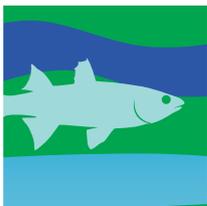
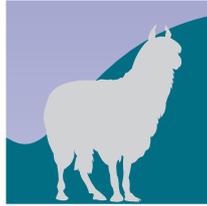


COUNTRY REPORTS



THE STATE OF **TONGA'S**
BIODIVERSITY FOR FOOD AND
AGRICULTURE

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FINAL DRAFT, SOW BIODIVERSITY FOR FOOD AND AGRICULTURE

COUNTRY REPORTS: TONGA

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1.0 Assessment and monitoring of biodiversity for food and agriculture

General context:

Geography

The Kingdom of Tonga is an archipelago of 172 coral and volcanic islands, of which 36 islands are inhabited, spread over 360,000 km² in the South Pacific Ocean. Most of the islands are very small in size, ranging from those of only a few hectares, to Tongatapu, the largest island, with an area of 265 km². The total land area is 747 km², made up of the four main island groups of Tongatapu and Eua (370 km), Ha'apai (119 km²), Vava'u (143 km²) and the two Niua's (71 km²).

Population

The 2011 census recorded the total population for Tonga of 103,252. There was an increase of 1.2% (1,261 people) compared with the population of 101,991 in 2006. The 2011 census counted 51,979 males and 51,273 females, representing a gender ratio of 101 males to 100 females. The population of Tongatapu was 75,416, which constitutes 73% of Tonga's total population, while the remaining 27% was spread throughout the outer-island groups of Vava'u (14.4%), Ha'apai (6.4%), Eua (4.8%) and the Niua's (1.2%).

The Agriculture sector in the Tongan economy

Contribution to Tonga's total Gross Domestic Product (GDP)

Agriculture continues to be the predominant economic activity although its relative importance has dwindled in recent years. The sector's contribution to GDP declined from 26% in 2004/5 to about 19% in 2009/10; it then declined further to 18% in 2013/14. Public administration, construction and manufacturing are other key sectors contributing to Tonga's total GDP.

Agriculture sector annual growth

The agriculture sector experienced strong growth of 4.7% in 2013/14; with 1.5% directed toward exports while 3.2% were for the domestic market. Growth is expected to slow down in 2014/15 due to the effect of severe drought in the second half of 2014. Agriculture production in the Ha'apai region was also severely damaged by cyclone Ian in early 2014. It was estimated that 90% of all crops, fruit trees and forestry was destroyed by the cyclone. Another cyclone hit Tonga in Feb 2016 and although it was not as devastating as cyclone Ian, food security was affected, particularly in the island of Vava'u.

Agriculture/Fisheries exports

Since 2009/2010, agricultural exports have steadily increased. In that year, about 90% of the country's exports consisted of agricultural and fishery products, with a value estimated at \$14 million pa'anga (US\$6.5mn). This growth in total agricultural exports was due to an increase in exports of non-squash commodities - particularly root crops, coconuts, watermelons and kava. Squash exports declined by 12% in 2013/14, reflecting the withdrawal of a major exporter from the market.

Fish dominated Tonga's exports in 2013/2014, contributing 22% of domestic exports, followed by crustaceans and other aquatic invertebrates at 20%, while root crops contributed 18%, kava 9%, and

squash pumpkins 7%. Together these products made up 76% of domestic exports. Fish exports declined in 2013/14 due to reductions in major fisheries exports. Tuna exports fell by 49% as the number of foreign fishing vessels operating in Tonga declined from 24 to 8. It is expected that in 2014/15, fish exports will pick up due mainly to anticipated increases in tuna exports. Exports of tuna, which constitutes 40% of fisheries exports, more than doubled in the first half of 2014/15. Seaweed export increased by 39% in the first half of 2014/15. In addition some high value fisheries products such as live hard coral and live fish are anticipated to experience positive growth - up by 25% and 29% respectively in 2015.

Agriculture domestic production

In 2013-2014, agricultural production for the domestic market declined by 10%. This decline was mainly due to a decrease in sales of root crops. However, survey data from MAFFF indicated that roadside sales increased by 44%. The increase in volumes of roadside sales was strong enough to offset the decline in the volume of Talamahu Market (Nuku'alofa) sales. A significant share of agricultural production is for subsistence.

Forestry

Forest ecosystems continue to provide the local communities with relatively small but increasing economic benefits. According to the 5th National Biodiversity Strategy Action Plan (NBSAP) report, the contribution of Forestry towards national Gross Domestic Product (GDP) has increased almost twofold since the fourth NBSAP. Much of the increase has resulted from export of sandalwoods (*Santalum yasi*). The most prominent forest-product development agency is the operation of the Tonga Forest Product Limited (TFP). Although small scales portable sawmill commenced operation in 2012, the trend in timber production has been steady in the past 10 years including the time when Tonga Timber Limited was operational (1995-2010). The timber annual throughput averages at 300 m³. This equates to 2-3 ha of plantation forest harvested annually or approximately 3% of annual timber import volume. The export of dried sandalwood, primarily to Chinese markets between 2007 and 2011 amounted to approx. 326,447 kg. Given an average local buying rate of T\$30 per kilogram, this injected some 9-10 million pa'anga (about US\$4.5mn) directly to the local communities.

Role of biodiversity for food and agriculture (BFA) in your country

Majority of the households in Tonga relies on agriculture as their main source of livelihood. As shown in the Table 1 below (taken from the National Agriculture Census 2015), the total percentage of households engaged in agriculture for the whole Kingdom was 86%. The proportion of households in the outer islands engaged in agriculture was higher with the highest percentage of 98% in Ha'apai Island. This reliance on agriculture demonstrates the importance of BFA to support agricultural productivity.

Table 1a: Households in Tonga reliant on agriculture

Islands	Total households in Tonga	Total Agriculture Active households/organizations	Total Agriculture Active households	Total Agriculture Active Organization
TONGA	16,122	13,944	13,936 (86%)	8 out of 10
Tongatapu	11,914	9,963	9,958 (89%)	5 out of 6
Vava'u	2,360	2,191	2,190 (93%)	1 out of 1
Ha'apai	934	916	915 (98%)	1 out of 1

'Eua	644	620	619 (96%)	1
Niuas	270	254	254 (94)	0

The total number of agricultural (including fisheries) active households by type of activity for cropping, livestock and fisheries is shown below in Tables 1b, 1c and 1d:

Table 1b: Number of households involved in cropping

Islands	Cropping			
	Total	Subsistence	Semi subsistence	Commercial
TONGA	10,296	3,849	6,358	89
Tongatapu	6,677	2,331	4,272	74
Vava'u	2,006	1,052	946	8
Ha'apai	824	280	543	1
'Eua	514	91	421	2
Niuas	275	95	176	4

Table 1c: Number of households involved in livestock

Islands	Livestock			
	Total	Subsistence	Semi subsistence	Commercial
TONGA	12,255	3,396	8,530	329
Tongatapu	7,289	2,430	4,613	246
Vava'u	2,834	584	2,209	41
Ha'apai	1,075	208	846	21
'Eua	827	139	668	20
Niuas	230	35	194	1

Table 1d: Number of households involved in fisheries

Islands	Fisheries			
	Total	Subsistence	Semi subsistence	Commercial
TONGA	2,360	1,267	997	96
Tongatapu	980	376	520	84
Vava'u	835	590	236	9
Ha'apai	317	148	165	3
'Eua	69	28	41	0
Niuas	159	124	35	0

A socioeconomic study, 'Natural resources and livelihoods in Vava'u to identify, describe and quantify the linkages between natural ecosystems and household livelihoods in the Vava'u Archipelago in Tonga, including the adjacent marine exclusive economic zone (EEZ)' was conducted by the IUCN Oceania Regional Office, in collaboration with SPREP and Coastal and Marine Advisers. The survey indicated that the full value of the human benefits of nature's goods and services is not often recognized and relationships between natural ecosystems and communities, households, and businesses are often poorly understood or taken for granted. Ecosystems provide a wide array of

benefits, such as food, shelter, treatment of human wastes, and facilitate or support recreational, spiritual, and cultural activities¹.

Of ecosystem services, forests contribute to protecting catchment areas, stabilizing erosion-prone slopes, minimizing surface run-off, sequestering and storing atmospheric carbon, regulating microclimates, and ensuring the continued recharging of underground and surface water sources for human consumption, agricultural crops, hydropower generation, and for supporting freshwater species and habitats. Bird and mammal fauna contribute to pollination processes, and seed dispersal for many native trees species.

Uncontrolled and illegal harvesting, as well as, encroachment are identified as common threats to biodiversity conservation in Tonga in the 5th NBSAP.

Table 2a Production systems present in Tonga

Sector	Code	Production system names	Present
Livestock	L1	Livestock grassland-based systems: Tropics ⁶	Yes
	L5	Livestock landless systems: Tropics	Yes
	L6	Livestock landless systems: Subtropics	
	L7	Livestock landless systems: Temperate	
	L8	Livestock landless systems: Boreal and /or highlands	
Forests	F1	Naturally regenerated forests: Tropics	Yes
	F5	Planted forests: Tropics	Yes
Aqua-culture & Fisheries	A1	Self-recruiting capture fisheries: Tropics	Yes
	A13	Non-fed aquaculture: Tropics	Yes
Crops	C1	Irrigated crops (rice) : Tropics	
	C9	Rainfed crops : Tropics	Yes
Mixed	M1	Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Tropics	Yes

Table 2b Production system present in the country

Code of Production System	Name of production system	Description
L1	Livestock grassland-based systems: Tropics	Commercial cattle production using large areas of land leased by private individuals, church groups and schools or land belonging to His Majesty and the nobility.
L5	Livestock landless systems: Tropics	These are livestock kept in pens such as pigs, chicken and ducks. While majority of the 110,310 pigs enumerated in 2015 Census are free range, there is an increasing number of pigs being kept in pens due to the national drive towards a clean, sustainable and

¹D:\Work\fa0\tonga\IUCN - Quantifying the value of key ecosystem services in Vava'u.htm

		healthy living environment. Free roaming pigs are very destructive, damage crops and destroy almost all the plants in the surrounding areas. In the 1970's, there was a small thriving export of wild ear mushrooms from Tonga, growing from logs in the bush. With the increase in pig population from the 1980's this export ceased as pigs disturb all the logs, turned around everyday and no chance for mushroom to grow. Chicken and ducks are also partly kept in pens but majority are free range.
F1	Naturally regenerated forests: Tropics	This land includes conservation areas such as the Eua National Park and Mount Talau National Park, uninhabited islands like Tofua and Kao and other protected and unallocated areas with an estimated land area of 6,457.7 ha in total. The Eua National Park is an important place where people gather many of their subsistence needs in terms of seasonal fruits like oranges, other foods like wild chicken, flying foxes, wild pigs, birds, coconut crabs, and non-food products such as firewood, posts and poles, flowers, leaves, barks and medicines.
F5	Planted forests: Tropics	There is only one plantation forest in Tonga which is in 'Eua Island. The total area of the plantation is 501.5 ha. This is mainly planted with Pine (<i>Pinus caribea</i>), with Mahogany, Teak and other introduced species. This forested area in Eua supports a water catchment area that supplies the water for the whole island of Eua.
A1	Self-recruiting capture fisheries: Tropics	A total of 2,360 households in Tonga were engaged in fishing activities in 2015. Reef finfish and tuna fishing activities with 386 households engaged in reef fishing, while 936 engaged in tuna fishing. Other very common fishing activities included shellfish, lobster and sea cucumber fishing.
A13	Non-fed aquaculture: Tropics	Aquaculture is very limited in Tonga with pearl culture, giant clam culture and seaweed culture. Recent introduction was a seaweed culture of <i>Kappaphycus</i> spp?
C9	Rainfed crops : Tropics	Crop production in Tonga is largely rainfed with a total agriculture land area of 66,406 acres. From the Census of 2015, 51% of this land is on fallow, 36% on annual crop, 5% perennial crop, 7 % pasture-cattle and horses; and 1% with livestock-pigs, goats and chicken. Out of the cropped area, a total of 10,296 household engaged in crop cultivation. The total cultivated land area was recorded at 57,713 acres. The main food crops cultivated are cassava, yam, Taro Futuna (<i>Xanthosoma sagittifolium</i>), Sweet Potato and Taro Tonga (<i>Colocasia esculenta</i>). The most cultivated perennial crops are Kava, Paper Mulberry (<i>Broussonetia papyrifera</i>), Vanilla and Pineapple.

M1	Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Tropics	Tonga’s farming system is still largely traditional and basically is a mixed or integrated system, called “ngoue tuifio”. This is integrated farming using annual, perennial and longer term crops such as sandalwood and fruit trees, as well as raising livestock on the same Farm. From the Census 2015, out of the 16,122 households in the census, 86 % or 13,944 are agriculture active households. 74% of these agriculture active households are cropping. 37% and 62% out of households cropping were subsistent and semi-subsistent growers respectively. Only 8% of the households were engaged in commercial cropping.
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1.2 State, trends and drivers of change of biodiversity for food and agriculture

Forest ecosystem: Forest ecosystems continue to provide the local communities with relatively small but increasing economic benefits. Since the fourth national report, the contribution of Forestry towards national Gross Domestic Product (GDP) increases almost twofold. There is relatively low plantation forest development which has positive benefits for ecosystem services, including contributing to water quality. However, there appears to be an increasing risk of pest and disease infestation of partially logged sites where merchantable logs are left to rot in the field. A return of the logging unit to complete the clear felling would disturb the naturally regenerated vegetation. Selective logging inside the declared watershed areas poses threat to the conservation of the main source of water for the island. Despite allowing of timber trees to mature, necessary silvicultural practices such as thinning, pruning and sanitation measures not carried out as desired. Public consultations highlighted a significant loss of cultural and medicinal plants.

In Vava’u, the conversion of lands on very steep slope for settlement and development is becoming a common practice. These areas have forests that provide supporting services for the protection of lagoon and marine resource from pollution. In Tongatapu, conversion or subdividing of agricultural land for residence and development has resulted in the clearance of small fragmented forest and important tree species and plant varieties.

The local indigenous coconut varieties are considered to be rare and only found on isolated small islands in the Ha’apai group. These native populations should be protected for conservation of local varieties.

Natural disaster, such as cyclones, tsunami, climate change and heavy mechanisation (Figure 9) are still the main cause of destruction for forest ecosystem and biodiversity. With increase in climate change impacts, there is a correspondent increase in the frequency of occurrence and the intensity of natural disaster.

Some exotic species introduced with good intention is becoming a concern in the conservation of forest ecosystem and biodiversity. *Cordia alliodora* (kotia) was introduced as timber species for plantation establishment on ‘Eua posed a major threat to the conservation of biodiversity at the

national park and in the adjacent remaining forest on the royal estate. The species regenerates profoundly and is spreading along the eastern boundary of the plantation with the national park. It has been reported that *Cordia* has started to intrude the national park area. Usually, with an opening in the canopy, the species will establish and eventually, over time, colonize the area.

The introduction of *Santalum album* for species trial has threatened the genetic conservation of the local species of *Santalum yasi* through hybridization and the overharvesting. The new hybrid has shown very good growth and performance. With the current rate of harvesting for export and the mass production of hybrid seedlings for planting, there is concern of local species becoming extinct if selected natural population is not protected. *Santalum yasi* is found only in Tonga and Fiji.

The encroachment of residential areas into forested land is a threat to forest ecosystems – particularly on the main island of Tongatapu

Agrobiodiversity: There is a reduction in variety of traditional crop species as you move further north from Tongatapu. This is due to the islands smallness and remoteness from Tongatapu. The variety of fruit trees are also decreased due to increase competition for land use, especially for commercial farming and population increase. Other threats identified include heavy dependency on machinery for cultivation, fertilisers and pesticides, and climate change and natural disasters. Tonga's limited genetic pool may lead to loss of traditional genetic materials that may have been endemic to Tonga. This could explain the poor diversity in our root crop species (tuber-base cultivars) in comparison to fruit trees (seed based cultivars).

The assessment of the species diversity in agriculture for the NBSAP report was conducted in four districts in each of Tongatapu ('Ahau, Popua, Vaini, Lapaha) and Vava'u (Tefisi, Neiafu, Ha'alaufuli and Pangaimotu) one each in Niuatoputapu and Niuafou'ou and one collectively in Ha'apai. The assessment showed that the main weakness is the limited size of the genepool for all crops. The following threats were identified:

- (a) The use of pesticide and fertilizer in agriculture which has increased dramatically since the production of squash for export in 1987
- (a) Extreme weather events such as droughts and cyclones
- (b) It is worth mentioning the threat from free range pigs in Tonga. A total of 110,310 pigs were enumerated in the 2015 Census (more than the human population of 103,252). These are mainly free roaming pigs and very destructive, destroying crops which includes food crops and almost all the underneath vegetation. It also causes so much soil erosion in Tonga. In the 1970's, there was a small thriving export of wild ear mushrooms from Tonga. With the explosion on the number of free range pig population in the 1980's, this export was also destroyed with pigs constantly turning the logs in the bush and leaving no chance for the mushroom to grow. No chance as well for many seeds and young seedlings to grow.

Marine ecosystems: The demand for marine resources has increased due to Tonga's growing population and change in dietary demands. Overexploitation and destructive fishing practices are still the major threats to the marine ecosystem although natural disasters (i.e. hurricanes & tsunamis, water temperatures variations, natural predators, etc.) may contribute. The 2011 Reefs at Risk Revisited analysis suggests that over a third of Tonga's coral reefs is threatened by overfishing

(moderate risk or higher), however lack of resource assessment is the key issue for the marine ecosystem.

The destructive fishing methods such as dynamite fishing, fish poisoning and using hookah and SCUBA diving are still ongoing activities even though regulatory wise, these fishing methods has been declared illegal practices under Fisheries Management Act 2002. The SCUBA and hookah under water using air apparatus boasted as other major threats for the reef fishes and sea cucumbers resources included giant clams' species (i.e. *Tridacnidae*). Pollution and eutrophication also affect Tonga's coastal waters and reefs (Anon, 2010).

Pollution and eutrophication also affect Tonga's coastal waters and reefs (Anon, 2010). Tonga does not have adequate sewerage systems in place and eutrophication has been reported, particularly around Nuku'alofa areas. In Fanga'uta lagoon on Tongatapu, urban runoff and eutrophication are the suspected causes for loss of hard corals, and the algal bloom reported in the year 2000. Runoff of agriculture fertilizers from plantations and sewage effluent are the major contributors to eutrophication. There are also concerns over wastes from boats and ships, with regular arrivals and departures of containerships and inter-island ferries. Pollution from solid waste is also an issue, especially in urban areas.

The overall trend of the marine biodiversity still unknown due to lack of baseline study but based on the export production for commercial marine species recorded at Fisheries Division database, it was clearly indicated of resources decline especially inshore fisheries resources (i.e. sea cucumber, aquarium production, etc.).

Mangrove ecosystems: The people of Tonga who settle along the coastal area of Fanga'uta lagoon are mostly the people who generated more income from mangroves such as cutting of mangrove for firewood at the market, making tie for tapa cloth and sell at the market, selling crabs and fishes at the market. Economic valuation on mangroves ecosystem was one of a component for Mangrove Ecosystem Climate Change Adaptation and Livelihoods (MESCAL) Project but it was not completed. The main threats to the Biodiversity at the lagoon, identified from previous studies and reports, were nutrients drifted down to the Lagoon from agricultural lands, chemicals from household usages, expansion of developments and urban areas to lagoon perimeters resulting in degradation of mangrove strips from clearing, overharvesting, waste dumping, land reclamation and storm-water drainage. Unsustainable stripping of the mangroves for tannins (a pigment that is used to make dyes) for the tapa making and medicine, and cutting the mangroves for firewood and building materials pose additional threats to the remaining mangroves in Tonga.

Invasive alien species: small Island ecosystems are extremely vulnerable to invasions. Several invasive species have been identified as threats to terrestrial biodiversity, for example, *Solanum torvum* and *Merremia peltata*. *Merremia peltata* (Fuemea) is covering lower and higher canopy plants in 'Eua

b) Indicate whether the country has any national information system in place on associated biodiversity and identify the most frequently monitored components of associated biodiversity –Not aware of any and yet to check from other Ministries.

The only baseline information that might assist in determining changes in the marine ecosystem is the landing catch and export production recorded by Fisheries Division database for the major commercial marine resources at Tongan coastal waters during this period (2010 – 2013).

- c) **List associated biodiversity species that are actively managed in production systems for the provision of ecosystem services in Table 2.**
- d) **Provide in Table 3 a list of wild food species known to be harvested, hunted, captured or gathered for food in your country. Indicate the change in state of the species over the last 10 years (strongly increasing (2), increasing (1), stable (0), decreasing (-1), or strongly decreasing (-2), or not known (NK)).**
- e) **If available, provide information on the proportion of the population in your country that uses wild food on a regular basis for food and nutrition.**

Information not available

- f) **Briefly summarize the state and trends of and the drivers of change affecting:**
 - Associated biodiversity : micro-organisms, invertebrates, vertebrates, plants
 - Ecosystem services : regulating, supporting
 - Wild food resources

The main drivers of change for the regulating and supporting ecosystem services, associated biodiversity and wild food resources are:

- Agricultural intensification which can result in (i) inappropriate land use and habitat destruction (forest and mangrove clearing); (ii) increased pesticide and fertilizer use; (iii) increase in mono-cropping leading to a decline in the biomass and/or quality of native/natural vegetation. Excessive use of pesticides and fertilizers risks pollution of the reefs – as revealed by the Reefs at Risk Revised analysis (2011)
- Invasive pests and diseases, for example, Merremia vine affecting forest quality;(c) Unsustainable use of resources –applies to fishing (and includes not just over-fishing but use of destructive practices) and also harvesting of wild foods
- Competition for land due increasing population – increase in new and existing urban settlements, as well as commercial enterprises
- Climate change through extreme weather events such as cyclones, floods, storm surges and changing temperature, moisture levels etc., affecting the life cycles, dissemination and balance of organisms.

Box 1: Describe one or two examples of countermeasures that have been taken in the country to reduce adverse effects of drivers on associated biodiversity, ecosystem services and/or wild foods. Counter measures in Tonga:

- National Forest Policy for Tonga, Dec 2009. This policy includes the protection of Eua Forest in support of the water catchment in 'Eua Island, among other associated benefits derived from Eua Forest. This water catchment is the main source of water supply for the whole island of Eua with a total household of 863, and a population of about 5,000.

- Tonga Code of Forest Practice, 2010 also established in Tonga and one specific for 'Eua Island, the "Code of Harvesting Practice for the 'Eua Forestry Plantations, 2000" was also available. – important guides to reduce negative impact of harvesting trees and ensure environmental protection from the harvest operation.

1.3 Needs and priorities

a) **Identify the country's main needs and priorities in terms of the state of biodiversity for food and agriculture, and in particular of associated biodiversity, wild foods and ecosystem services.** The guidelines refer you to:

(a) Major gaps in information and knowledge; *-limited publicity and information sharing, needs more community programmes on protection of biodiversity and associated biodiversity- needs increased awareness*

(b) Main capacity or resource limitations; *-limited capacity and finance to sustain implementation of relevant programmes; lack of data*

(c) Main policy and institutional constraints- *lack of specific policies and integration of these policies between and within Ministries and NGO Programmes. Needs more strategic integration and specific actions to protect biodiversity and associated biodiversity in Tonga; lack of capacity within institutions; agency responsibility - mandate*

(d) What are the actions required and what would be the priorities?

As associated biodiversity and ecosystem services cover all the different sectors – environment, water etc. you will need to liaise with colleagues in these sectors to get this information easily. The NBSAP reports might provide some information

With reference to wild foods:

(a) Major gaps in information and knowledge; *- lack of documentation and updated information, effective information sharing and understanding of its tangible and intangible values.*

(b) Main capacity or resource limitations; *- Lack of knowledge in the Government about wild foods and thereby not given particular attention to include in its strategic plan such as appropriate measures to continue its sustainable production and benefit sharing among the community who normally gather them/direct beneficiaries.*

(c) Main policy and institutional constraints- *Lack of policy on its management and mandate on whose responsibility is it.*

(d) What are the actions required and what would be the priorities. *Wild foods information should be included in the next Agricultural Census or HIES for Tonga. Government needs to look at policies to regulate and protect wild foods and its habitat/source aimed at its sustainable production, use and shared among the people in the communities.*

II. Sustainable use and conservation of biodiversity for food and agriculture

2.1 Sustainable use

Table 4 management and diversity based practices that support the maintenance and use of biodiversity for food and agriculture in production systems.

Common traditional practices in Tonga include crop rotations, appropriate timing of planting and densities, inter-cropping/companion planting to mitigate pest and diseases

Management practices supporting the use and conservation of biodiversity for food and agriculture	Description/examples of management practices	
Agroforestry (Mixed production system and Rainfed crops-Tropics)	Traditional farming system in Tonga is a form of agroforestry where food crops, perennial crops and other non-food crops are managed/and/or planted in an 8 acre farm, integrated together. This is practiced by 95 % of the total agriculture active households who are still practicing subsistence and semi-subsistence farming in Tonga. Only 5% of farmers in Tonga are commercial growers.	increase
Organic Agriculture (Mixed production system and Rainfed crops system-Tropics)	Vanilla Plantations of about 431 acres in Vava'u Islands are organically certified. This certification, above all, does not allow the use of synthetic pesticides that harms the environment and other associated biodiversity in the vanilla plantations. It promotes mulching using local materials such as coconut husk and other coconut products and organic materials from the farm. Organic vanilla plantations promote biodiversity and sustainable livelihoods for smallholder vanilla growers.	increase
Home Gardens (Mixed production system and Rainfed crops system, Tropics)	Home gardens are highly promoted in Tonga with the active promotion of healthy eating lifestyles through consumption of a variety of locally produced fruits and vegetables from the home gardens. From the last Census of 2015, a total of 2,888 home gardens or 409,698m ² of home gardens were recorded from the 16,122 households in the Census.	increase
Bush Fallowing or Shifting cultivation (Mixed production system and Rainfed crops system-Tropics)	Bush fallowing is a traditional practice in Tonga where after the cycle of food production is completed, the farm is left for years to rest and recover for the next	Increase in terms of numbers of land holding being fallowed

	cycle of production, sometimes left to become a secondary forest. Shorter fallow period is now prevalent with increasing demand for land. One alternative is the planting of legumes/mucuna plant in the absence of long fallow for quick recovery of soil.	(comparison of data from Census 2001 and 2015) but length of fallow from those existing farms are getting shorter/decreasing
Integrated pest management ((Mixed production system and Rainfed crops system-Tropics)	Common traditional practice includes crop rotations, appropriate timing of planting and densities, inter-cropping/companion planting to mitigate pest and diseases	Increase

The use of Mucuna was taken up by a commercial grower (Nishi Trading – Tongatapu) and more farmers are now using this approach. The NGO, (Mainstreaming of Rural Development Information, Tonga Trust) MORDI is actively promoting mucuna with seeds distributed to outer islands last year.

Box 2: Describe a successful programme or project that has been undertaken in the country to support one of the practices listed in Table 4.

One of the successful programmes in Tonga is the Tonga Health’s program on Home Gardening and “Give me Five Program”. Home gardening is focused on promotion of vegetable production and consumption of a variety of local vegetables for health. The “Give me five program” is the planting of any 5 fruit trees/plants at the backyard for each households. These programmes enhance biodiversity with planting of diverse fruit trees at the household level in combination with various types of introduced and local vegetables.

The programs are promoted for Women and Youth with assistance on seedlings and advice/training on planting, care and maintenance of these fruit trees and vegetables. From the last Census of 2015, a total of 2,888 home gardens were recorded.

b)Provide examples whereby the biodiversity per se, or its lack, had a direct effect on productivity; food security and nutrition; rural livelihoods; ecosystem services; sustainability;

A good example in Tonga was the decline in soil productivity, biodiversity loss and to a great extent, loss of rural livelihoods due to extensive clearance of agroforestry farms for squash production for export. Squash production started in 1987 and peaked in 1993 with total production of 18, 499 tons valued at 12.4 million. It had a heavy toll on soil fertility, biodiversity and many other ecosystem services. Large areas of land were cleared; import of fertilizers and pesticides soared. In the past, the focus of the Government is on export and increased contribution of the agriculture sector to economy through export. Biodiversity and environmental protection was not integrated in the Government’s strategic plan. This has changed with greater awareness and “pressure” for the need to integrate environmental protection in Tonga. We now have Tonga’s Agriculture Sector Plan with target implementation to start this year, 2016. Two of the programs are “Climate Resilient Environment” which will focus on ensuring that Tonga’s key natural resources are preserved, will also focus on building knowledge of the underlying environmental conditions. The other programme is on “Sustainable Livelihood and Healthy Food” which will focus on improving farmers’ knowledge

and technologies for climate-resilient and diversified crop and livestock production systems and the marketing of these products.

c) List in Table 5 examples whereby the use of biodiversity for food and agriculture contributed to cope.

Table 5 Examples whereby the use of biodiversity for food and agriculture (BFA) contributed to cope with climate change, invasive alien species, and natural or human-made disasters

Objective	Description
Use of BFA to adapt to and mitigate climate change ²	Crops react and behave differently with climate change. The more diverse our crops, the safer it is for us as shown with our experience with different varieties of mango in Tonga. Most of the local variety of mango in Tonga fruit regularly. In 2014, we had drought and two particular varieties of Mango in Tonga that never fruit for the last 13 years surprisingly bear unusually large fruits. These are the large varieties of mango - one was about 400-700 grams each while the other one was between 800-1,200 grams. This particular agroforestry farm had over 30 mangoes with 6 different varieties in an 8 acre plot. I think this instance is biodiversity and its beauty with climate change.
Use of BFA to manage the spread of/control invasive alien species ³	No actual examples but we can see from monocultures, disease and weeds can destroy the crop quickly but not in the case of multicrop farm.
Use of BFA to prevent natural or human-made disasters and/or reduce their effects on livelihoods, food security and nutrition ⁴	The world economic crisis of 1997 with oil price hike brought many industrialized countries into poverty. Many commercial farmers from these countries were severely affected. This crisis did not affect much Tonga, in terms of food shortage and hunger experienced by other countries due to the fact that our food production system is resilient, based on small holding agroforestry system.

d) List and briefly describe ecosystem/landscape/seascape approaches that have improved the management and use of biodiversity for food and agriculture in the country.

Tonga features two national Ridge to Reef projects that will strengthen and expand marine and terrestrial protected areas, enhance carbon storage through restoration of damaged forests and farmlands, build national climate resilience, and strengthen capacity for integrated water resources and coastal management⁵. One project seeks to conserve the ecosystem services of the Fanga’uta Lagoon Catchment on Tongatapu - the project objective is to conserve the ecosystem services of the Fanga’uta Lagoon through an integrated land, water and coastal management approach thereby

² Reference: question 69 of country report guidelines.

³Reference: question 46 of country report guidelines.

⁴Reference: question 43 of country report guidelines.

⁵<https://www.thegef.org/gef/node/10726>

protecting livelihoods and food production and enhancing climate resilience. The three components of the project are: Lagoon catchment through the establishment of an effective governance system and sustainable management of the lagoon ecosystems (Component 1); implement integrated environmental management approaches for improving conditions of critical habitats, productivity, water quality and fisheries in the lagoon catchment (Component 2); and strengthen knowledge and awareness of the Fanga'uta Lagoon ecosystem functions and associated socio-economic benefits within the national stakeholders and local communities (Component 3).

Tonga's GEF Pacific IWRM Demonstration Project entitled "Improvement and Sustainable Management of Neiafu, Vava'u's Groundwater Resource" has strengthened arrangements for improved watershed management and community engagement. The project is also successfully testing various measures to reduce stress on the Neiafu aquifer. Key project results include: formation of the Neiafu Aquifer Management Committee; 60% increase in community engagement with national Government on water issues; assessment of sustainable yields from Neiafu Aquifer; and installation of 11 trial sanitation systems to reduce groundwater contamination. This Pacific IWRM 'Progress Snapshot' highlights results achieved to date.⁶

e) Provide examples of activities undertaken to maintain and use traditional knowledge of associated biodiversity and wild foods.

Tonga holds an annual Agriculture, Forestry and Fisheries Shows throughout the main islands of Tongatapu, Vava'u, Ha'apai, Eua and the 2 Niua's. It promotes production and display of best local products/produce from each island and hence promotes agro biodiversity and associated biodiversity. Prizes are provided for best display such as best traditional mats/taovala's, baskets, and Tongan oil to name a few of the items included. Just for Tongan oil item alone, there are 8 categories, oil made of coconut, candlenut or Tamanu oil with 8 different flavour or scents from leaves, flowers, barks of traditional trees and plants of Tonga. Tongan women are generally very protective and careful of the traditional trees and plants, particularly in their town and bush allotment as these are important source of materials such as leaves, flowers and fruits, not only for food but also for traditional celebrations of national events and other traditional festivities. There is a big concern that traditional knowledge is disappearing with probably little effort done on documentation. Traditionally, knowledge in Tonga and most of the Pacific is passed on by inheriting how to do things or by word of mouth, not written

f) Identify possible needs and priorities in terms of the sustainable use of biodiversity for food and agriculture, and in particular of associated biodiversity and wild foods.

Tonga is blessed to have so many development partners (local, regional and international) who are willing to assist and provide funding for various development programs in the Kingdom. I think there is a need to review and evaluate these projects/programs and assess its impact on biodiversity for food and agriculture. We definitely need greater capacity to monitor these projects and promote more of biodiversity for food and agriculture. Information system and improved cross-sectoral collaborations are equally important.

⁶<http://www.pacific-iwrn.org/>

National policies and strategies in place to support sustainable use of BFA – especially for agriculture and fisheries, for example, land management policies that permit or limit production practices or, for example, permit or limit long lease of large areas of land to producers likely to engage in mono-cropping. Land in Tonga is not for sale but can be leased up to 99 years, maximum according to the law. Short term leases are the common one these days – 5-10 years.

Certification systems, such as organic certification, that encourage sustainable practices in production systems - market creation for products or services provided by ecological agriculture may be important in ensuring long-term adoption of sustainable practices, substituting public financial support after an initial phase.

Increased awareness and education for all stakeholders including decision-makers, researchers, producers and consumers is needed to highlight the multi-functionality of agriculture and the interconnectedness of biodiversity, ecosystem functioning and human health.

2.2. Conservation

a) Describe the status of *in situ* conservation of associated biodiversity and wild food species in your country:

National *in situ* conservation initiative(s):

- The initiative taken by a private business, 'Ene'io Enterprise Ltd, to establish a botanical garden for the purpose of providing eco-tour services to the community and visitors to Vava'u continue to stand out as model for public awareness but it also functions as *in situ* conservation.

Sub-regional/regional *in situ* conservation initiative:

- The Framework for Nature Conservation and Protected Areas in the Pacific Islands region, 2014-2020⁷ will provide guidance for the region on key priorities for biodiversity conservation and ecosystem management with clear linkages to NBSAPs and the Aichi Biodiversity targets. Strategic goal C is 'to improve the status of biodiversity by safeguarding ecosystems, species and diversity'⁸
- The goal of the GEF-PAS Integrated Island Biodiversity project is 'to conserve ecosystems, species and genetic diversity in the Pacific region. The project is focusing on improved systems and processes including resource assessment and monitoring, legislation, capacity and awareness building. The project sites are mainly focused on Niuafu'ou, Vava'u and 'Eua islands⁹. Other countries involved in this project include Cook Islands, Nauru and Tuvalu – therefore it is a sub-regional initiative. Through this project a rapid biodiversity assessment (BIORAP) was carried out in the Vava'u group.
- Marine and coastal biodiversity management in the Pacific island states (Fiji, Solomon Islands, Tonga and Vanuatu) and atolls (Kiribati): the objective is the management of the

⁷https://www.sprep.org/attachments/Publications/BEM/Framework_Nature_Cons_Prot_Areas_PIR_2014_2020.pdf

⁸<https://www.cbd.int/sp/targets/>

⁹<http://ecc.gov.to/core/index.php/front/projects/26/19>

marine and coastal biodiversity. The project focuses on developing and strengthening institutional and individual capacities for biodiversity conservation in marine and coastal areas in the five target countries

b) Describe the status of *ex situ* conservation of associated biodiversity and wild food species in your country:

List and describe any existing national ex situ conservation initiative(s).

Sub-regional/regional in situ conservation initiative(s):

Tonga, as a SPC member country can participate in ex situ conservation through SPC and USP. In 2011, the Secretariat of the Pacific Community developed the Pacific Islands Tree Seed Centre (PITSC) to help research, conserve and disseminate seeds of socio-economically important tree species for its 22 member countries and territories, including Tonga. In April 2014 the RBG, Kew and SPC signed a 10-year agreement to work together in supporting and implementing plant conservation activities in the Pacific region, specifically with the PITSC. Kew also has a direct partnership with Tonga¹⁰. The vision of the Regional Strategy and Action Plan on Forest Genetic Resources Conservation and Management is: *by 2020, the Pacific Island Countries and Territories are enjoying improved livelihoods, greater food security and increased environmental protection, resulting from enhanced collaboration and coordination within and between them in the conservation, management and sustainable utilisation of forest genetic resources, while maintaining their unique Pacific cultures*

The SPC Centre for Pacific Crops and Trees can support SPC member countries in conserving agricultural biodiversity.

The Fiji Herbarium at the University of the South Pacific houses more than 50,000 vascular plant specimens in the main collection. It also has a wet collection of plant parts, bryophytes and algae from the Pacific region. The Herbarium serves as a very important resource in matters pertaining to the taxonomy, conservation and ecology of plants, forestry, land use planning, economic plants and weed problems in the region.

Constraints for ex situ conservation in the region include limitations in, or lack of, research, national policies and strategies, funding, facilities, public education and training for staff, as well as land tenure issues.

c) Identify possible needs and priorities in terms of the conservation of biodiversity for food and agriculture, and in particular of associated biodiversity and wild food species..

The Vava'u BIORAP Study has recommendations for action on conservation of biodiversity for food and agriculture. Of relevance to the conservation of BFA, in particular, associated biodiversity and wild food species are:

- (a) Raise awareness of the conservation values and threats to the biodiversity of Vava'u through discussions and awareness and education programmes with landowners, communities, resource owners and tourism operators on the management of significant sites

¹⁰<http://www.kew.org/discover/blogs/kew-science/why-and-how-are-we-saving-seeds-pacific-island-plants>

- (b) Raise awareness of environmental laws and regulations and increase enforcement. Key examples include those covering managing extraction of resources; and regulating developments such as new resorts (including requirements for Environmental Impact Assessments).
- (c) Conduct surveys of traditional knowledge of local people on their relationships with the environment and natural resources
- (d) Reduce runoff of sediments, nutrients and pollutants by appropriate management of land and retain and replant mangroves to reduce runoff from coastal developments.

A number of priority sites and actions were identified:

- (a) 'Euakafa Island - highest richness of marine non-cryptic macro invertebrates; a fringing reef with complex habitats; high coral and reef fish diversity and biomass; and was one of four sites with the most threatened (IUCN-red listed) fish species

Other marine sites of similar importance for their stock diversity were also identified. Conservation approaches would have to address the main threats to these sites which were identified as:

- Reduce fishing pressure and encourage good practices;
- further protect reproduction (e.g. spawning areas) to ensure stock recovery;
- create protected areas that will allow resource recovery while benefiting adjacent fisheries through the spill over effect;
- implement raising awareness and involving communities in the management of their resources,
- propose incentives for alternative livelihoods and raising funds for conservation

There are conservation areas such as the Eua National Park and Mount Talau National Park but these are not well protected from overharvesting and abuse in terms of collection and gathering of food and other products from the Parks. We need regulation and its enforcement to protect the conservation of biodiversity and associated biodiversity and wild foods from these areas.

The promotion of best practices for sustainable agricultural production, using an ecosystem approach (using biodiversity and related biological processes), will support the more efficient use and conservation of biodiversity for food and agriculture, including in situ and ex situ conservation. This can be achieved through the promotion of the development of national policies and programmes (e.g. Farmers Field Schools) that use the ecosystem approach.

Close coordination and collaboration with MAFFF is needed to ensure planned expansion in agriculture does not impact negatively on sensitive habitats including catchment areas, riparian strips, steep slopes prone to erosion and slips and areas earmarked for biodiversity conservation.

Improved monitoring and data gathering is needed including mapping data to enable future assessment of the environmental impacts of agriculture on the environment.

Increased awareness and education for all stakeholders including decision-makers, researchers, producers and consumers is needed to highlight the multi-functionality of agriculture and the interconnectedness of biodiversity, ecosystem functioning and human health.

Capacity building and supplementing is needed either at the national, sub-regional or regional level to support both development of conservation strategies, including prioritization and development of technologies.

Effort should be made to contain the spread of invasive species for example, *Merremia peltata*. These measures should also be incorporated into management plans for national parks, KBAs and catchment areas

Regional strategy to address BFA is required as in reality it is an area that little is known about.

Overall the trend towards conservation of biodiversity has increased over the years due to the policies and legislation in place to sustainably manage aquaculture, agriculture and forestry activities. However, compliance is still an issue, and therefore enforcement is needed to be strengthened.

2.3 Access and exchange

a) Describe in Table 6 the main measures in the country (i) regulating access to; and (ii) ensuring the fair and equitable sharing of benefits arising from the utilization of biodiversity for food and agriculture.

This should be quite easy to do and you have the other SOW reports to refer to for PGRFA, AnGR, FGR and AqGR.

Components of BFA	Description of measures governing access to BFA	Description of measures regulating the fair and equitable sharing of benefits arising from the utilization of BFA
<i>Genetic resources</i>		
PGRFA	Tonga ratified the ITPGRFA so ABS is through the IT MLS	
AnGR	Tonga has not acceded to the Nagoya Protocol	
FGR	Tonga has not acceded to the Nagoya Protocol Tonga signed the MTA with SPC for access to and exchange of FGR	
AqGR	Tonga has not acceded to the Nagoya Protocol	
<i>Associated biodiversity</i>		
Micro-organisms	Any research into marine organisms would likely be in collaboration with USP which is the regional agency with expertise in this area.	
Invertebrates		
Vertebrates		
Plants		
<i>Wild foods</i>		

b) Identify possible needs and priorities in terms of the policies and regulations governing the access to and ensuring the fair and equitable sharing of benefits arising from the utilization of biodiversity for food and agriculture, and in particular of associated biodiversity.

According to the 5th report on the NBSAP progress Access and Benefit Sharing has 75% of its objectives in the Red (unsatisfactory progress). It has 25% of its objectives in Yellow (work in progress). This sector lacks support in term of legislation and policies in place. The Ministry of Environment, Energy, Climate Change, Disaster Management, Meteorology, Information and Communication (MEIDECC) needs to coordinate this sector and can take up this responsibility then there is hope of improving the performance in future. Documentation of traditional knowledge is very important to Tonga so MECC should feel responsible to take part in this very important issue. Users need clear access and providers also need to know his/her share.

III. Policies, institutions and capacity

3.1 Policies, programmes, institutions and other stakeholders

a) Describe relevant policies and programmes the country has adopted and is implementing to support the conservation and sustainable use of biodiversity for food and agriculture, **and specify to which extent they address associated biodiversity and wild foods**. Relevant policies and programmes are those that aim at:

- the coordinated use and conservation of sectoral genetic resources
- addressing food security and nutrition
- the sustainable use and conservation of associated biodiversity
- the maintenance of ecosystem services
- improving resilience and sustainability of production systems
- supporting farmers, livestock keepers, forest dwellers and fisher folk to adopt and maintain practices that strengthen the conservation and use of biodiversity for food and agriculture
- the application of an ecosystem/landscape/seascape approach

Some of the Policies and Programs/Projects- not sure to what extent they address associated biodiversity and wild foods.

Policies & Programs	Implementor and Partner/Donor	Year
1. Tonga Strategic Development Plan (TSDP II) <ul style="list-style-type: none"> • One of the important Pillars on this plan is on Natural Resources and Environmental Inputs. One of the national outcome is “Improved use of natural resources for long term flow and benefits” 	Government Strategic Plan	TSDP II (2015-2025)
2. Tonga Agriculture Sector Plan (TASP)	MAFF (regulatory/monitoring)	2016
3. National Biodiversity Strategic Action Plan (NBSAP)	Framework for CBD MEIDECC – lead with other stakeholders	Fifth Review Report Submitted in 2014, follow-up report to be submitted in

		June 2016
4. National Forest Policy for Tonga	MAFFF	2009
5. Eua Code of Harvesting Practice	MAFFF	2012
6. Cope with Climate Change in the Pacific Island Region (CCCPIR) <ul style="list-style-type: none"> • Agroforestry Trial, Nakolo Village • Eua National Park-Watershed Management • Women and Food Security 	MEIDECC/Forestry Div- GIZ Project	2010-2015
7. Building Resilience of Food Production System to Impact of Climate Change in Tonga	USAID/SPC/MAFFF	2013-2015
8. Pacific Risk Resilience Program PRRP) - Food Security and Livelihood Cluster & CCDRM in Tonga	MAFFF-AusAid	2016-?
9. GEF-Pacific Alliance for Sustainability Island Biodiversity Project on implementing the island biodiversity programme of work by integrating the conservation management of island biodiversity	MEIDECC-GEF	
10.		

b) Provide a short analysis of the strengths and weaknesses of the policies and programmes mentioned above and indicate their level of implementation.

For strategic plan and corporate plans from line Ministries of the Government, its strength is that each Ministries got these plans as it is required in the budget process. Its weakness is the limited capacity and resources to implement and monitor these plans. Theoretically, plans are made for implementation followed by regular monitoring and evaluation on delivery of these plans. One of the weaknesses on Government Strategic Plans and Corporate Plans is the lack of monitoring and evaluation on accomplishment or lack of accomplishment of the planned activities. Major factor to this shortcoming includes the lack or limited capacity of the Government. The M&E component of the Strategic Plan is in place but not implemented due to lack of capacity.

For programs and projects, the strengths are community participations and the visibility of actions taken for particular needs of the community/recipients. The weakness includes lack of sustainability of some of these projects as well as limited integration with other projects. Publicity and promotion of projects needs strengthening.

There is a need for national effort to document the lessons learned from these programmes and projects, to share these lessons learned to wider community and groups as well as to Development Partners and Donors

BOX 3. Provide up to three examples to highlight how stakeholder groups in the country, such as groups or associations of farmers, forest dwellers, fisher folk and livestock keepers, NGOs or other

civil society organizations, have actively contributed to the improved sustainable use and/or conservation of biodiversity for food and agriculture and the maintenance of ecosystem services.

- Vava'u Vanilla Growers Association – Vanilla plantations in the island of Vava'u of over 300 Vanilla Growers are now certified organic (2015). Preparation and audit process for this certification took 3 years. Vanilla growers were trained and grounded on good practice of vanilla plantation management such as “no pesticides” and organic mulching which promotes environmental and associated biodiversity protection.
- Civil Society Forum of Tonga (CSFT) – an NGO based in Tongatapu who has been actively engaged in many biodiversity programs in Tonga such as Mangrove Rehabilitation Program, Coastal Protection and Replanting in the Coastal Zone, Forest Conservation in Vava'u and Coastal Erosion Program in Ha'apai. NBSAP document had a long list of projects under Civil Society
- Vava'u Environmental Protection Association (VEPA) –The Vava'u Environmental Protection Association (VEPA) is a Vava'u based NGO actively engaged in the conservation of Vava'u's natural resources. VEPA was incorporated as a national society in The Kingdom of Tonga in January of 2010 and is governed by a local board. VEPA's programs are run in accordance with our Strategic Action Plan 2012-2017 with an annual activities plan co-coordinating projects under our three defined areas of work which include Biodiversity and Conservation, Resource Development and Education and Awareness. Our projects span all areas of the environment including the conservation and rehabilitation of marine and terrestrial species and ecosystems, Climate Change Adaptation and Waste Management with a large focus on ecosystem based adaptation through community conservation projects, awareness and school programs. VEPA works closely with the Government of The Kingdom of Tonga and partners with other Pacific Island organizations. VEPA's recent work was a collaboration on Biological Rapid Assessment Program (BIORAP) Survey of Vava'u carried out on Feb 13-28, 2014.

c) Provide examples of successful inter-ministerial cooperation in the area of conservation and sustainable use of biodiversity for food and agriculture and describe the relevant collaboration mechanisms.

The NBSAP document is a product of collaboration between Government Ministries and NGO – MEIDEC (Ministry of Environment, Energy, Climate Change, Disaster Management, Meteorology, Information and Communication), MAFFF (Ministry of Agriculture and Food, Forests and Fisheries), and Civil Society Through this process good projects were established collaboratively. Constraints to collaboration however affected implementation limited capacity, lack of clarity on mandate or lack of mandate and budget constraints

d) Identify possible needs and priorities in terms of policies, programmes and institutions governing biodiversity for food and agriculture, and in particular associated biodiversity and wild food species.

1. Needs a clear direction on which Ministry will be responsible in monitoring biodiversity for food and agriculture in each country.
2. Needs clear policy on biodiversity or its integration in the existing policies and programs of government. Need someone to review and look where it will fit and where it is needed/appropriate.

3. Wild foods should be included in the next Household and Income Survey (HIES) and Agricultural Census in Tonga.
4. Biodiversity and associated biodiversity for food and agriculture are sometimes seen as “intangible” and needs to promote and publicize more of the “tangible” side of it through demonstration, education and training.
5. From the Agriculture Sector – needs more biodiversity demonstration areas, similar to Fisheries’ SMA’s. “Biodiversity Village” is a potential category for prize giving during the Agriculture Show in Tonga –for 2017. Criteria will include village with the most variety of yams, taro, cassava, livestock, etc. present and cultivated in the village.
5. Potential inclusion in the science school curriculum about biodiversity and associated biodiversity (if not yet included).

3.2 Capacity

a) Identify and prioritize training and education needs that target the conservation and sustainable use of associated biodiversity and describe possible constraints.

1. Needs a clear direction/mandate on who exactly will be responsible in monitoring biodiversity for food and agriculture in each country.
2. Special “Biodiversity and Associated Biodiversity Awareness Workshop” is needed for all MAFF Staff, including Minister and CEO.
3. Needs a full-time Biodiversity Officers (one terrestrial and one marine Biodiversity Officer). This person needs to be trained on anything that is required of him/her.
3. On- the-job attachments to relevant organizations will be a very useful tool in learning more about biodiversity for food and agriculture.
4. Continuous/sustainable documentation, information management and regular reporting and information sharing on biodiversity for food and agriculture are critical for each country to establish.
5. Training in biodiversity valuations so they can be incorporated into cost-benefit analyses of proposals.

b) Identify and prioritize research needs to strengthen the conservation and sustainable use of associated biodiversity, wild foods and ecosystem services and describe possible constraints.

A better understanding of the level of agricultural biodiversity that adds resilience to agriculture production from home gardens to larger-scale enterprises.

Research into propagation and conservation of any wild foods identified as endangered.

Research into improving guidelines and recommendations for strengthening sustainable and resilient agriculture.

IV. Regional cooperation

4.1 Regional initiatives the country is involved in to conserve and use biodiversity for food and agriculture

Table 7 relevant regional policies and programmes embedding the conservation and/or use of biodiversity for food and agriculture, and in particular associated biodiversity, wild food species and ecosystem services.

Regional policies and programmes	Description
Pacific Plan	Pacific Forum leaders agreed to the development of a 'Pacific Plan' with the goal to "Enhance and stimulate economic growth, sustainable development, good governance and security for Pacific countries through regionalism. The Plan has reference to 'Improved Natural Resource Management and Environmental Management' in the plans Strategic Objective no. 5, with initiatives being promoted in: sustainable development, fisheries, forestry, coastal waters, waste management, energy, freshwater management, biodiversity and climate change.
The Framework for Nature Conservation and Protected Areas in the Pacific Islands region, 2014-2020	The Framework will provide guidance for the region on key priorities for biodiversity conservation and ecosystem management with clear linkages to NBSAPs and the Aichi Biodiversity targets. Strategic goal C is 'to improve the status of biodiversity by safeguarding ecosystems, species and diversity
Pacific Islands Regional Marine Species Programme 2013-2017	A regional strategy for cooperative conservation and management of dugongs, marine turtles, whales and dolphins in the Pacific Region. Other marine species of conservation concern will be added as the need arise.
A New Song for Coastal Fisheries: Pathways to Change	In March 2015, regional Pacific stakeholders and Governments engaged in collaborative planning to establish a new direction in the management of Coastal Fisheries. A New Song for Coastal Fisheries: Pathways to Change calls for a "...new and innovative approach to dealing with declines in coastal fisheries resources and related ecosystems". The paper makes five recommendations designed to strengthen community-based ecosystem approaches to fisheries management (CEAFM) across the region by adopting a capacity development approach as an integrated strategy, to develop capacity in CEAFM in information, management, monitoring and enforcement functions, from community to national government.
Pacific Islands Regional Ocean Policy and Framework for Integrated Strategic Action (PIROP)	The Pacific Islands Regional Ocean Policy is a policy for all the islands of the Pacific: it has been adopted by the leaders of all Pacific Island countries through the Pacific Islands Forum and is additionally supported by all Pacific Island territories. The Policy underscores the continuing importance of ocean and coastal resources and environments to the region's nations, communities and individuals. Central to the policy is the belief that ocean, coastal and island ecosystems contain high biological diversity that has sustained the lives

	of Pacific Island communities since first settlement and that it is vital to reduce the negative impacts of human activities and implement measures that protect and conserve biodiversity. It is important that biodiversity protection be pursued in a way that is compatible with community control of resources, and not unduly restrictive of social and economic development, particularly at the community level
Regional Strategic Plan on the Conservation, Management and Sustainable Utilization of Forests and Trees Genetic Resources in the Pacific	Regional Strategic Plan on the Conservation, Management and Sustainable Utilization of Forests and Trees Genetic Resources in the Pacific approved in 2008 by Ministers and Heads of Agriculture and Forestry - serves as the framework for planning and implementing the conservation, management and sustainable use of forest and tree genetic resources with the PICT. One major recommendation from that Regional Strategy and Action Plan is the establishment of the regional tree seed centre
Pacific Ridge-to-Reef Program	Goal of the programme is to maintain and enhance Pacific Island countries' ecosystem goods and services (provisioning, regulating, supporting and
Pacific Regional Action Plan on Sustainable Water Management	One of the three key messages is: Implement strategies to improve the management of water resources, and surface and groundwater catchments (watersheds) for the benefit of all sectors including local communities, development interests, and the environment.

4.2 Needs and priorities

- a) **Identify possible needs and priorities in terms of embedding biodiversity for food and agriculture, and in particular associated biodiversity, wild foods and ecosystem services into regional and international initiatives.**

The main priority is improved coordination and information sharing between the different initiatives, highlighting the importance of:

- Clarifying the agency and staff responsible for this area of work which is embedded in different sectors
- Improved monitoring, evaluation, reporting and documentation to ensure information is shared across the initiatives
- Improved national to regional data collecting and reporting mechanisms
- Better knowledge management systems so data collected can be easily accessed and shared between programmes
- Increase in integrated policy planning with a ridge-to-reef /ecosystem/landscape approach
- Improved utilization of regional programmes/initiatives for capacity building

V. Synthesis of needs and priorities and the possible way forward

The country's sustainable management practices of biodiversity for food and agriculture will require the pursuit of a **collective effort** among stakeholders:

- the local Government for appropriate and effective policies, as well as coordination and facilitation,
- the farmers/growers/land users for their wisdom(and lack of it) on use of our natural resources,
- the NGO and community at large for their critical role in sharing information
- the exporters and traders in the agriculture and fisheries sectors for their obligations as responsible party in the value chain,
- the service providers on their role in facilitating trade, and
- the donor and development partners/agencies for their effective and coordinated support and facilitation.

Countries may wish to use Table 8 to summarize their needs and priorities, and possible actions to be undertaken, with respect to the four priority areas of the guidelines.

There is a long list of recommendations from the recent BIORAP Study in Vava'u as well as recommendations from the NBSAP documents and this will be included in the report.