 of Part III of the Waste Management Act	To establish, improve, maintain, operate and manage the collection and disposal of all waste in the Kingdom	Current
National Ozone Advisory Committee	Section 4 (1) of Part I of the Ozone Layer Protection Act 2010	To carry out functions under this Act and to advise the Minister concerned on matters pertaining to the ozone layer and Tonga's commitments concerning it	NA
National Marine Pollution Committee	Section 16 of Part III of the Marine Pollution Prevention Act 2002	To advise the Minister on matters pertaining to the development and maintenance of the National Marine Spill Contingency Plan (NATPLAN) other matters related to marine pollution as stated in the said Act	NA

Commented [E18]: Please ensure that the intended meaning has been maintained in this edit.

State of Conservation in Tonga

Appendix C: Participating in non-governmental conservation initiatives

Multi Environmental Agreement	Initiative name	Type (for example, NGO project or intergovernmental regional initiative, etc.)	Brief description (purpose, achievements, etc.)	Comments/Status
CBD	AFD/SPREP Regional Solid Waste Management Initiative	SPREP/AFD (Agence Française de Development)	To improve solid waste management in the Pacific islands, primarily through a structured programme of technical capacity building of Pacific islanders and through the development of a used oil management programme across Pacific island countries and territories	Began in 2011 and scheduled to end in 2015
CBD	Pacific Islands Framework for Action on Climate Change (PIFACC)	SPREP	To ensure Pacific island people build their capacity to be resilient to the risks and impacts of climate change	Began in 2006 and scheduled to end in 2015.
CBD	Community-Based Resource Management of Coastal Special Management Areas (SMAs)	Global Environment Facility (GEF)	To strengthen communities management capacity of their coastal SMAs and continue to enhance conservation and sustainable use of their coastal marine resources	Launched in 2011 – indefinite
CBD/UNFCCC, RAMSAR	Pacific Mangroves Initiative (PMI)	IUCN, SPREP, UNDP	To promote sustainable management of mangroves and associated coastal ecosystems	Now in form of MESCAL which ends in December 2013
CBD/RAMSAR	MESCAL	IUCN	To increase the climate-change resilience of Pacific Islanders as well as improve their livelihoods through selected capacity support in adaptive co-management and restoration of mangroves and associated ecosystems	Began in 2010 and scheduled to end in December 2013
CBD	Model Species Recovery Plan (MSRP)	Conservation International, Tonga Trust	To develop a Species Recovery Plan for Endangered Species of the <i>malau</i> (Polynesian Megapode) in Tonga	On-going
CDB	International Climate Change Adaptation Initiative (ICCAI)	AUSAID and the Australian Department of Climate Change and Energy Efficiency	To assist and enhance resilience, financing of priority adaptation measures, understanding and strengthening capacity of partner countries to adapt to impacts of climate change, assess key climate vulnerabilities and risks, formulate appropriate adaptation strategies and plans, and mainstream adaptation into decision-making	2008–2013
CBD	University of the South Pacific-EU Global Climate Change Alliance project	USP and European Union	Focus on helping the most vulnerable developing countries like Tonga to more effectively address the challenges associated with climate change and support their efforts to develop and implement adaptation and mitigation responses	On-going and indefinite
CBD	Coping with Climate Change in the Pacific Island Region Programme	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and SPC	To strengthen the capacities of Pacific member countries and regional organisations to cope with the impacts of climate change	2009–2015
CBD	Pacific Adaptation on Climate Change 2008–2013	Global Environment Facility (GEF), (AusAID) (UNDP, SPREP)	To strengthen Tonga's water resource management	2008–2013

State of Conservation in Tonga

Multi Environmental Agreement	Initiative name	Type (for example, NGO project, intergovernmental regional initiative, etc.)	Brief description (purpose, achievements, etc.)	Comments/Status
CBD	South Pacific Sea Level and Climate Monitoring Project	AUSAID	To generate an accurate record of variance in long-term sea level for the Pacific region and provides information about the processes, scale and implications of sea-level rise and variability of extreme events on South Pacific communities, making sea-level data more readily available and usable to support management of coastal infrastructure and industries	Commenced in 1991 – current and indefinite
CBD	Disaster Preparedness: Coping Communities Initiative	Tonga Community Development Trust (TCDT) and NZ AID	To reduce the social, economic and environmental impacts of disasters on the Tongan communities and economy, promote the achievement of associated Millennium Development Goals and facilitate community self-organisation to prepare for and manage disasters and to build risk-reduction measures into daily development activities	Long-term
CBD	Red List of Threatened Species	IUCN	To help determine the conservation status and trends of species in Tonga and help identify species/ecosystems under threat; and assist in conservation planning and priority setting; and raise awareness of threatened species throughout Tonga	Indefinite
CBD, WHC, RAMSAR	Marine and Coastal Biodiversity Management in Pacific Island Countries MACBIO [4]	IUCN	To strengthen management capacity of MPAs and facilitate economic evaluations of coastal and marine resources	Launched in 2013 geared towards strengthening MPA management
CBD, CITES, WHC, RAMSAR	BIOPAMA	IUCN	To address threats to biodiversity, while reducing poverty in communities in and around protected areas	2012–2016
CBD	E-Waste Project - Waste Electrical and Electronic Equipment (WEEE)	Volunteers	To drive awareness on the importance of correct e-waste disposal, to encourage involvement in a collection program and to develop the framework for managing incoming electronics to the Kingdom of Tonga	On-going
CBD	Vava'u Turtle Monitoring Program	Vava'u Environmental Protection Association (VEPA)	To address the loss of these traditional practices and to use proven community-led models from Papua New Guinea and Vanuatu to develop capacity within community environmental leaders with a focus on turtle conservation and education	On-going

State of Conservation in Tonga

CBD	Pacific Adaptation to Climate Change Project	UNDP, SPREP	To reduce vulnerability and increase adaptive capacity, of communities equally, to the adverse effects of climate change in key development sectors, including coastal and water management, food security and water resource management	Started 2009–2013
-----	--	-------------	--	-------------------

Appendix D: How key threats to habitat are addressed in Tonga

Threats	Legal Framework	Institutional Arrangements	Strategy/Plans/Comments
Land use and land-use change	<p>There is no legislation specific to Land Use Planning (LUP)</p> <p>Other pieces of legislation related to land-use planning are: Land Act, Environment Management Act 2010, Environmental Impact Assessment Act 2003, Environmental Impact Assessment Regulations 2010, Waste Management Act 2005, Parks and Reserves Act, Forest Act</p>	<p>Legislation established the institutional framework that governs implementing legislation and mechanisms that activate core LUP activities and strategies.</p> <p>The Planning and Urban Unit of the Ministry of Lands and Surveys and Natural Resources is responsible for planning and coordination of urban developments.</p> <p>The Ministry of Works is responsible for issuing building permits with approvals from the Department of Health, the Ministry of Land and the Fire Department.</p> <p>The Environment Dept. is responsible for assessing the EIA, water connections with the Tonga Water Board.</p>	<p>NBSAP, Strategic Development Plan 8, Urban Planning Management System, Integrated Urban Infrastructure Development Sector Plan (IUDSP), National Forest Policy, Tonga Sustainable Land Management (SLM) Project.</p> <p>Lack of spatial planning legislation, policy and limited experienced staff and resources have prevented the Planning Unit from providing effective and efficient urban planning and management.</p> <p>Needed is up-to-date information, the use of planning tools such as GIS and remote sensing, supportive legislation and an inclusive planning process that promotes a multidisciplinary approach and provides for public consultation and input.</p>
Environmental impact of developments and activities	Legislation specific to Environment Impact Assessment are the EIA Act and the EIA Regulations	The Ministry of Environment is responsible for regulating the Environment Management and the EIA Act and Regulations, including the overseeing of the EIA process for any development proposals in Tonga.	NBSAP, Tonga Strategic Planning Framework 2011–2014 (TSPF) Tonga Environment Planning and Management Strengthening Project, National Strategic Development Framework 2009–2014.

State of Conservation in Tonga

	<p>The primary legislation related to EIA is the Environment Management Act 2010</p>	<p>The National Environment Coordinating Committee (NECC) is the advisory body for all environmental projects including climate change. It also serves as the mechanism to coordinate climate change-related issues at both the policy and technical levels. The committee is chaired by the Minister of Environment and Climate Change.</p>	<p>Strategy 22 of the TSPF advocates Ensuring sustainable use of the environment by enforcing EIAs.</p> <p>Several major projects have undergone the EIA process, namely the Vuna Wharf Project and Tonga Naval Base Rehabilitation Work.</p>
--	--	--	---

Threats	Legal Framework	Institutional Arrangements	Strategy/Plans/Comments
<p>Pollution and waste</p>	<p>The Waste Management Act 2005 is the relevant legislation governing waste management and pollution control</p> <p>Other related legislations include the Environment Management Act EIA Act, EIA Regulations, and Hazardous Wastes and Chemicals Act 2010. Health Services Act, Marine Pollution Prevention Act, Ozone Layer Protection Act 2010, Public Health Act</p>	<p>The Ministry of Health is the approved Authority for all areas of Tonga other than the island of Tongatapu, until waste management service areas are declared for those areas pursuant to the Waste Management Act.</p> <p>A approved Waste Authority may enter into contractual arrangements for the provision of services necessary to discharge its functions and to perform its waste management activities, including activities related to:</p> <p>(a) the management and operation of waste dump sites and approved waste dumps, waste storage and treatment facilities; and (b) the collection and transportation of wastes.</p>	<p>NBSAP, Japan Technical cooperation Project for promotion of regional waste Initiative on Solid Waste Management in Pacific Island Countries, National Infrastructure Investment Plan 2013 (NIIP).</p> <p>Despite the landfill in Tapuhia, Nukualofa, pollution remains a problem largely arising from increasing, improper solid waste disposal and random waste disposal by seagoing vessels. Littering and indiscriminate dumping of solid waste are major concerns in urban areas. Beaches, vacant land and roadsides have become dumping grounds in the main.</p> <p>The use of pesticides and weed-killing chemicals is a common practice in agriculture and is affecting groundwater. Collectively, these pollutants endanger flora, fauna and the livelihood of the local community.</p>
<p>Deforestation and mining</p>	<p>There is no legislation specific to deforestation and mining</p> <p>Related legislation include the Minerals Act Marine Pollution Prevention Act 2002 EIA Act, EIA Regulations 2010 Environment Management Act 2010 Forests Act</p>	<p>The Ministry of Lands, Survey and Natural Resources is responsible for issuing of prospecting and exploration licenses.</p>	<p>NBSAP, Tonga Strategic Planning Framework 2011–2014, MESCAL, National Forest Policy 2009 Joint Country Strategy 2009–2013 in support of Tonga’s Strategic Development Plan 9 [2009–201], POWPA, Tonga Sustainable Land Management Project, Tonga Environment Planning and Management Strengthening Project.</p> <p>Several exploration licenses on Deep Sea have been granted. Strategy 6 of the Tonga Strategic Planning Framework 2011–2014 recognises the importance of deep-sea mining.</p>

Commented [E19]: Please complete this date range.

State of Conservation in Tonga

	<p>Forest Produce Regulations, Land Act Petroleum Mining Act [Cap 134]</p> <p>Petroleum Mining Regulations. Land Timber Regulations [Cap 132B]. Petroleum Mining Regulations [1]</p>	<p>The Environment Assessment Committee prepares Assessment Review Report and recommendations to the determining authority whose formation was approved by Cabinet and comes under Ministry of Environment and Climate Change.</p>	<p>Increased/intensified land-use, and decreasing availability of land and increased population growths have worsened deforestation.</p>
--	--	--	--

Threats	Legal Framework	Institutional Arrangements	Strategy/Plans/Comments
Climate change and disaster impacts	EIA Act, EIA Regulations 2010 Environment Management Act 2010 Forests Act Forest Produce Regulations, Land Act, Ozone Layer Protection Act 2010 Waste Management Act 2005. Emergency Management Act 2007	<p>The National Emergency Management Office (NEMO) was established under the Emergency Management Act 2007.</p> <p>The National Emergency Management Committee is also established under the Emergency Management Act designed to coordinate effective emergency management and emergency response in communities before, during and after the impact of an event.</p>	<p>NBSAP, Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management 2010-2011, Disaster Risk Management and Climate Change Adaptation Action Plan, Tonga Environmental Planning and Management Strengthening Project, National Strategic Development Framework 2009–2014, the Pacific Islands Framework of Action on Climate Change 2006–2015, the Pacific Disaster Risk Reduction and Disaster Management Framework for Action 2005–2015, 2009–2014.</p> <p>Tonga is highly vulnerable to volcanic and tsunami hazards because of its geographical location and geological constitution. The island group is situated at the subduction zone of the Australian and the Pacific tectonic plates and within the Ring of Fire where intense seismic activities occur. It is about 200 kilometres to the west of the Tonga Trench, which is a potential source of tsunami, worsened by the country's generally low and flat average latitude.</p>

State of Conservation in Tonga

		Standing Committee on Climate Change and the Environment is the Parliament of Tonga's Committee that oversees issues related to climate change, the environment and sustainable development.	
--	--	--	--

Appendix E: Legal frameworks, institutional arrangements and strategies in place related to species conservation

Threats	Legal Framework	Institutional Arrangements,	Strategy/Plans/Comments
Endangered species	<p>Tonga is not a Party to the CITES convention. There are no specific legislations dealing with endangered species in Tonga.</p> <p>However there are primary pieces of legislation related to endangered species, such as Birds and Fish Preservation Act, Birds and Fish Preservation (Amendment) Act Environment Management Act 2010 EIA Act, EIA Regulations Fisheries Management (Conservation) Regulations and Fisheries Regulations.</p>	<p>The Ministry responsible for fisheries regulates licensing, permits for fishing and related activity including authorisation of activities in Special Management Areas.</p> <p>Extraction is prohibited in protected areas unless consent is provided for by the Prime Minister.</p> <p>Minister of Agriculture, Forests and Fisheries may with Cabinet's consent permit any person to collect specimens subject to such conditions as he may impose of any or all protected birds or fishes.</p>	<p>NBSAP, MESCAL, POWPA, Tonga Environment Planning and Management Strengthening Project (TEMP), Vava'u Environmental Protection Association (VEPA, Tongan Development Trust and other NGOs play a vital role in the conservation and protection work of species.</p> <p>The effects of the absence of Tonga's commitment to CITES are lessened by the initiatives and activities carried out by organisations like SPREP.</p> <p>Threats to endangered species arise from habitat loss, habitat degradation over-exploitation, pollution, diseases, non-compliance of laws, etc.</p>
Invasive species	<p>There is no Legislation specific to invasive species. However, there are legislations related to invasive species, such as the Biosafety Act, Birds and Fish Preservation Act Environment Management Act, EIA Act, EIA Regulations, Noxious Weeds Act, Rhinoceros</p>	<p>The Director of Agriculture, Forests and Fisheries regulates fumigation of any plant, tree, shrub or vegetable or any articles manufactured, etc., from any South Pacific island.</p>	<p>NBSAP, Pacific Invasives Initiative, Tonga Strategic Development Framework (TSDF) 2011–2014, Tonga Environmental Planning and management Strengthening Project.</p>

State of Conservation in Tonga

	Beetle Act, Fisheries Regulations, Forests Act, Plant Quarantine Act	The Minister within Ministries responsible for Ministry of Agriculture Forests and Fisheries may proclaim a plant to be a noxious weed from time to time.	Tonga has approximately 85 invasive species Tonga's small landmass makes its fauna and flora particularly vulnerable to the damages caused by invasive species. Wiping them out would impose a heavy financial burden on the country. Weekly shipping traffic is high in Tonga with about 500 yachts arriving in the Port of Refuge harbour in Vava'u every year. The lack of effective regulation of the dumping of ballast water or waste and of effective border control and Port entry controls increase the risks of introduction of invasive species into Tonga.
--	--	---	---

Threats	Legal Framework	Institutional Arrangements,	Strategy/Plans/Comments
Loss of genetic resources	There is no legislation specifically on genetic resources; however, there are other pieces of legislation relating to this issue, such as Birds and Fish Preservation Act Parks and Reserves Act, Forests Act Fisheries Management Act Diseases of Plants Regulations, Fisheries Management Act, Aquaculture Management Act 2003	<p>The core function of the Fisheries Division involves conserving, managing, developing and sustainable utilisation of the Kingdom's aquatic resources to ensure food security and improve the social and economic well-being of the people of Tonga.</p> <p>The Secretariat of the Pacific Community and Australian Centre for International Agricultural Research (ACIAR) and other organisations play a vital role in the development of Tonga's genetic resource.</p> <p>The Ministry concerned with Agriculture, Fisheries and forestry are at the forefront of the Government's genetic resource development.</p>	<p>NBSAP, International Network of Edible Aroids (INEA), Pacific Agricultural Plant Genetic Resources Network (PAPGREN), ACIAR Project, Global Crop Diversity Trust Project.</p> <p>Apart from the research facility in Vaini in Tongatapu, Tonga generally lacks proper policy, laws, scientific expertise, resources and adequate facilities to allow effective research and benefits of its genetic resources.</p> <p>Several overseas companies like the Indigenous Pharmaceuticals Incorporated look to develop local medicine from Tonga's genetic resources; however, Tonga must tread with caution particularly when dealing with patenting of items potentially worth large sums in the commercial market.</p>

State of Conservation in Tonga

			Strengthened protection and preservation provides for better resource, crop and food security.
Biosafety	Biosafety Act 2009	The National Biosafety Advisory Committee is the Competent National Authority for all matters arising from the Cartagena Protocol and its implementation including the monitoring, development, use, handling and trans-boundary movement of living modified organisms within Tonga, including matters regarding modern biotechnology, etc.	<p>NBSAP, Tonga Fruit Tree project, The Tonga–SPC JCS 2009–2013.</p> <p>Tonga lacks adequate policies resources, expertise to facilitate work relating to working with pathogens and toxins or its containment.</p> <p>There is a clearly lack of geneticists or genetic engineers and others of biotechnological specialists.</p> <p>Tonga also lacks containment equipment or expertise, which fortunately for the country has not been required to date.</p> <p>Resources, training, laws and policies must be drawn up to cater for this vacuum.</p>

DRAFT