# Belize's Fifth National Report to the Convention on Biological Diversity

## Reporting Period: 2009 - 2013

## September, 2014



**Belize's Fifth National Report to the Convention on Biological Diversity, submitted by the Forest Department, Ministry of Forestry, Fisheries and Sustainable Development, Belize**

We thank all those participants who took part in the review process, both in Government agencies, in regional workshops and focal group meetings across Belize.

Nature ----- Culture ------ Life

This report was produced under the

"National Biodiversity Planning to Support the implementation of the CDB 2011 - 2020 Strategic Plan in Belize (National Biodiversity Enabling Activities)"

With funding from the United Nations Development Programme – Global Environment Facility

**Please cite as: Fifth National Report to the United Nations Convention on Biological Diversity: Belize (2014). Ministry of Forestry, Fisheries and Sustainable Development, Belmopan.**

## INTRODUCTION

Belize became a contracting partner to the Convention on Biological Diversity (CBD) in 1993, and is committed to implementing its obligations under the CBD. This 5th National Report provides a mid-term review of the status of implementation of the CBD in Belize, covering a five year period from January 2009 to December 2013, using information generated through a consultative process, with significant input from both public and private sectors. It also draws on the key sources of information, including the following:

***National Development Framework***

- Horizon 2030
- National Poverty Elimination Strategy and Action Plan (2009)
- Belize Medium Term Development Strategy 2010 – 2013 (2010)
- Belize Millennium Development Goals Report and Post 2015 Agenda

***National Reports on Biodiversity Status***

- The Rationalization Report of the National Protected Areas Policy and System Plan (2013)
- National Stocktaking Report (2014 – in prep.))
- National Report on Threats to Biodiversity and Drivers (2014 – in prep.)
- The Belize National Aichi Targets and Indicators (2014 – in prep.)
- The Status of Protected Areas: Belize (2010)

Report development has been led by the Ministry of Forestry, Fisheries and Sustainable Development, of the Government of Belize, in accordance with Article 26 of the CBD, which states that each Contracting Party shall report on measures it has taken to implement the CBD and the effectiveness of these measures. The reporting process has been supported by the United Nations Development Programme. The information provided in this report has been presented in such a way as to facilitate integration into the CBD mid-term review of progress towards the implementation of the Strategic Plan for Biodiversity 2011-2020, into the status of the Aichi Biodiversity Targets, and towards development of the fourth edition of the Global Biodiversity Outlook.

## EXECUTIVE SUMMARY

This Fifth National Report to the Convention on Biological Diversity provides a summary of Belize's activities towards implementation of this convention for the reporting period 2009 to 2013.

Part I of the report provides a broad overview of trends in biodiversity since 2009. Belize is founded on its biodiversity wealth, with a heavy reliance on a healthy, natural resource-based tourism industry, the primary productive sectors (fishing, agriculture, and forestry), and ecosystem services that supply the nation with water security, renewable natural resources, tropical storm and flood protection and hydroelectric power. As a country faced with increasing climate change impacts, ecosystem integrity is recognised as critical in the mitigation of the potential catastrophic damages resulting from predicted, increased temperatures, increased drought and flood events, and increasingly strong tropical storms.

Belize still retains 61.1% of its natural, intact forest cover, with approximately 35.8% of Belize's land territory falling within protected areas. Whilst 19.8% of territorial waters fall under marine protective management, only 6.7% of this is through legally established replenishment zones (No Take zones) – the remainder allow for commercial, recreational and subsistence fishing. The Belize Fisheries Department is focusing on incorporating 10% of all marine and coastal habitats within Belize's territorial waters as functional and legally protected non-extractive replenishment zones.

90% of Belize's recognized ecosystems have greater than 10% representation within the National Protected Areas System. The majority of the gaps are within the marine environment, and have been partially addressed through the declaration of Turneffe Atoll in 2012, Belize's newest and largest marine protected area. Threats to biodiversity are being addressed, though efforts are limited by human and financial resource availability. Four areas of particular concern are: i) declining coral reef health; ii) increasing rate of clearance of large tracts of lowland forests; iii) large-scale transboundary incursions into protected areas along the border with Guatemala, and iv) potential oil exploration and extraction in the marine environment. Steps are being taken by aquaculture, agricultural and forestry industries towards improving environmental sustainability, and reducing pressures on the environment – particularly on the coral reef.

Part II of this report provides an update on the status of Belize's National Biodiversity Strategy and Action Plan (currently being revised). It also discusses the challenges of ensuring that biodiversity and the environment are mainstreamed, and that national development decisions take into account the maintenance of the natural environment. The development of the National Land Use Planning Framework and the Integrated Coastal Zone Management Plan seek to address this at the national level.

Part III summarises Belize's progress towards the Aichi Biodiversity Targets and contributions towards relevant Millennium Development Goals. Whilst many of the targets are only partially met, actions are being taken by both Government and Non-Government agencies to improve their status. This will be strengthened further once the national Aichi Targets have been clearly defined, integrated into the revised National Biodiversity Strategy and Action Plan, socialised and mainstreamed to provide national goals.

# PART 1. UPDATE ON BIODIVERSITY STATUS, TRENDS AND THREATS, AND IMPLICATIONS FOR HUMAN WELLBEING

## 1. THE NATIONAL IMPORTANCE OF BIODIVERSITY TO BELIZE

Belize, as a nation, is considered relatively unique -"a very small country with a rich endowment of natural resources of global importance" (FAO, 2000). It is founded on its biodiversity wealth, from the first days of the logging industry to today's reliance on a healthy, natural resource-based tourism industry, the primary productivity sectors (fishing, agriculture, and forestry), and ecosystem services that supply the nation with water security, tropical storm and flood protection, non-timber forest products and hydroelectric power. As a country faced with increasing climate change impacts, ecosystem integrity is recognised as critical in the mitigation of catastrophic damages resulting from increased drought and flood events, and increasingly strong tropical storms.

Many rural families across Belize have smallholdings producing basic, subsistence level crops for their households, supplementing their diets with freshwater or marine fish - with a high reliance on adequate water supply for both. The most vulnerable communities, with the highest poverty rate, particularly those in southern Belize, have a high direct dependence on natural resources, considered critical to their health and well-being. There is a strong culture of natural resource use - extraction of forest materials for construction (thatch palm leaves and structural poles), and edible and medicinal plants, and game species for food and health care.

### *Ecosystems*

Located at the confluence of North and South America, Belize, despite its small size, is recognized for its high biodiversity - and with a low human footprint, much of this biodiversity is still retained. However, it is coming under increasing pressure as the population grows, the human footprint expands, the threat of oil exploration in the marine environment remains, cross-border incursions impact more and more of Belize's territory, and climate change impacts increase.

Belize still retains 61.6% of its natural, intact forest cover (Cherrington et al. 2012); approximately 40% is protected under the National Protected Areas System, the remaining 20% either on national lands or in private ownership (Sabido, 2014). Three important large, forested nodes are recognised within the National Protected Areas System Plan and associated Rationalization report for their importance in maintaining both national and regional biodiversity. Belize's primary Key Biodiversity Area (KBA) lies within the Maya Mountains Massif, whilst the secondary KBAs lie within the other two nodes (Meerman, 2007). Whilst the largest, the Maya Mountains Massif, is legally protected within the National Protected Areas System, the others are gradually being eroded, as at least a portion of the forest lies within large private land holdings. These are being sub-divided and sold off for agriculture, following the levying of a non-developed land tax, and the non-recognition of tourism or conservation as productive sector development.

Belize has four global ecoregions, with fourteen broad ecosystem types identified under the national ecosystem mapping (BTFS, 2012), further broken down into 68 ecosystem types (revised from a previous 78 ecosystem types) (Meerman, 2011).

***Broad Ecosystems (BTFS, 2012)***

- Lowland broad-leaved forest
- Sub-montane broad-leaved forest
- Lowland broad-leaved dry forest
- Shrubland
- Lowland savanna
- Lowland pine forest
- Sub-montane pine forest, Wetlands
- Water
- Mangrove and littoral forest, Seagrass,
- Coral reef
- Sparse algae
- Open sea

The **Petén-Veracruz Moist Forest** ecoregion, encompassing the broadleaf tropical forests, is well represented in Belize, but considered as globally critical / endangered, a reflection of the high rate of deforestation and land use change in the region (Olson et al., 2002), The **Belizean Pine Forest**, also considered globally critical / endangered, represents one of the few examples of premontane pine forest in the Neotropics.

Less well represented, but of importance for regional endemics, is the **Yucatan Moist Forest**, considered vulnerable globally (Olson et al., 2002), and limited in Belize to the north east of the country. Climate change predictions suggest that elements of the Yucatan Moist Forest will become more prevalent in forest ecosystems further south as rainfall becomes less predictable, and will be important in the maintenance of viable forest cover in the medium to long term, particularly in northern Belize. Connectivity for this forest type to other forests is therefore particularly important in climate change planning, and has been recognised in both the National Protected Areas System Plan and associated rationalization process, and in the Integrated Planning Framework for Land Resource Development, linked to the National Land Use Policy.

Coastal ecoregions of Belize can be subdivided into two. The **Belizean Coast Mangrove** ecoregion encompasses the various mangrove ecosystems that exist on the mainland – extensive stretches of inundated dwarf mangroves in shallow, coastal lagoons, tall basin mangroves, and fringing mangroves of the coast. These mangroves, and those of the **Belize Reef Mangrove**, restricted to the cayes, are recognised for their critical importance in coastal and caye protection, and for their role in the fisheries sector, providing nursery functionality for many commercial and sport fishing species.

The **Belize Reef Mangrove** ecoregion encompasses the offshore mangroves, extensive seagrass beds and coral reef. Belize is well known for the beauty of its reefs, sand cayes and coastal waters - the marine environment falls within the Western Caribbean, considered one of ten global coral reef hotspots (Conservation International, 2002). This unique, global importance has been recognized through the declaration of seven of Belize's marine protected areas as components of the Belize Barrier Reef Reserve System, a serial World Heritage Site, in 1996. Belize's barrier reef, a significant part of the largest barrier reef in the western hemisphere, runs parallel to the shore, a valuable resource for traditional fishing communities and Belize's marine-based tourism industry, and encompassing some of the richest marine resources of the Mesoamerican Barrier Reef System. As well as coral reef, the coastal lagoon has extensive interconnected seagrass beds and mangrove-lined cayes that provide the essential ecosystem connectivity for maintenance of the exceptionally diverse marine life.

An example of estuarine stromatolite reef, one of very few modern stromatolite reefs known in the world, runs parallel to the shore for 1.5km in the northern most protected area of the country - Belize is important in representational protection of these rare reef structures (SACD, 2013).

The importance of Belize's wetlands is reflected in the declaration of two RAMSAR sites, Crooked Tree Wildlife Sanctuary and Sarstoon Temash National Park, providing critical habitat for wetland ecosystems and species. The ecosystem services of Crooked Tree Wildlife Sanctuary, in particular, are critical during flood events, in terms of flood control, and play a significant role in mitigating potential flooding of Belize City.

One of the goals of the National Protected Areas Policy and System Plan (NPAPSP, 2005), endorsed by Government in 2005/6 is to ensure that the "*National Protected Areas System includes high quality examples of the full range of environment types within Belize, with balanced representation of the ecosystem types they represent"* (NPAPSP, 2005). An assessment of representation within the National Protected Areas System (NPAS) identified that, in 2012, over 90% of Belize's recognized ecosystems had greater than 10% representation within the NPAS – as per IUCN targets. 60% of ecosystems had greater than 30% representation within the NPAS. Realignments to improve the representation of rivers, unrepresented ecosystems and riparian vegetation were recommended.

In the marine environment, in particular, Belize falls short of the CBD targets for ecosystem representation. The greatest gaps are under the various categories of ***Caribbean Open Sea:***

- ***Caribbean Open Sea – Abyssal*** is not yet represented within the national ecosystem coverage
- Two other deep water ecosystems (***Bathyal*** and ***Mesopelagic***) have limited coverage, 0.3% and 3.1% respectively. This decreases to 0.2% and 2.9% respectively when including only those areas in replenishment zones (No Take Zones) in the assessment

The recent declaration of the Turneffe Atoll Marine Reserve in 2012 2012 (Statutory Instrument 105 of 2012 and accompanying regulations 105 of 2012), has increased representation of the Coastal Shelf and Mesopelagic waters to over 10% within MPAs, though only 7.8% and 2.9% respectively, lie within Replenishment Zones. Mangroves, too, improved in coverage, with 16.8% of national ecosystem coverage under protection (TNC, pers. com., 2014).

Whilst not an ecosystem in their own right, seamounts such as those between Turneffe and Lighthouse Atolls are also considered important systems that are currently not represented within the NPAS.

Coastal forests (littoral forests) and beach vegetation (Tropical coastal vegetation on very recent sediments, moderately drained), are considered highly vulnerable ecosystems, lying in areas targeted by tourism development. Even with the declaration of the new protected area at Turneffe, protection of littoral forest is still under the 10% target. These ecosystems will be further stressed in the future with the predicted short term increase in coastal development, and predicted long term increase in rise in sea level.

| Marine Ecosystem | Territorial Sea | Within the NPAS | % Representation in MPAs | % Representation in NTZ |
|---|---|---|---|---|
| Caribbean open sea abyssal | 83,558.80 | - | 0.0 | 0.0 |
| Caribbean open sea bathyal | 391,715.50 | 982.95 | 0.3 | 0.2 |
| Caribbean open sea mesopelagic | 469,620.70 | 59,886.41 | 12.8 | 2.9 |
| Coastal Shelf | 119,939.54 | 39,585.56 | 33.0 | 7.8 |
| Coral Reef | 60,313.04 | 32,728.17 | 54.3 | 14.3 |
| Deep Patch Reef and Seagrass | 15,234.40 | 15,217.49 | 99.9 | 26.4 |
| Deep Water Mud | 262,250.09 | 57,644.78 | 22.0 | 2.9 |
| Littoral Forest | 16,820.53 | 1,437.05 | 8.5 | 2.7 |
| Mangrove | 62,154.08 | 10,441.30 | 16.8 | 3.2 |
| Seagrass | 379,130.90 | 89,764.68 | 23.7 | 1.9 |
| Sparse Algae and Sea Grass | 136,887.19 | 110,164.39 | 80.5 | 6.6 |
| **NTZ:** No Take Zone<br>This estimation covers MPAs and protected areas up to 1km inland from the coast<br>Based on BTFS Ecosystem map Meerman | | | | |

***Ecosystem representation in the Marine Environment (TNC, 2014)***

Other ecosystems with limited representation include rivers, often being used to define protected area borders, but not included within the protected areas themselves. This impacts the effectiveness in protection of species such as the critically endangered Central American river turtle (*Dermatemys mawii*). Two seasonally inundated ecosystems of the coastal plain - ***Eleocharis marsh*** and ***Tropical evergreen seasonal broad-leaved lowland swamp forest, tall variant*** also have less than 10% coverage. The NPAPSP Rationalization report provides recommendations on mechanisms to address these remaining shortfalls and gaps.

***Ecosystem Services***

Belize, as a country, is heavily dependent on its natural resources and the environmental services they provide – these are critical to the wellbeing of Belize's people and to the health and well-being of the nation's economy. Both the marine and terrestrial protected areas of the system integrate features that protect ecosystem services and provide some resilience to climate change (Walker et al., 2013).

***Water Security:*** With its small population, Belize has the highest per capita water resources in the Americas. However, as a Small Island Developing State (SIDS), it is also identified as one of the countries that will be most at risk from climate change (IIED, 2007), with decreasing rainfall. Whilst there has not been a comprehensive, national evaluation of water resources, past work has provided estimates for the Maya Mountains Massif (Hammond et al., 2011). The Maya Mountains Massif, an area of extensive forest cover – over 1.28 million acres (5,180 $km^2$) - is within the National Protected Areas System, either fully protected or under sustainable forestry management, and is particularly important in its role of watershed protection. The headwaters of the majority of Belize's river systems originate within the Maya Mountains,

supplying the coastal plain communities and agricultural areas of Belize with access to clean water, as well as provisioning a significant area in neighbouring Guatemala.

The fourteen watersheds of the Maya Mountains Massif provide water security for over 128 communities and 55% of the total land mass of Belize, as well as supplying over 180 communities in Guatemala (Walker et al., 2008). The large tracts of intact forest canopy of lowland Belize also play an important role in rainfall catchment, and are particularly important for refilling the aquifer of the limestone platform of the north. Unseasonal drought conditions are starting to be encountered, particularly in the north, where agricultural areas overlie limestone rock, leading to soil desiccation. This change in rainfall pattern, attributed to climate change, is exacerbated by vegetation removal for agriculture, along with increased exploitation of both surface water and aquifers. A National Integrated Water Resource Management Policy has been endorsed by Government to provide for management of these resources, and is the first initiative in Belize to put a cost on an environmental service. There are ongoing initiatives under the National Integrated Water Resource Management Authority (NIRWA) to develop current estimates of water availability and value, and implement measures to ensure wise use and long term sustainability of Belize's water resources.

***Forest Resources:*** The tropical forests, particularly in the southern third of the country, where poverty is highest, are important to the indigenous Maya, providing materials for construction, as well as food and medicinal plants. These are predominantly rural communities with livelihoods that are highly dependent on access to land and natural resources. There are ongoing initiatives investigating the feasibility of establishing traditional right-based access regimes in key Forest Reserves for these rural communities, as well as efforts engaging rural communities in the principle of Sustainable Forest Management in the forested areas that occur within their community land.

***Steep Slope Protection:*** The importance of maintaining forest cover on steep slopes to maintain the stability of steep slope soils and reduce the potential for landslides is recognised in environmental guidelines from the Department of the Environment (DoE), which address the concerns of the increase in clearance of steep slopes for agriculture (DoE, 2012). Protection of forests on steep slopes is largely responsible for the limited number of catastrophic fatal landslides in Belize during tropical storm events, when compared with neighbouring countries, and steep slope protection against erosion has been a contributing factor in the logic behind the establishment of a number of the protected areas in Belize.

***Filtration:*** The importance of maintaining riparian vegetation is also highlighted in the DoE environmental guidelines, with identification of the critical need to leave the 66 foot buffer reserve along all water bodies (DoE, 2012). There is increasing awareness of the importance of riparian vegetation in providing a buffering filter against agrochemical contamination from runoff for maintaining healthy rivers and reef. Past experience with storm floods has also demonstrated the impacts clearance of the 66 feet buffer and subsequent erosion of river banks can have on infrastructure - such as the loss of the Kendal Bridge during Tropical Storm Arthur in 2008, severing road connections between north and south Belize, affecting the economy for months, and requiring a multimillion investment for replacement.

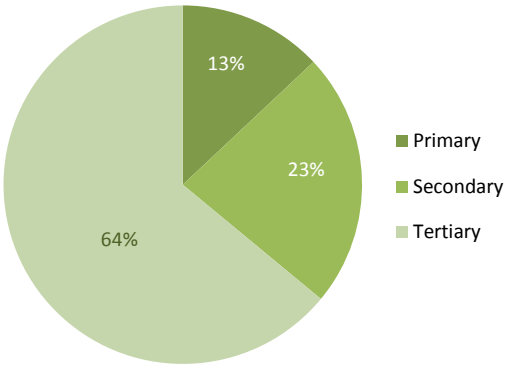
***Flood Control:*** Belize has large areas of low-lying wetlands, and with 35% of the population concentrated in coastal areas, these wetlands are extremely important in their role of flood control - storing flood waters after tropical storm events, and then releasing them slowly back into the rivers. Crooked Tree Wildlife Sanctuary and Burdon Canal Nature Reserve, whilst originally designated for their importance for birds, are both critical in the regulation of flood waters during tropical storm events, mitigating downstream impacts that would otherwise affect Belize City, with an estimated 18% of Belize's population (SIB, 2014) – much of the City lies in a basin, at or just below sea level, and is increasingly vulnerable to flooding (Padeco, 2011). Despite the knowledge of this important function, poorly planned construction of causeways have impacted water flow, reducing the functionality of the Crooked Tree wetland.

***Economics:*** The aesthetic beauty of the cayes and the spectacular reefs draw tourists to Belize from all parts of the world, supporting much of the tourism industry, an important contribution to Belize's foreign exchange earnings. The barrier reef, with its coral and associated seagrass and mangrove ecosystems, provides critical economic and environmental services (fisheries, tourism, and coastal protection), as well as habitats for many unique species, maintaining a large genetic resource pool. Seagrass and mangrove are also increasingly recognized for the roles they play as important carbon sinks, and for providing critical protection for life and property during tropical storm events. Mangroves benefit from widespread awareness of their role in fisheries, infiltration of land based runoff, and as a critical habitat for nesting and migratory birds and other wildlife.

During the NPASP Rationalization process, protected areas in both the marine and terrestrial environments were assessed for both their resilience to climate change, and their contribution towards building Belize's resilience (Annex 2).

***Natural Resources and the Economy***

The primary sector – the agricultural, fishing and logging industries - contributed 13% to the national economy in 2012. The **agriculture / aquaculture sector** is focused on a limited number of industrial scale farming initiatives – primarily citrus, banana, sugar cane and farmed shrimp. Citrus and banana are found throughout the Stann Creek Valley and southern coastal plain, and are relatively well organized, with international markets that are necessitating their move into certification, including environmental standards, to improve their social and environmental sustainability.




**% Contribution to GDP by Sector (SIB, 2012)**

Shrimp farming forms the basis of the aquaculture industry, and is reliant on a clean and adequate water supply. The 13 shrimp farms employ over 1,000 people, predominantly from the southern communities (BSGA, pers. com., 2014). On top of its investment in human resources, the shrimp farms also contributed BZ$51,564,250 to the export earnings of Belize in

2013 (SIB, 2014). The shrimp farming industry has been a global leader in the move to certification under the Aquaculture Stewardship Council – again through market-driven necessity. Belize will be first country where 75% of shrimp farms are fully certified, and the first in the world to achieve certification.

In the south and central Belize, employment in the larger agricultural industries results in migration of workers from poorer rural communities, to live and work at the citrus, banana and shrimp farms. Cattle farming is also increasing in footprint in southern Belize and is also prevalent in western Belize, being one of the current drivers behind deforestation, resulting in large areas of cleared lands and degraded soils.

The north is predominantly characterised by extensive farming – predominantly sugar cane farming, with low mechanization and a large labour force. Several Mennonite communities in the north and west provide Belize with rice, beans, corn and beef. These communities, whilst very important for the economy, are, with a few exceptions, also associated with the highest rates of land clearance, land degradation, and unregulated use of pesticides.

Belize's agricultural / aquacultural industries are highly vulnerable to adverse weather and disease, in an area with an increasingly high risk of tropical storm activity and unseasonal weather patterns. Almost two thirds of Belize's agricultural areas are located on soils overlying limestone, prone to dessication in times of low rainfall (Meerman, 2005). This, combined with the climate change predictions of longer dry seasons, increased temperatures and reduced rainfall in the future leads to a need for more effective environmental management and maintenance of both agriculture and remaining forest cover to ensure future water security.

The **timber industry**, whilst on the decline in Belize, still contributes towards export earnings, with a value of Bz$5.65 million in 2013 (SIB, 2014), and a trend of increasing exports of secondary hardwoods such as black poison wood and black cabbage bark between 2009 and 2013. The management focus is on long term forest license concessions for sustainable forest management, though short term forest licenses, which encourage unsustainable practices, are slow to be phased out. Whilst hardwoods (species such as mahogany (*Swietenia macrophylla*), cedar (*Cedrela odorata*), Santa Maria (*Calophyllum antillanum*) and yemeri (*Vochysia hondurensis*)) and pine are the primary species being harvested, there are also a number of non-timber forest products such as xaté (*Chamaedorea* spp.) and "popta" seeds from the palmetto palm (*Acoellorraphe wrightii*). The latter is harvested and exported for the medicinal market.

The **fishing industry** has strong traditional roots, and is focused on the shallow waters between the coast and the barrier reef, and on the three offshore atolls. It is both socially and economically important to Belize, with more than 2,750 fishermen directly dependent on capture fisheries, supporting an estimated 12,500 Belizeans from 20 communities, and with a further 1,000 people involved indirectly in processing and export (Belize Fisheries Department, 2013). The primary products in the marine sector are Caribbean spiny lobster, Queen Conch and finfish (primarily snapper and grouper), with sea cucumber as a relatively new extractive industry. Fishing is considered commercial artisanal - non-industrial, with fishermen fishing independently, using open boats, sail sloops, and canoes, either free-diving, using lobster traps and shades, or by hook and line. An estimated 90 to 95% of the product is sold to four fishing cooperatives,

two of which then export to the United States and Europe. It is estimated that 90% of the product is exported directly to foreign markets, the only 10% being marketed in Belize (EDF, 2014). Economic dependence on the traditional, non-mechanised coastal-shelf fishing industry is high, particularly in the northern coastal communities, with limited options for diversification away from the fishing industry. Fishing is highly dependent on the health of the reef, which is facing multiple pressures not only from unsustainable fishing, but also from land based threats, climate change and ocean acidification. Belize is working to address the first two of these issues through implementing a rights-based managed access system across the marine protected areas of the coastal waters, and through environmental regulations that set agricultural and aquaculture industry standards.

| Marine Domestic Exports, 2013 (Capture Fisheries) | |
|---|---|
| ***Product*** | ***Value (Bz$)*** |
| Lobster Tail | 13,760,860 |
| Conch | 11,290,550 |
| Whole fish | 2,764,530 |
| Aquarium Fish | 620,720 |
| Lobster Meat | 360,200 |
| Crab | 90,270 |
| Fish Fillet | 7,510 |
| ***Total*** | ***28,894,650*** |
| | ***SIB, 2014*** |

The **tourism industry** is the number one foreign exchange earner - nearly 834,000 visitors travelled to Belize in 2012, with approximately 257,300 (30%) of these being overnight visitors, and 576,700 (70%) through cruise ship visitation (Central Bank / BTB, 2014). Tourism is primarily natural- and cultural-resource based, with visitors focusing on the cayes, coastal communities and coral reef (particularly snorkelling, diving and sport fishing), and inland protected areas. Tourism expenditure in Belize exceeded BZ$639 million in 2012 – predominantly from the overnight sector, which contributed 86.4% (BZ$552.2 million) of total expenditures, despite being only a fraction of the total number of tourists (BTB, 2013). The tourism industry accounts for 28% of employment, and, also supports restaurants, transport providers (including water taxi services and internal airline companies), boat captains, tour operators and a number of other service providers, as well as those employed directly by the tourism industry (BTB, 2013).

The atolls, reef and coastal mangroves provide critical protection against tropical storm events, coastal flooding and erosion - the barrier reef and atolls provide an estimated value of US$120–$180 million in avoided damages per year, breaking the force of storm surges from the Atlantic (WRI, 2007).Coastal mangrove protection is estimated at a further US$111–$167 million per year, buffering the land against tropical storm force winds and preventing shoreline erosion (WRI, 2007).

Tourism visitation to the protected areas of the National Protected Areas System is an important financial contribution to the effective management of these sites. Hol Chan Marine Reserve, Belize's key marine-based destination, and easily accessed from the cayes, attracted 65,592 visitors in 2012, whilst St. Herman's Blue Hole National Park, the most accessible of the terrestrial protected areas, attracted 14,372 visitors. An informal mechanism for re-investment of entrance fees into protected area management is ongoing for the majority of co-managed protected areas, and is particularly important in supporting operational costs. Legally, however, all fees should go into the GOB general revenue system, as is the case for those marine reserves that do not benefit from co-management agreements. The knock-on benefits of protected area-related tourism for communities are evident in rural areas, such as Maya Centre, adjacent to the Cockscomb Basin Wildlife Sanctuary, where local women have a thriving arts and crafts market, and many of the hunters have now switched to providing guided tours of the protected area.

***Case Study: Economic valuation outputs of catch-and-release sport fishing in Belize – bonefish, permit, and tarpon***

Tourism in Belize is based on the natural and cultural resources…

- Catch and release sport fishing for bonefish, permit and tarpon creates an annual economic impact of over Bz$25 million in direct expenditures into the Belize economy, plus an additional $31 million in value added expenditures, providing a total yearly economic impact of about $56 million - approximately 6% of the Belize's tourist economy.
- Sport fishing for bonefish, permit and tarpon are estimated to results in approximately $2.7 million in Hotel Tax, Property Tax, Business Tax, GST, Employee (income and social security) Taxes, and Airport Exit Taxes generated for the Belize treasury.
- In 2007, more than 100 independent fishing guides provide services to approximately 4,800 international fishing guests at hotels and resorts throughout Belize, and at least 13 fishing lodges hosted nearly 1,000 international anglers from Europe, Canada, the United States and elsewhere
- Nearly $30 million in annual wages and salaries as well as 1,800 full-time jobs are supported by the sport fishing industry.

***Fedler, 2008***

Belize hasn't yet become self-sufficient in energy, but is investigating **clean development mechanisms** to boost its energy production. There are currently two primary hydroelectricity generating systems operational and feeding into the national grid. The value of hydroelectric power generated from these two (the Chalillo three dam system and Hydro Maya) combined has been estimated at US$17.5 million per year, based on 2008 figures. Solar and wind power are both being investigated for their potential to reduce Belize's reliance on imported power from Mexico, and both are used by isolated private properties across Belize and on the cayes that are of the grid.

The value of **potable water** has been estimated at between US$0.3 and US$2.3 million, and is dependent on the level of maintenance of forest cover (Hammond et al., 2011).

***Species***

As part of the Mesoamerican biodiversity "hotspot" - the land bridge between the North and South American continents - Belize has species representation from both continents. With its large expanse of relatively undisturbed forest, it is part of the northernmost range of species more associated with South America, such as the harpy eagle. It also has a number of Yucatan endemics – species such as the endangered Yucatan black howler monkey (*Alouatta* pigra) and more common Yucatan jay (*Cyanocorax yucatanicus*), which thrive in the drier northern forests.

**Critically Endangered Species of Belize**

| | |
|---|---|
| Staghorn Coral | *Acropora cervicornis* |
| Elkhorn Coral | *Acropora palmata* |
| Morelet's Treefrog | *Agalychnis moreletii* |
| Central American River Turtle | *Dermatemys mawii* |
| Goliath Grouper | *Epinephelus itajara* |
| Hawksbill Turtle | *Eretmochelys imbricata* |
| Social Wrasse | *Halichoeres socialis* |
| Smalltooth Sawfish | *Pristis pectinata* |
| Largetooth Sawfish | *Pristis pristis* |
| Cycad sp. | *Zamia prasina* |
| Coffeus rain frog | *Craugastor coffeus ** |

***IUCN, 2014***

**C. coffeus* has recently been added to the species list as a range extension

Whilst species inventories are not yet complete for many taxa, it is known that Belize provides habitat for over 100 globally threatened species - at least 11 Critically Endangered species (4 terrestrial and 7 marine), 31 Endangered species (21 terrestrial, 10 marine), and 63 Vulnerable species (33 marine, 30 terrestrial). Range extensions and new species are still being added to the national list, particularly from the more remote areas of the Maya Mountains Massif, as more specific field work targets taxa such as amphibians, plants and snails.

Of the 11 Critically Endangered species, the two species of sawfish (the smalltooth and large tooth sawfish (*Pristis pectinata* and *Pristis pristis*) are considered ecologically (if not actually) extirpated from Belize in the last 30 to 40 years (Graham, in Harrison et al., 2014), primarily as a result of the unregulated use of gillnets. Goliath grouper (*Epinephelus itajara*) populations have decreased significantly (Graham, 2009), as have populations of the Central American river turtle (*Dermatemys mawii*) (Rainwater et al., 2010). Both these species are considered traditional, cultural delicacies and have only partial protection under Belizean law, through size limits, bag limits and seasonal closures.

Despite being a small country, Belize has over forty endemic plant species, many restricted to the pine savannah ecosystems, isolated limestone peaks and sinkholes. The karstic characteristics of the limestone areas has resulted in extensive cave formations with endemic sub-species such as the cave chulin (*Rhamdia laticauda typhla*), a cave-dwelling catfish. At least fourteen other vertebrate species are also endemic to mainland Belize, including the freshwater mountain molly (*Poecilia teresae*), the Petén centipede snake (*Tantilla hendersoni*) and the Maya Mountain frog (*Rana juliani*), all only found only in the Maya Mountains Massif.

The sheltered waters of the reef lagoon, somewhat isolated from the rest of the Western Caribbean, also harbour a number of endemics…to date, twelve endemic marine fish species have been identified from the patch reefs of the coastal lagoon, lying between the mainland and the barrier reef, with another eight

being identified from the outer barrier reef and the atolls (Lobel et al. 2011). Many of these are new species identified in the last five years, with the potential for continued discoveries in the future. These include the white lined toadfish (*Sanopus greenfieldorum*), only known from within the Mesoamerican reef system. The isolated cayes of the barrier reef and atolls also host endemics such as the Island leaf-toed gecko (*Phyllodactylus insularis*), found only on the Atolls (Meerman, 1996).

Implementation of national species recovery strategies, whilst not covering all threatened species (or even all critically endangered species) has had an impact on those targeted. The Critically Endangered hawksbill turtle (*Eretmochelys imbricata*), for example, has shown a population increase noted by both in-water surveys and nesting beach monitoring reports, following full legal protection of this and other marine turtle species in 1992, addressing the issue of overharvesting. The population of the regional sub-species of the West Indian manatee – the Antillean manatee (*Trichechus manatus manatus*) – is also considered to have increased in numbers following inclusion of this species in the Wildlife Act in 1981, giving it full protection, and the implementation of strategies under the Species Recovery Plan developed in 1998 (Auil, 1998), and about to go through revision.

## 2. MAJOR CHANGES IN THE STATUS AND TRENDS OF BIODIVERSITY IN BELIZE

There has not been an in-depth assessment of the status of biodiversity in Belize to date, so this report pulls together the current information and initiatives that have been, and are, ongoing during the assessment period, to provide a partial baseline. Belize is currently developing its National Biodiversity Monitoring Framework (NBMF), led by the Environmental Research Institute of the University of Belize (UB-ERI). The Framework is based on a highly participatory process with Government agencies (Forest and Fisheries Departments), researchers and protected area co-management agencies defining targeted national monitoring questions. Whilst the NBMF is still being developed, once implemented it will provide a baseline and protocols for measuring the status and trends of priority ecosystems and biodiversity in Belize.

A number of remote-sensing studies have been conducted for the terrestrial sector to keep track of deforestation and mangrove clearance (Cho-Ricketts et al., 2010; Cherrington et al., 2011; Cherrington, 2014). Forest inventory data exists for a number of privately held lands and those Forest Reserves under long-term, sustainable forest management concessions, with data from these inventories being used to develop annual export quotas, as required by CITES. More targeted forest inventories are also conducted when necessary, such as the inventory of rosewood in southern Belize, resulting in a moratorium in harvesting of this species until sustainability standards can be set.

The Belize Fisheries Department and co-management agencies have implemented standardized monitoring of trend for marine biodiversity, particularly for coral health and commercial species. For commercial species, these are then used in the development of Species Management Plans, and for determining seasonal closures. An initial assessment has also been made of perceived biodiversity trends in protected areas, conducted as part of the Status of Protected Areas reporting Walker et al., 2010).

***Ecosystems***

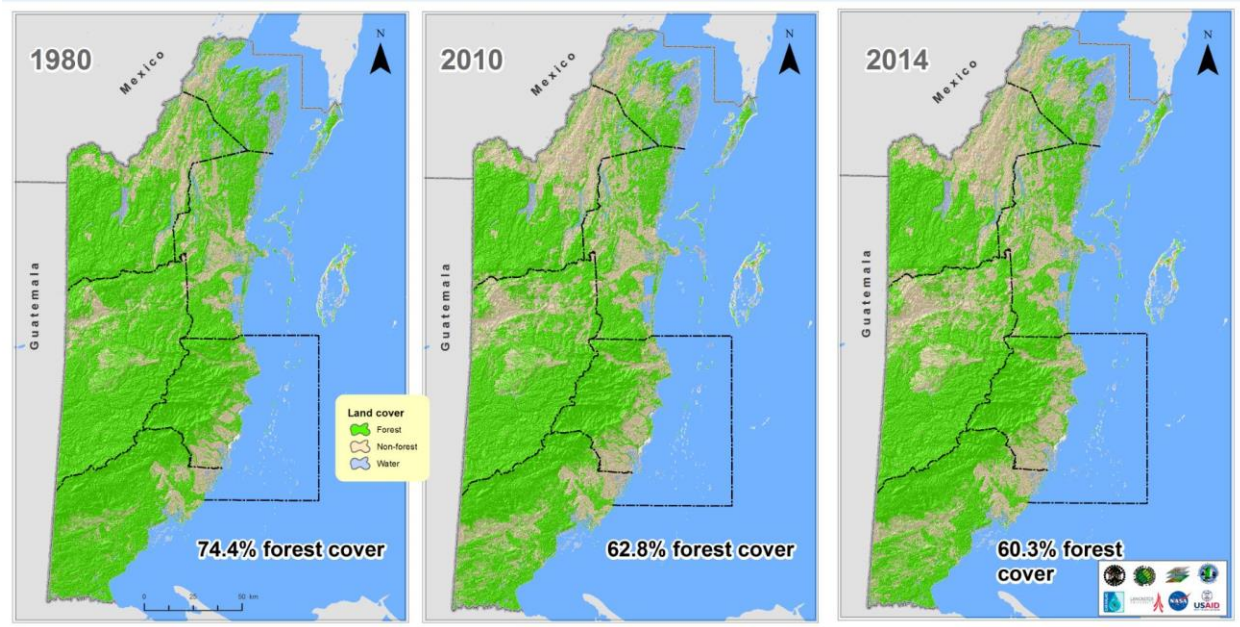
| Year | Forest Cover (ha.) | Change/yr. (ha.) | % Change | % Forest Cover |
|---|---|---|---|---|
| 1980 | 1,648,783 | - | - | 74.4% |
| 1989 | 1,616,027 | 3,593 | 0.22% | 72.9% |
| 1994 | 1,536,025 | 18,823 | 1.17% | 69.3% |
| 2000 | 1,459,301 | 12,784 | 0.83% | 65.8% |
| 2004 | 1,416,530 | 11,033 | 0.76% | 63.9% |
| 2010 | 1,391,391 | 4,220 | 0.30% | 62.8% |
| 2012 | 1,366,300 | 11,231 | 0.81% | 61.6% |
| 2013 | 1,354,155 | 12,144 | 0.97% | 61.1% |

***Forest Cover 1980 – 2013 (Cherrington, 2013)***

With 61.1% of its forest cover intact, and with one of the lowest deforestation rates in Central America, Belize has been acting as a stronghold for Central American wildlife. Species such as jaguars, tapir and white-lipped peccary, indicative of large tracts of intact forest, are still considered to have viable populations, and harpy eagles have been recorded breeding, at the northern-most extent of their range. The deforestation rate has, however, been significant, with forest cover falling from 74.4% of Belize's land territory in 1980 to the current level of 61.1%. The deforestation rate has increased over the last two years (2012 and 2013), approaching 1% for 2013. Data from 2014 suggests that this rate of clearance has accelerated further, with a reduction to 60.3% forest cover (Cherrington, 2014).

Of the 1.35 million hectares of forest cover that remains, approximately two thirds lies within the National Protected Areas System. It is agreed that in general, the protected areas are maintaining their forest cover and ecosystem functionality. However, there are some key areas where incursions are occurring inside the protected area boundaries, with an 8.4% decrease in forest cover since 2010 (Cherrington, 2014). Much of this is along the porous western border with Guatemala. However there has also been some erosion of Forest Reserves within Belize. With the increasing human development footprint, the pressure to access the protected areas for agricultural land has increased. The majority of non-transboundary incursions into protected areas occur where there is a lack of effective management presence on the ground – Grant's Work Forest Reserve, on the coastal plain, for example, has all but disappeared, having been eroded by increasing agricultural incursions, realignments of boundaries and eventual dereservation over the past five years. Where long-term forest licensees or protected area co-management agencies maintain active, on-site management, non-transboundary incursions very seldom occur.

Transboundary incursions, however, are becoming an increasing issue adjacent to the western border with Guatemala. Of the 2012-2013 recorded forest clearance within protected areas, the majority occurred in those protected areas that lie against the western border with Guatemala – Chiquibul National Park, Columbia River Forest Reserve, Caracol Archaeological Reserve and Vaca Forest Reserve. These correspond to agricultural incursions by farmers from Guatemala, driven by limited access to land and rising poverty along the Guatemalan side of border, a porous border, and limited resource on the Belize side for effective surveillance and enforcement.




***Land use change across Belize, 1980 – 2014 (Data from Cherrington, 2015; Adapted from Cherrington et al. 2012)***

Private agricultural sector has been working towards improved environmental sustainability through social and environmental certification – shrimp farms, banana, citrus and sugar cane farms are all in the process of improving their environmental footprint, focusing on better management of agrochemicals, reduction of effluent and protection of riparian and mangrove buffers. This is driven primarily by international market demands, and supported by revisions to the Environmental Protection legislation. These require large agricultural initiatives (over 500 acres) to submit Environmental Impact Assessments before starting development, and for shrimp farms to install settling ponds to remove nutrients before releasing water. The latter is already having a significant impact on levels of nutrient runoff from shrimp farms into Placencia Lagoon, a coastal lagoon considered important for maintenance of fish stocks and manatee populations, with reduction of pollution levels and a corresponding increase in the health of the lagoon ecosystem.

In the coastal / marine environment, there has been a concerted effort by GoB and NGOs to raise the level of ecosystem protection to 10%, with the addition of Turneffe Marine Reserve to the National Protected Areas System. The importance of the ecosystem services provided by mangroves, is recognised in the Forest Act (SI 16 of 1965), and further strengthened by mangrove-specific legislation (SI 52 of 1989 – amended in 2010, but not yet approved). Clearance of mangrove requires a permit from the Forest Department – however this process is often circumvented, as enforcement capacity is limited, and fines are currently too small when compared with the financial incentives of coastal development. This is being amended in the revised mangrove legislation. A recent risk assessment for mangroves suggests that whilst 30% of mangroves are at low risk from human stressors, 58% are at medium risk and 12% at high risk, with the highest incidence of impact on Ambergris Caye (CZMAI, 2013). Mangrove cover maps have been generated for 1980, 1989, 1994, 2000, 2004, and 2010; the last also included a national validation exercise of field visits, generating an estimated mangrove cover of 74,684 hectares.

***Species***

Belize has a total of 105 globally threatened species (11 critically endangered, 31 endangered and 63 Vulnerable) and a further 55 near threatened. A draft list of nationally threatened species was developed as part of the National Protected Areas System Plan, but still requires validation, as part of the update to the National Biodiversity Strategy and Action Plan (Annex 1).

While the Government of Belize focuses on forest, fishery and protected areas management, threatened species conservation efforts are led primarily by the NGO community, generally with the support of the Wildlife Office of the Forest Department (Ministry of Forestry, Fisheries and Sustainable Development). Issues with many of Belize's globally threatened species are being addressed through such initiatives – including the mandating of four NGO rehabilitation facilities (for parrots, primates, manatees and crocodiles), and specific in-situ species conservation programmes in both the terrestrial and marine environments.

The global and national threatened species lists, along with availability of data from protected area managers, formed the basis for selection of seventeen indicators - species of concern - for the terrestrial environment, for assessment as part of the State of Protected Areas reporting. Based on the status of these indicators, the overall viability of species of concern in the terrestrial protected areas system of Belize is considered to rate at the lower end of GOOD - "*populations reduced, but should recover with limited human intervention*" (Walker et al., 2010). For some species - the Central American river turtle (*Dermatemys mawii*), the yellow-headed parrot (*Amazona oratrix*), and the Petén sub-species of the scarlet macaw (*Ara macao*), the Antillean manatee (*Trichechus manatus manatus*), and Yucatan black howler monkey Belize is considered part of the last remaining stronghold, with the most viable populations remaining in the region.

***Case Study: Terrestrial Species of Concern***

The Critically Endangered ***Central American river turtle*** (*Dermatemys mawii*), locally known as the "hicatee", is considered one of Belize's most at-risk species, with a rapidly declining population. It is a cultural delicacy, and whilst there are regulations in place for its protection (year-round possession limits, prohibition of possession of hicatee nets', a brief closed (non-hunting) season, and a complete prohibition on selling and purchasing *Dermatemys*), these still allow for legal hunting when in season. The current level of extraction is considered unsustainable (Rainwater et al., 2010). The recognised need for improved monitoring and protection led to a nationwide survey of hicatee populations in 2010, demonstrating that *Dermatemys* has been heavily depleted in many parts of Belize since the previous surveys in the 1980's and 1990's, with only 39 sub-adult / adult turtles captured during the entire 2010 survey. Hunting pressure is removing this species from many of the watersheds, with only 50% of 1980's survey localities producing capture results. In a few remote areas, however, especially in those areas with some level of protection, relatively healthy populations still remain (Rainwater et al., 2010). Despite the legislation protecting the hicatee, national enforcement across Belize is a challenge unless within an actively managed protected area. The Belize Fisheries Department is the regulatory authority for this species, with enforcement falling under the Fisheries Enforcement Section. Human resources within the section are limited, however, for

effective ongoing surveillance in inland waters outside the protected areas system. In recognition of this, the Fisheries Department is expanding its scope in the freshwater environments through its revised Fisheries Resource Bill (still to be endorsed by Cabinet).

ACTIONS TAKEN: The Forest and Fisheries Departments, Environmental Research institute (University of Belize - ERI) and relevant, key NGOs form the National Hicatee Conservation and Monitoring Network. A number of protected area co-management NGOs are involved in the network and implement targeted surveillance and enforcement for this species, as well as incorporate population monitoring into their field activities, and awareness into their education and outreach programmes. There has been national collaboration to implement an awareness programme, with increased awareness at cultural events, sensitizing communities on the regulations for hicatee. Legislation protecting hicatee banned fishing for hicatee in six areas with key populations (Statutory Instrument #55 of 1993), and strengthening through proposed regulations includes extending the closed season from one to three months and reducing bag limits to only one turtle per person or vehicle.

Endangered ***yellow-headed parrots*** (*Amazona oratrix ssp. belizensis*) have also been flagged as a critical species. Their large size and ability to learn words makes this species particularly attractive for the pet trade, and many households across the country have these parrots as traditional, but illegal, pets. Whilst there has been no recent population assessment in Belize (the last being in 1994), all indications are that numbers have fallen, due to poaching of nestlings for the illegal pet trade, increasing frequency of fires in pine savannas, and competition with citrus farmers. Protected area co-management agencies monitoring this species estimate that there are now fewer than 1,500 individuals remaining in the wild (BBR, 2014).

**SPECIES OF INTERNATIONALCONCERN**

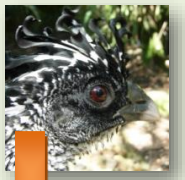
**Decreasing Population Trend**

**Central American River Turtle (Hicatee)**
*Dermatemys mawii*

***Critically Endangered***
**Status in Belize:** Poor
**Risk Level:** Very High

**Yellow-headed Parrot**
*Amazona oratrix*

***Endangered***
**Status:** Fair
**Risk Level:** Very High



**Great Curassow**
*Crax rubra*

***Vulnerable***
**Status:** Fair
**Risk Level:** High

**SPECIES OF NATIONAL CONCERN**

**White-lipped Peccary**
*Tayassu pecari*

**Status:** Fair
**Risk Level:** Very High

**Scarlet Macaw**
*Ara macao*

**Status:** Fair
**Risk Level:** Very High

ACTIONS TAKEN: Parrots are protected under the Wildlife Protection Act (1981). A partnership between the Forest Department Wildlife Programme and NGOs is addressing this decline through both in-situ and ex-situ conservation strategies. Where yellow-headed parrots occur within protected areas, site-specific

initiatives are in place to address threats - managing fires, increasing nesting sites using artificial nest boxes, and increasing enforcement against poaching of the nestlings during the nesting season.

Whilst parrots are protected under the Wildlife Protection Act, the cultural and human resource challenges of addressing the illegal pet trade have meant that until recently, there has been no enforcement of legislation. A significant push for enforcement for all parrots was started in 2012, and strengthened in 2014, with a permit system being introduced for birds in long term captivity, and a no-tolerance stance for new birds entering the trade through poaching. The Belize Bird Rescue centre, one of four Government mandated rehabilitation centres, is working with the Forest Department and the Toledo Institute for Development and the Environment (TIDE) to rehabilitate former captive parrots, for return to the wild at Payne's Creek National Park. A hand-rearing and release programme for at-risk chicks is also being initiated. A population survey is under discussion as a collaborative effort by co-management NGOs, in the recognition of the need for up-to-date population data.

The globally Vulnerable ***great curassow*** (*Crax rubra*), considered a prime game bird species, is also declining throughout Belize, but is still considered present in significant numbers - far higher than those of neighbouring countries - and not yet considered at Very High risk. Areas of greatest pressure are in national forests adjacent to communities (outside of protected areas) and from transboundary incursions from Guatemala in the Chiquibul and Columbia River forests, where this species has been largely extirpated.

The globally vulnerable ***white-lipped peccary*** (*Tayassu pecari*) has been flagged as 'in acute decline' as hunting, forest fragmentation and the increasing human footprint have impacted the once large populations. Whilst there are no specific monitoring plans or conservation action plans in place for peccaries, most effectively managed protected areas maintain a record of sightings and group size, and report declining populations. Large herds of 200 or more have now declined to herds of 30 to 50, and populations have disappeared entirely from more accessible areas of the country. A population decline of 90% or more was reported in the Chiquibul Forest, with illegal hunting of game species as a food supplement linked to the large-scale illegal trans-boundary xaté harvesting by Guatemalans in the Chiquibul Forest in 2005 (Walker et al., 2007). This species is now thought to have been largely wiped out in that area by continued transboundary poaching, though there are indications of re colonization of the peripheral Mountain Pine Ridge area (R. Martinez, pers. com., 2015). Similar pressures are also being reported in the transboundary Columba River forest areas of the southern Maya Mountains Massif.

ACTIONS TAKEN: Three biological corridors have been identified to ensure maintenance of forest connectivity between the large forest nodes (Meerman et al., 2005, Meerman et al., 2011; Walker et al., 2013), and have both the Forest Department and NGOs championing their development. Protected area co-management agencies are conducting surveillance activities against illegal hunting in individual protected areas, and a National Ranger Training Program is being implemented, building ranger capacity, increasing their knowledge of wildlife legislation, effective enforcement and surveillance, and providing an understanding of the principles of conservation and protected area management. The Forest Department is conducting spot checks on restaurants and meat shops suspected of illegally selling game species without a license. The scale and impact of transboundary incursions, however, remain beyond the

capacity of Belize to adequately address on its own, particularly in view of the current political conflict between Belize and Guatemala.

Transboundary incursions from Guatemala are also the main threat for the isolated population of ***scarlet macaw*** (*Ara macao*) in Belize, estimated at fewer than 200 individuals. This species is at high risk from transboundary poaching of nestlings for the illegal wildlife trade, with Guatemalan poachers crossing the border specifically to target the nesting sites during nesting season.

ACTIONS TAKEN: Scarlet macaws are protected under the Wildlife Protection Act (1982). Friends for Conservation and Development, the co-management agency for the Chiquibul area (the primary nesting site location) and a team of volunteers (the Scarlet Six Bio-monitoring Team) provide active protection of as many of the nest sites as possible during the nesting season each year, and in 2014, managed to reduce nest theft, increasing nesting success by two chicks to a total of seven. Despite these concerted efforts, nest poaching has not yet been fully halted.

Forest fragmentation and the increasing human footprint is also a threat for other forest-dependent species – in particular, the Endangered ***Geoffroy's spider monkey*** (*Ateles geoffroyi*) and the ***Yucatan black howler monkey*** (*Alouatta pigra*). Populations are becoming increasingly isolated in the remaining large forest nodes and isolated forest pockets as deforestation and forest fragmentation increases. In the Central Belize area, populations of both these species were affected in 2010 by Hurricane Richard, then in 2011 by extensive fires, and are only slowly recovering (Champion, pers. com., 2014). This trend of impacts from tropical storms and associated post-hurricane fires is predicted to increase in future years with the increasing impacts of climate change, pressuring the populations further. Both these species also face threats from the illegal pet trade, with over forty five primates currently in rehabilitation, being prepared for release back into the wild.

ACTIONS TAKEN: Both primate species are protected under the Wildlife Protection Act (1982, currently revised and waiting approval). The Forest Department works closely with Belize's Primate Rehabilitation Centre, which focuses on rehabilitation of these two species and, where feasible, reintroduction back into the wild. 85% of the over 80 individuals to have entered the rehabilitation programme in the last four years are ex-pets, confiscated by the Forest Department in its no-tolerance campaign against the wildlife trade in Belize. The remaining 15% of intakes are injured, wild primates, displaced primates wandering into urban areas, or from stranded individuals or troops isolated in forest fragments by agricultural expansion.

The ***Jaguar*** (*Panthera onca*) also requires extensive tracts of natural vegetation, as well as a healthy prey base, and is therefore a logical keystone species target for active conservation initiatives in Belize, linked to the establishment of biological corridors. This species, protected under the Wildlife Protection Act (1982, currently revised and waiting approval), is coming increasingly into conflict with humans as agricultural expansion encroaches on forest areas - over 60 cats were reported killed by farmers between 2002 and 2004 as a result of livestock conflicts across the country (Foster, 2008). Despite this, jaguars are still found throughout Belize and are not considered in danger of disappearing in the near future. Long term viability, however, is being affected by deforestation and forest fragmentation.

ACTION TAKEN: The maintenance of the large forest nodes and establishment of biological corridors for maintaining forest connectivity are the most effective strategies Belize has for maintaining its jaguar population. The Forest Department has a Wildlife Conflict Officer tasked to deal with problem jaguars attacking livestock in and around rural communities, and works with farmers to improve livestock management to reduce conflict. A Problem Jaguar Rehabilitation Program has been established at the Belize Zoo to take trapped jaguars, rather than killing them, but it is accepted that these animals cannot be returned to the wild. The Program is now full and can't take any more jaguars. Farmers are allowed, by law, to kill jaguars that are threatening their lives or that of their livestock, but are required to report such killings to the Forest Department (though this often doesn't happen).

Whilst not included within the species indicators, the viability of the ***key nesting bird colonies*** is of particular national concern, with species such as brown pelicans, magnificent frigatebirds, great egrets, reddish egrets, white ibis, and roseate spoonbills at high risk from losing nesting sites through caye development. Seven Bird Sanctuaries were established in 1977 under the Lands Act for the protection of key bird nesting and roosting sites on cayes. However, only one of these sites (Man O' War Caye, located within South Water Caye Marine Reserve) is fully integrated into the National Protected Areas System, and few of the others have any significant management presence (Walker et al., 2013). Protection of these sites is doubly difficult as at times the colonies shift cayes, and some key colonies, particularly for wood storks, were not included within the original listing. The question of mandate is also an issue and needs to be addressed, as the sites are designated under the Lands Department, not under the National Parks System Act, Forest Act or the Fisheries Act, and are therefore lie under the mandate of the Ministry of Natural Resources rather than the Ministry of Forestry, Fisheries and Sustainable Development.

ACTIONS TAKEN: Recommendations have been made in the NPAPSP Rationalization process for addressing this significant gap in species representation, and for the re-designation of the Bird Sanctuaries as protected areas under the National Protected Areas System, during the revision of the National Parks System Act.

A number of ***tree species and non-timber forest products*** are managed under the Forest Department through the Forest Act (1927, revised 2000). However, limited human and financial resources, combined with tropical storm and hurricane damage to forests, have led to over-harvesting of several species, including rosewood, cedar, mahogany and xaté.

ACTIONS TAKEN: Whilst these timber and non-timber species are unlikely to become extinct in Belize, species management practices are being put in place to better manage them. A moratorium, for example, has been declared on the harvesting of Honduran rosewood (*Dalbergia stevensonii*), pending a stock assessment on which informed management decisions can be made, in response to concerns of illegal and unsustainable harvesting in national lands at a level that had the potential to remove all seed trees. The impacts of such positive steps are, however, often significantly diminished by political interference.

The timber industry is regulated through short term and long term licences, with over 900,000 acres of both private and national forested land under license (Forest Department, 2014). Logging is generally low intensity, relatively low impact, and selective for those trees preferred by the timber market, leaving the

overall structure of the forests intact. Strict regulations spell out the need for license holders to ensure minimal impacts in riparian areas, and maintenance of hill slope forests over 25%. The intent is to move away from short term licenses to 40 year long term sustainable forestry management licences. These provide sufficient security for license holders to be able to invest in replanting and rotational harvest of timber stocks. After severe tropical storms or hurricanes, salvage licenses will be approved but are difficult to monitor, with limited human and logistical resources available for adequate supervision. Past experience has shown that salvage licenses are often operated indiscriminately and without though for long term sustainability, removing the remaining healthy seed trees as well as those damaged by the storms. The licensing processes for all license types are also undermined at times by arbitrary provision of licenses to unqualified, politically connected people or companies

The Forest Policy is currently being revised and will guide and strengthen future forest management by the Forest Department.

***Case Study: Marine Species of Concern***

Belize is famous for its ***barrier reef***, stretching parallel to the shore along the length of the country. Belize also has three offshore atolls that benefit from being largely isolated from the majority of land-based human impacts. With its aesthetic beauty and rich marine life, the reef and associated ecosystems bring critical tourism dollars into Belize's economy, and supports an important traditional, low-technology fishing industry. The health of the reef, however, has been declining since the 1970's / 1980's, with a phase shift from greater coral cover to greater macroalgal cover. Monitoring under the Healthy Reefs initiative using the Simple Integrated Reef Health Index (SIRHI), provides data for key indicators, scanning a period from 2008 to 2012, over 36 sites in Belize, and covering % coral and macroalgal cover, and herbivorous and commercial fish biomass).

| SIRHI Indicator | 2008 | 2010 | 2012 |
|---|---|---|---|
| Coral cover % | 12 | 9 | 19 |
| Fleshy macroalgae % | 9 | 17 | 16 |
| Herbivorous fish (g. 100m$^3$) | 1788 | 1407 | 1870 |
| Commercial fish (g. 100m$^3$) | 757 | 573 | 495 |

***Healthy Reefs, 2012***

5% of the coral reef survey sites in Belize are rated as Good, 22% as Fair, 44% as Poor and 29% as Critical (Healthy Reefs, 2012). In general, the mean % coral cover increased from 12% in 2008 to 19% in 2012, and is considered Fair, though over a similar time frame, the mean % macroalgae cover also increased from 9% to 16%. The ratio of the two has improved, with the average coral cover now exceeding macroalgal cover. Between 2006 and 2012, 14 sites increased and 19 decreased in health, with 6 showing no change. Over the same timeframe, commercial fish biomass declined by 35% and non-commercial, herbivorous species remained stable (Healthy Reefs, 2012). Climate predictions for Belize suggest that the prognosis for reef health is not good – the marine environment in Belize lies on the threshold of coral temperature tolerance – the predicted 1°C sea surface temperature rise will take many of the corals out of their tolerance range. Whilst short term increases in temperature have been linked to coral bleaching events of differing severity, corals have shown an ability to recover, and it is hoped that this resilience may assist them in adapting to the higher temperatures predicted.

**SPECIES OF INTERNATIONALCONCERN**

**Goliath Grouper**
*Epinephelus itajara*

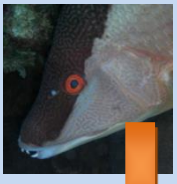
***Critically Endangered***
**Status in Belize:** Fair
**Risk Level:** Very High

**Hawksbill Turtle**
*Eretmochelys imbricata*

***Critically Endangered***
**Status in Belize:** Good
**Risk Level:** Very High

**Hogfish**
*Lachnolaimus maximus*

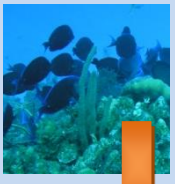
***Vulnerable***
**Status in Belize:** Fair
**Risk Level:** High



**ECOSYSTEMS**

**Coral Reef**

**Status in Belize:** Fair
**Risk Level:** Very High

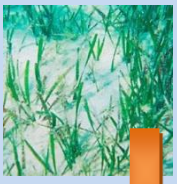


**Mangroves**

**Status in Belize:** Good
**Risk Level:** Medium

**Seagrass**

**Status in Belize:** Very Good
**Risk Level:** Low



ACTIONS TAKEN: Belize reef conservation strategies include the establishment of a network of marine protected areas that include replenishment zoning, management of the fishery, and programmes such as the highly innovative and successful "Fragments of Hope" initiative - growing resilient coral fragments in nurseries and planting out in impacted reef areas. Reef resilience to climate change impacts – particularly increased water temperatures and increased ocean acidification, has been shown to increase when local human pressures are reduced, and there are several initiatives being implemented to reduce land-based pollution.

The Belize Fisheries Department has set a number of strategies in place that will assist in building reef resilience. Key legislation was enacted (SI 49 of 2009) to protect larger parrotfish species, once it was demonstrated that populations of these primary reef grazers showed significant decreases in numbers from over fishing. This is being effectively enforced to protect all grazers responsible for maintenance of reef health. This is reflected in the increase in herbivorous fish biomass to 1870 g.100m$^2$ in 2012, though this is still considered Poor when compared with the regional average of 2049 g.100m$^2$ (Healthy Reefs, 2012). It is hoped that the increase in grazers will be reflected by a decrease in macroalgae in future years (Healthy Reefs, 2012).

Belize has four sea turtle species – the Critically Endangered ***hawksbill*** (*Eretmochelys imbricata*) and ***leatherback*** (*Dermochelys coriacea*) turtles**,** and the Endangered ***green*** (*Chelonia mydas*) and ***loggerhead*** (*Caretta caretta*) turtles nesting in Belize. Sea turtle populations are fully protected, but remain highly threatened by loss or degradation of nesting habitat, particularly through coastal development, and from impacts from neighbouring countries.

ACTIONS TAKEN: All marine turtles are legally protected and cannot be taken. Following their designation as protected species, turtle numbers and numbers of nests are now increasing. A Turtle Monitoring Network engages both Government and Non-Government agencies in monitoring of nesting beaches and in-water population surveys, as well as citizen scientists under the ECOMAR Turtle Watch programme.

***Shark populations*** in Belize have declined significantly over the last ten years. Only the whale shark (*Ryncodon typus*) and the nurse shark (*Ginglymostoma cirratum*), with their high tourism value, are under legal protection. The Endangered scalloped and great hammerheads (*Sphyna lewini* and *S. mokarran*), and Vulnerable oceanic whitetip and dusky sharks (*Charcharinus longimanus* and *C. obscurus*) are among those species targeted by shark fishermen, primarily as transboundary incursions to provide fins for the shark fin trade. At one point, over 2,000lbs of shark meat was illegally exported to Guatemala per week (Graham, pers. com.), a level that cannot be considered sustainable. Also of concern are the high levels of methyl mercury contamination in 87% of shark tissue samples tested (Graham, pers. com.).

Belize has already seen the local extinction of two species - the Critically Endangered the largetooth and the smalltooth sawfish (*Pristis perotteti* and *P. pectinata*)) (IUCN, 2014). These species inhabited shallow bays, lagoons and estuaries and were a primary target when gill nets first arrived in Belize. Populations declined rapidly, and by 1985, the last known individuals were caught, with no further validated reports in many (>10) years. However, unverified reports from northern Belize suggest that a remnant population of smalltooth sawfish may still be present in isolated coastal lagoons - anecdotal records are received most years from local fishermen of one or two adults and juveniles, generally after storm events (Walker / Community consultations, Sarteneja, 2014; Graham, in Harrison et al., 2014).

ACTIONS TAKEN: The marine protected areas system forms the foundation of Belize's ecosystem-based fisheries management, with effecting enforcement of rules and regulations benefitting all marine species, including sharks. The increasing management effectiveness in shark nursery areas such as Corozal Bay Wildlife Sanctuary and the designation of Turneffe Atoll Marine Reserve in 2012 also strengthens Belize's commitment to maintaining sharks in Belize waters. The Belize Fisheries Department is in the process of developing a Terms of Reference for creation of the National Shark Working Group, to tackle the issues of shark fishing in Belize waters, and to assist with the finalisation of the Shark Action Plan.

The ***commercial fishery*** is critical in terms of both the national economy and in supporting coastal communities. Over the last fifteen years, marine resources have been declining, and data spanning 2010 – 2012 suggests that this decline is accelerating. The fishery is threatened by the open access regime, overfishing, illegal incursions from neighbouring countries, illegal and politically motivated issuing of fishing licenses to non-residents, declining reef health, increasing land-based impacts, the arrival of the invasive lionfish, and insufficient funds for effective surveillance and enforcement – overshadowed by the implications of climate change.

The two major capture fishery products, lobster and conch, had an export value of BZ$25.4 million in 2013, and directly support over 2,750 fishermen and their families. Belize is one of the few countries where fishing is entirely by free-diving, limiting the depths at which conch and lobster can be harvested. The fishing is also limited by weather – particularly in the tropical storm season - with boats being either open launches or small wooden sailboats. Each sector of the fishing industry – lobster, conch, finfish, sea cucumber and aquarium fish – also has its own set of regulations, season closure, size limits and quotas.

***Caribbean spiny lobster*** (*Panulirus argus*) is the most economically-important marine species in the national capture fishery. The lobster fishery is currently regulated by a fishing season (from June 15$^{th}$ to

February 14th of the following year), a size limit (minimum of 3 inch carapace length, minimum tail weight of 4 ounces), a ban on the use of SCUBA and other gear restrictions, and license limitations. It is significant to note that the general trend of total national lobster production over the period from 1981 to 2008 is a decline of almost 37.2% (Fisheries Department, 2014), but production is now considered to have stabilized, suggesting that the stock is fully exploited. However, with the increasing number of fishermen, this has resulted in each fisherman taking less product home.

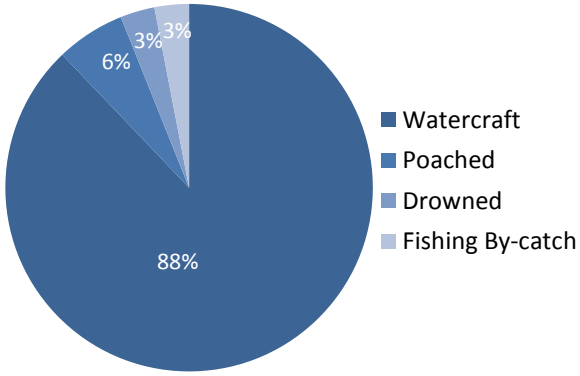
The second most important commercial species is the ***Queen conch*** (*Strombus gigas*). This is regulated by size regulations (minimum shell length of 7 inches and market clean weight of 3 ounces) and gear restrictions (a ban on the use of SCUBA). Surveillance of fishing was further strengthened by legislation that prohibits fillet and dicing to prevent undersized harvesting (SI 90 of 2003). Belize carries out bi-annual national conch surveys before the start of the open season and at season closure to inform management, define annual quotas, and to provide leverage for Belize's continued fishing of this species. Other countries in the region with more industrialised fishing recently called for this species to be listed as endangered or threatened under the ESA of the USA, which would have had implications on the export market for the conch products. However, the USA has recently concluded that the petition for listing in the ESA has no merits due to the lack of scientific information showing a decline of stocks, and no further actions are expected in the short-term future (Federal Register, 2014).

Commercial finfish have shown an ongoing decrease in mean biomass, from 700 g.100m$^2$ in 2009 to 495 g.100m$^2$ in 2012. This rates as Poor, particularly when compared with the regional average of 728 g.100m$^2$ (Healthy Reefs, 2012). Large specimens of the Endangered ***hogfish*** (*Lachnolaimus maximus*), for example, one of the most prized commercial species, have almost disappeared from the reef. The Critically Endangered ***goliath grouper*** (*Epinephelus itajara*) has shown significant decline over the last ten years in Belize, with the average fish length at landing decreasing, and many of those fish now reaching market below reproductive age. Unlike the Endangered ***Nassau grouper*** (*Epinephelus striatus*), the goliath grouper is not fully protected under the Fisheries regulations, though is governed by size restrictions in the revised Fisheries regulations (draft, waiting acceptance by Cabinet). Many of the commercial finfish species – particularly grouper and snapper - spawn in aggregations in specific sites along the reef. Legislative protection, targeted surveillance and enforcement, and monitoring of the sites has resulted in some recovery being reported at those sites that have more effective protection. Three sites reported over 1,000 Nassau grouper for 2012, with the highest counts being from Northeast Point (Glovers Reef Atoll), averaging 1,725 individuals (SPAG Working Group, 2013). Numbers, however, are still considered critically low. The Spawning Aggregation Working Group plays a key role in this initiative, and is composed of the Fisheries Department, Wildlife Conservation Society and NGO co-management partners.

The greatest strides forwards in fisheries management is the implementation of a national roll out of Managed Access (MA), a rights-based fishery management regime, for all of Belize's marine reserves. MA supports fishermen that traditionally use specific marine reserves through restricted access permits, building ownership of the resource and vested interest in effective management of the protected areas. Currently in its pilot phase in two marine protected areas, MA is soon to be rolled out across all the territorial waters through the establishment of 9 fishing zones / fisheries management areas.

***American crocodile*** (*Crocodylus acutus*) populations are declining, with impacts on their nesting beaches from coastal development, and increasing human conflicts on the cayes. The population is thought to consist of less than 1,000 individuals, based primarily at Turneffe Atoll Marine Reserve, though the population also extends to other cayes.

ACTIONS TAKEN: Crocodiles are protected under the Wildlife Protection Act, and the Forest Department responds to reports of problem crocodiles. The Wildlife Officer of the Forest Department works closely with the American Crocodile Education Sanctuary (ACES), its NGO partner, to reduce the conflict between crocodiles and people in Ambergris Caye, the predominant area of conflict for this species, removing problem crocodiles as and when necessary. Part of the largest nesting area and nursery lagoon for this species is included in the Cockroach Bay Reserve, recently integrated into the zoning for the newly declared Turneffe Atoll Marine Reserve.




***Belize Manatee Stranding data of known causes, 2008 - 2013 (Galves, pers. com., 2014)***

Belize is considered a stronghold for the ***Antillean manatee*** (*Trichechus manatus manatus),* an Endangered sub species of the Vulnerable West Indian manatee. Manatees in Belize are facing increasing threats from tourism activities in the coastal area, particularly linked to cruise ship tourism. With the projected development of two cruise ship disembarkation points on near-shore cayes, both in key manatee areas, it is predicted that the population will face increased pressure, particularly from boat strikes, the primary cause of death in Belize (Galves, pers. com.). Between 2008 and 2013, 82 manatees have been reported as dead. Of these, definite cause of death is known for only 33 animals. Of these, 88% were caused by boats, many in the Belize River (Galves / CZMAI, 2014). High levels of heavy metals have been detected during necropsies in two key manatee sites (Corozal Bay Wildlife Sanctuary and Placencia Lagoon), pointing to issues of water contamination. With a population estimated at between 800 and 1,000, this may be significant cause for concern

ACTIONS TAKEN: A species recovery plan for manatees was written in 1998 (Auil, 1998), and guided the implementation of key strategies – the formation of the Manatee Working Group and the Belize Marine Mammal Stranding Network, declaration of three protected areas in key manatee areas, and the establishment of a Manatee Rehabilitation Centre, mandated under the Forest Department. The Manatee programme is still active in Belize, with a dedicated officer housed in the Coastal Zone Management Authority and Institute (CZMAI), supported by Sea2Shore, an international NGO. However, despite increased awareness and protective measures, mortality in the last two years has increased exponentially, as boat traffic increases in key manatee areas – the highest incident area being in front of Belize City and the adjacent lower estuarine reaches of the Belize River. Project-based strategies have been focusing on this key area, raising awareness of the risks to this species, particularly among tour guides, tour operators

and boat captains that use the river. However, being project-based, it is difficult to sustain activities for long-term impact. Revised species management planning is beginning in early 2015 (Galves., 2014).

***Belize's National Protected Areas System***

Belize's primary conservation intervention under the CBD is through the establishment and management of protected areas. The National Protected Areas System, as a tool, is effective in maintaining representative and intact ecosystems - over 90% of Belize's 68 recognized ecosystems have greater than 10% representation within the National Protected Areas System (NPAS), and 60% of ecosystems have greater than 30% representation (Walker et al., 2013).

The number of protected areas in Belize has fluctuated since 2005, through both new declarations and dereservations, with a current total of 103 (NPAS, 2013). Of these, 52 lie under the administration of the Forest Department, with a further 9 Marine Reserves and 12 spawning aggregation sites (many of which overlap existing Marine Reserves), being administered by the Fisheries Department. A further 19 Archaeological Sites are designated for their cultural importance, managed under NICH through the National Institute of Culture and History Act (1972), and 7 Crown Bird Colonies lie under the management of the Ministry of Natural Resources. 8 private protected areas are currently recognised within the National Protected Areas System.

Protected areas cover approximately 35.8% of Belize's land territory, an increase of 12.7% from 35.1% in early 2010, with the addition of four new protected areas (Cherrington, 2014). This reaches and exceeds the target set by the Convention on Biological Diversity. In the marine environment, 19.8% of the Territorial Sea lies within marine protected areas (TNC, pers. com., 2014). This is a significant increase since 2010, with the designation of Turneffe Atoll Marine Reserve in 2012, the largest of Belize's marine protected areas. However, even with this, only 6.7% of Belize's territorial waters can be classified as replenishment or "No Take" zones (TNC, pers. com., 2014) – the rest is under "General Use Management" which allows low tech commercial, recreational and subsistence fishing.

There are some discrepancies between protected area shapefiles – the official Lands Information Centre shapefiles are based on the individual Statutory Instruments (SIs) used to describe and establish the protected areas. However, there is a recognition that past descriptions are often incorrect, being defined based on the coarse scale Ordinance Survey maps for the country, or using old / inaccurate GPS coordinates. Further challenges come from the fact that some protected area boundaries are defined by rivers or coastlines, which change over time, altering the actual area (Lands Information Centre (LIC, pers. com., 2014). A similar issue exists in the marine reserves, with SIs for spawning aggregations overlapping those for general protected area boundaries, resulting in "double counting" of areas.

Several Forest Reserves, in particular, have been surveyed and de-reserved in part or whole, and are now productive agricultural lands…however are still officially within the protected areas system, as their SIs have not been altered. This includes Mango Creek (3), Grants Works, and Monkey Caye – all considered defunct, as well as the fertile river valleys of Sibun and Manatee Forest Reserves – now supporting citrus.

Whilst these issues are recognised, the official LIC shapefiles can only be changed with the revision of each individual Statutory Instrument – which will take time. However, this will also provide an opportunity for revisions based on the NPAPSP Rationalization recommendations for better representation of the small number of ecosystems that currently fall beneath the 10% ecosystem representation goal. A second, amended protected area shapefile has therefore been developed by Belize Tropical Forest Studies (BTFS) that more accurately shows the current protected areas system that exists on the ground, and is used for assessment of ecosystem coverage and representation (BTFS, 2014). A further amendment was made by the Nature Conservancy (TNC) to remove overlap of spawning aggregations and marine protected areas, to allow accurate assessment of ecosystem coverage within the marine environment.

Declaration of new protected areas (or realignments of existing protected areas) are guided by prioritization criteria established as part of the National Protected Area System Plan (Meerman et al., 2005) and strengthened through the rationalization exercise, based on values for ecosystem services, socio-economic benefits to communities, importance in facilitating biodiversity and ecosystem resilience to climate change, connectivity, ecosystem representation and biodiversity importance (Walker et al., 2013). As a result, four new protected areas have been declared since 2010, with a total area of approximately 135,165 hectares. The largest and most recent of these, Turneffe Atoll Marine Reserve, was based on its importance for the fishing and tourism industries, for representation of the deep sea marine environment, the high level of connectivity between reef, seagrass and mangrove, the presence of littoral forest and the need for a management framework for the predicted development impacts.

## 3. THE MAIN THREATS TO BIODIVERSITY IN BELIZE

The main pressures on biodiversity and ecosystems in Belize are well recognised and defined in the outputs, and can be categorised into a number of key broad direct threats:

**Primary Pressures on and Threats to Biodiversity in Belize**

- Land use change (deforestation, clearance of mangroves, filling of wetlands)
- Climate change
- Unsustainable exploitation of natural resources (fishing, hunting, logging / non-timber forest products)
- Pollution (agrochemicals, industrial / urban effluent, solid waste, sewage, sedimentation)
- Anthropogenic fires
- Invasive species
- Unsustainable Tourism Practices (exceeding guide/visitor ratios, exceeding limits of acceptable change, poor boat practices, impacts from cruise ship tourism)
- Transboundary incursions
- Natural disasters (hurricanes, earthquakes)

As part of the Stocktaking and Targets Setting activities, a national assessment of anthropogenic threats and drivers responsible for biodiversity loss was conducted using information from a literature review and

a series of regional meetings in 2014 (Table …). The regional meetings were conducted with broad stakeholder participation from a wide range of Government sectors and sectors of civil society, with the target of updating and validating threats and drivers across the country.

| Direct Threats / Pressures | Extent | Impact | Permanence | Total |
|---|---|---|---|---|
| Land Use Change | 4 | 4 | 4 | 64 |
| Coastal / Caye Development | 3 | 4 | 4 | 48 |
| Invasive Species (Lionfish) | 4 | 3 | 4 | 48 |
| Pollution | 4 | 3 | 3 | 36 |
| Unsustainable Fishing | 4 | 4 | 2 | 32 |
| Unsustainable Logging | 3 | 3 | 3 | 27 |
| Removal of riparian / coastal 66' | 3 | 4 | 2 | 24 |
| Unsustainable Hunting | 4 | 3 | 2 | 24 |
| Forest fires | 2 | 3 | 3 | 18 |
| Mining in rivers | 3 | 3 | 1 | 9 |

| **Extent** | **Impact** | **Permanence** |
|---|---|---|
| (4) Throughout (> 50%) | (4) Severe (target eliminated) | (4) Permanent (> 100 years) |
| (3) Widespread (25-50%) | (3) High (target seriously degraded) | (3) Long term (20-100 years) |
| (2) Scattered (5-25%) | (2) Moderate (moderately degraded) | (2) Medium term (5-20 years) |
| (1) Localized (< 5%) | (1) Mild (slight impact) | (1) Short term (< 5 years) |

**Table …Threat Assessment, Wildtracks, 2014**

Each threat was assessed based on Extent, Impact and Permanence, the total (E x I x P) being used to identify priority threats and drivers at the national level. Direct threat outputs were rolled-up into a final assessment of prioritised threats. More specific threats were rolled up into the primary pressures and threats – for example, Unsustainable Exploitation includes the illegal wildlife trade as a component of non-timber forest products.

***High Priority threats Identified during Regional Workshops***

Drivers identified from these workshops were defined at two levels:

- Direct Drivers –conditions that lead to the pressure and threats identified;
- Indirect Drivers –anthropogenic reasons behind the Direct Drivers

| Direct Drivers | Indirect Drivers |
|---|---|
| ▪ Market demand<br>▪ Conflicting Government sector-specific policies<br>▪ Government incentives<br>▪ Livelihood diversification<br>▪ Culture / tradition<br>▪ Limited capacity for effective enforcement | ▪ National policies for economic growth<br>▪ National poverty alleviation strategies<br>▪ National and international market demand<br>▪ Delay in implementation of national frameworks<br>▪ Inadequate national investment in natural resource management<br>▪ Porous border |

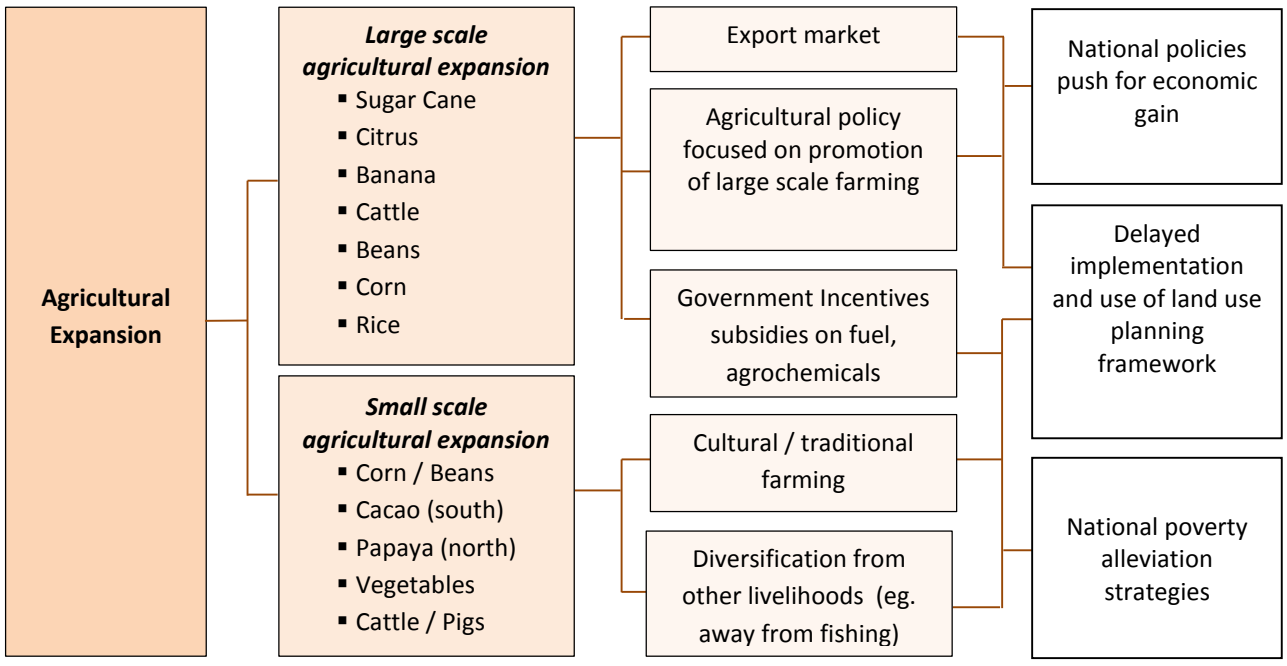
| | |
|---|---|
| ▪ Household needs – food, water, shelter, income | ▪ Culture / tradition<br>▪ Poverty |

## *Land Use Change*

Land use change results in the conversion of natural landscapes to man-made through a number of avenues, including deforestation, filling of freshwater and mangrove wetlands, and dredging of seagrass. Two primary drivers have been identified at the national scale - Agricultural Expansion (including aquaculture), and Population Expansion/Coastal - Caye Development

**Agricultural Expansion:** Agricultural expansion is occurring on two scales:

- large-scale commercial farming throughout much of the southern and central coastal plain, and northern Yucatan limestone plateau
- small scale slash-and-burn / slash-and-mulch milpa farming, primarily around rural communities in the south and west of Belize, but also occurring adjacent to rural communities in central and northern Belize as well




***Agricultural Expansion: Drivers***

***Challenges:***

- Delayed endorsement and implementation of Integrated Land Use Planning Framework as a tool to guide national planning of agricultural activities based on best use of land
- Increasing large-scale clearance of forest by rapidly expanding Mennonite farming communities
- Low/minimal focus on, or investment in, natural resource management by central Government - short term gain over long term sustainability
- Push to promote farming as an alternative to fishing, to address the issue of unsustainable fishing in the marine environment
- Limited focus on restoration of degraded farmlands – culture is to apply for and clear more land rather than restore degraded land
- A perception that farming and conservation are mutually exclusive
- Limited investment in, or promotion of, more intensive farming methods that require less area (few models within Belize demonstrating success, reluctance by farmers to risk the investment)
- Increased diversion of water for irrigation

***Opportunities:***

- Largest agricultural industries (citrus, banana, sugar cane) are becoming certified to meet their market requirements
- Environmental impact assessments (EIAs) are required for large agricultural projects (> 500 acres), with development of environmental compliance plans to assist in mitigation of impacts such as clearance of biological corridors, dredging, filling and / or contamination of wetlands, and removal of under-represented ecosystems
- NGO initiatives to strengthen small-scale farming and increase environmental sustainability
- Organic farming movement – small but reviving
- National assessments of climate change impacts on agricultural and aquaculture sectors, with recommendations for adaptation strategies

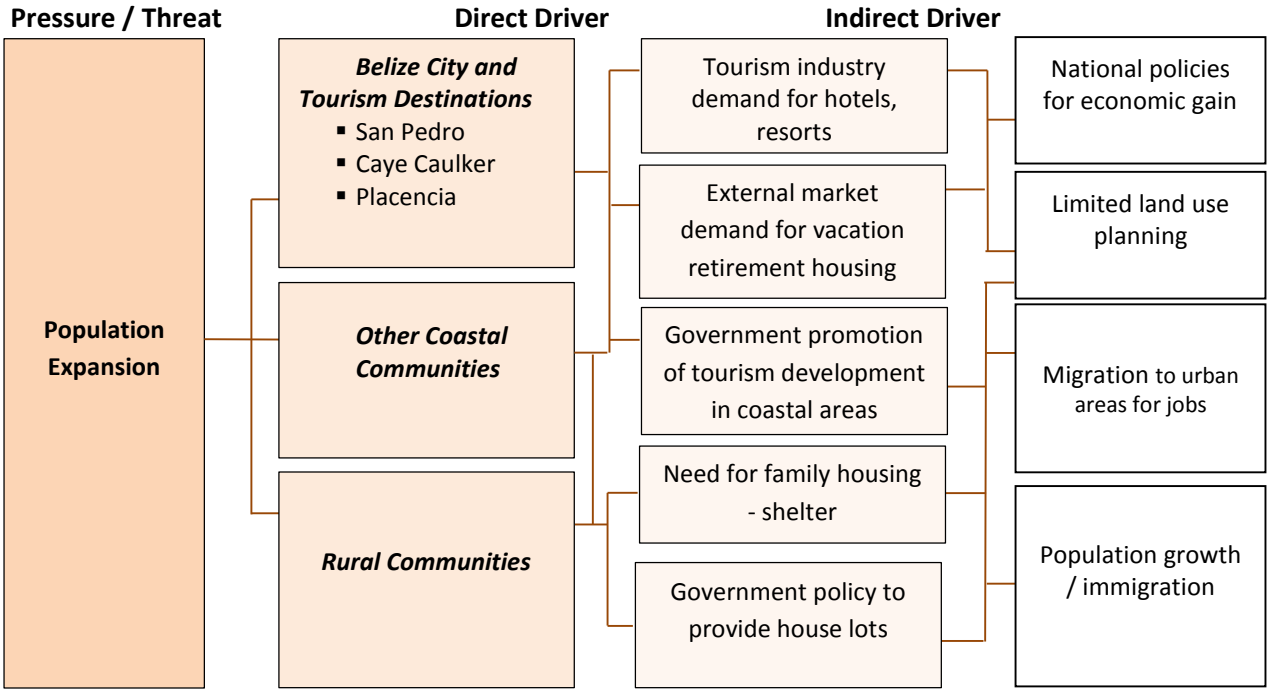
***Links to other Threats:*** Agriculture and agricultural expansion are also linked to other threats:

- agrochemical pollution of air, soil and water
- effluent runoff from shrimp farms
- increased sedimentation in rivers and on reefs / in coastal waters

***Expansion of Population Centres***

Expansion of population Centres can be categorised as occurring in three sectors:

- expansion in coastal and caye areas designated for development focus
- expansion of smaller coastal communities
- expansion of inland, rural communities and district centres (including Belmopan)




***Urban Expansion: Drivers***

*Land Use Change in the Coastal Zone*

The coastal shoreline and cayes are the most vulnerable in terms of development impacts, with the potential for affecting the long term viability of coastal biodiversity. Coastal and caye development for tourism has resulted in the removal of mangroves, littoral forest and coastal strand communities throughout Belize, resulting in caye destabilization, increased beach erosion, beach loss and sedimentation impacts on the reef. In addition, shoreline structures such as piers, dredged access routes, marinas and seawalls have led to loss and/or alteration of habitats. In cases of poor development practices, live and dead coral have been used as land fill.

Clearance of natural vegetation on the cayes undermines the stability of the islands themselves, making them, along with any infrastructure, a great deal more susceptible to the impacts of hurricanes and sea level rise. Red mangrove and herbaceous beach vegetation play a critical role in stabilizing coastal and caye structure, reducing coastal erosion, beach loss and sedimentation as well as providing nursery functionality for many marine species. Among the most threatened ecosystems in Belize, their loss is accelerating as the developmental value and demand for beach frontage escalates. The long-term sustainability of coastal and caye-based tourism and residential developments would be significantly more financially viable through the maintenance of these natural ecosystems.

The increasing focus and national push for coastal development in areas such as San Pedro and Placencia is also leading to migration of workers to these areas, with urban sprawl into less habitable and less healthy mangrove swamps, and a need for more dredging and landfill not only for the developments

themselves, but also for housing those people moving into the area in search of work. Poor sanitation in these peripheral areas has led to high pollution levels.

*Inland Community Expansion*

Belize has a very low population density, but one that is growing fast, both from natural population increase and from immigration from adjacent Central American countries. Unplanned growth of communities, whether small rural communities or urban population centres, will have an impact on the adjacent ecosystems and natural resources, with clearance of natural vegetation, draining of swamps in wet areas, and land fill.

Most communities still have a village or town reserve with lands available for allocation for development, but activities such as land fill of low, swampy areas or mangroves are often done on a per household basis, and poorly coordinated, with fill from one lot causing flooding in the next. Installation of roads does not always take into account the natural flow of water, resulting in increased flooding in some areas.

Some indigenous communities in the south have discussed setting aside village land as forest reserves, to ensure supply of construction materials and medicinal plants (Walker et al., 2009), but whether this will be viable as the communities grow, and there is more call for land, is still to be seen.

***Challenges:***

With projections for very significant population growth by 2030, the human footprint from both community and agricultural expansion will be increased substantially. Biodiversity impacts will inevitably be considerable, but may be mitigated to some extent by improved implementation of land use planning outputs. Challenges include the:

- Delayed endorsement and implementation of the Integrated Land Use Planning Policy and Framework as a tool to guide national planning of urban expansion activities
- Delayed endorsement of the Integrated Coastal Zone Management Plan for guiding decision making in the coastal and caye areas
- Delayed endorsement of the revised Mangrove Protection Act
- Over-riding of endorsed development plans and guidelines by Government for short-term gain
- The issue of informal/ unplanned establishment of new rural communities, particularly by immigrant populations, that can lead to their location in unsuitable areas with inadequate access to farmland to support them in the long term, increasing pressure to access land within protected areas, and increasing the threat of incursions
- Need for improved capacity in community leadership for better planning of community growth, especially with relevance to coastal protection and planning land fill / drainage
- Increasing recognition of Belize as a tourism / retirement destination, leading to potentially unsustainable expansion of key areas such as San Pedro, Caye Caulker and Placencia

***Opportunities:***

- Government and non-Government initiatives to build capacity of village councils
- NGO and NEMO assessments of community vulnerability to natural disasters and recommendations for adaptive development
- Government and NGO climate change initiatives including community development planning, particularly for more vulnerable coastal communities
- Climate change adaptation integrated into planning for Belize City (Padeco, 2012)

***Links to other Threats***:

Development is also linked to other threats:

- Poor solid waste management, and pollutant leakage into water table and waterways
- Poor sewage management, with eutrophication of adjacent waters
- Increased water use, drawing down the local aquifer
- Increased boat traffic in coastal areas, with increased water craft collisions with marine mammals

The Forest Department has identified a number of policy-based and incentive–based solutions for addressing Land Use Change (Forest Department, 2014):

| Addressing Land Use Change | | |
|---|---|---|
| **Driver** | **Policy Based Intervention** | **Incentive Based Interventions** |
| Agriculture | Implement Land Use Policy and Planning Framework | Amend Land Tax Act to incentivize maintenance of forest cover |
| | Implement sustainable agricultural practices | Certification of organic / sustainable agriculture farms, including livestock |
| | Formal planning and collaboration between MNRA / MFFSD | Implement KBA project related components |
| Infrastructure Expansion (including urban expansion, coastal development, roads) | Implement Land Use Policy and Planning Framework | |

## *Unsustainable Harvesting of Natural Resources*

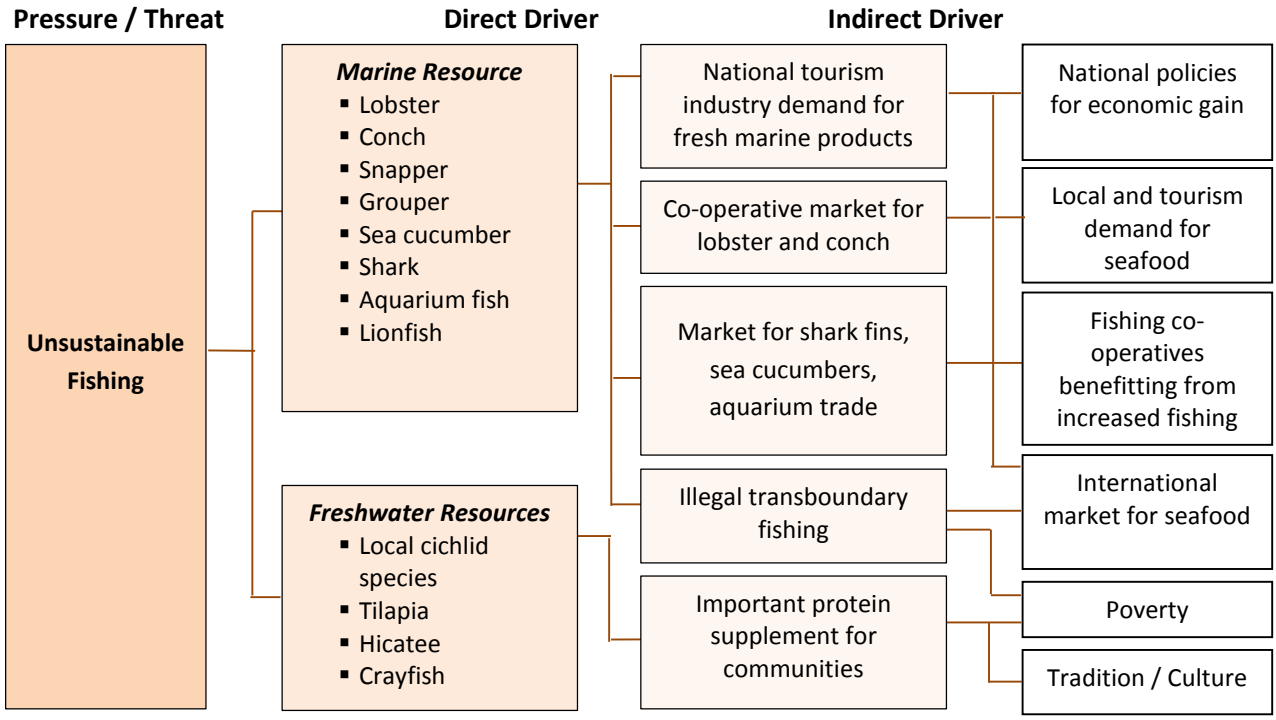
Unsustainable harvest of natural resources has been identified as a specific threat in three different sectors:

- Fishing
- Logging / extraction of non-timber forest products
- Hunting

### Unsustainable Fishing

Commercial fishing focuses primarily on the marine environment and the lobster and conch fishery. Whilst there is a permitting system in place, any Belize resident is eligible to apply for a fishing license. The open access nature of the fishery has led to too many fishermen going after too few lobster, conch and finfish. This is exacerbated by transboundary incursions, limited financial and human resources for effective surveillance and enforcement, and reduced reef health – the latter a result of the combined impacts of unsustainable fishing, pressure from land-based pollution and climate change.

Unsustainable fishing is being addressed through the introduction of Managed Access, a rights-based fishing regime, supporting fishermen that traditionally use specific marine reserves through restricted access permits, building ownership of the resource and vested interest in effective management of the protected areas. Currently in its pilot phase in two marine protected areas, Managed Access is soon to be rolled out across all the territorial waters through the establishment of 9 fishing zones or fisheries management areas.




***Unsustainable Fishing: Drivers***

Good reef health, critical for the fishing industry, is not only being impacted by unsustainable fishing, but also by land-based pollution, coastal and caye development, unsustainable tourism pressures and poor tourism practices…agriculture and tourism are both priority development goals, and are potentially expanding faster than they can be regulated.

***Challenges:***

- Delayed approval of revised Fisheries Resource Bill
- Delayed endorsement of Integrated Coastal Zone Management Plan for guiding decision making in the coastal and caye areas
- Over-riding of endorsed development plans and guidelines by Government for short-term gain
- Limited Central Government investment in management of the marine protected areas
- Illegal incursions from fishermen, primarily from Guatemala and Honduras, with limited surveillance and enforcement resources to address the issue
- The independence of the traditional fishermen – and their unwillingness to change
- Limited alternatives to fishing in some of the coastal communities
- Historical provision of fisher licenses to Guatemalan fishermen with Permanent Resident Status in Belize, in return for votes – now difficult to reverse these licenses, despite the conflict it causes with Belize fishermen

***Opportunities:***

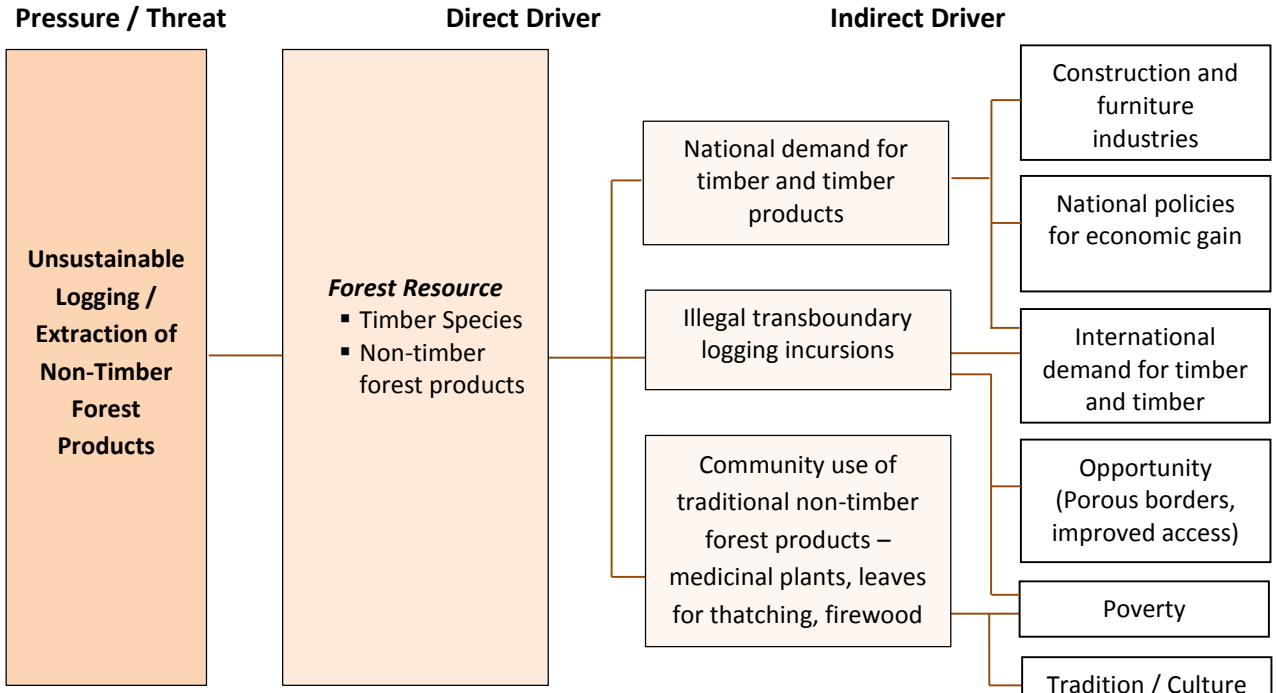
- Government and non-Government promotion of Managed Access
- Technical assistance from international NGOs to ensure success of Managed Access
- Investment in livelihood diversification in fishing communities by Government, NGOs, and international donor agencies to relieve pressure on the fish stocks
- Fishermen are becoming increasingly organized into associations, and therefore easier to communicate with and engage

***Unsustainable Logging***

Belize is moving towards improved sustainable harvesting practices, through Long-Term Forest Licences for the Forest Reserves, designed to promote sustainable forest management. The current revision of the National Forest Policy, National Forest Programme and the Forest Act will significantly strengthen Belize's management of its forest resources once completed and endorsed, as will the reduction and / or phasing out of Short-Term Forest Licences. The contractual agreements for Short Term Forest Licences include best management practices, but limited human and financial resources for monitoring the concession areas, and few incentives for concession holders to not take short cuts, leads to unsustainable logging practices. Illegal logging is also flagged as an active threat throughout Belize, as the increasing spread of agricultural clearance and roads provides easier access to intact forest areas.

The greatest loss of forest resources occurs along the porous border with Guatemala, with logging roads originating in Guatemala accessing Belize's forests in the Chiquibul and Columbia River protected areas.

As with illegal loggers from Belizean communities, these illegal loggers have no incentive to use sustainable forest management protocols.




***Unsustainable Logging: Drivers***

***Challenges:***

- Limited national investment in management of the Forest Reserves
- Illegal, large-scale, transboundary logging incursions from Guatemala, with limited resources and political resolve to address the issues

***Opportunities:***

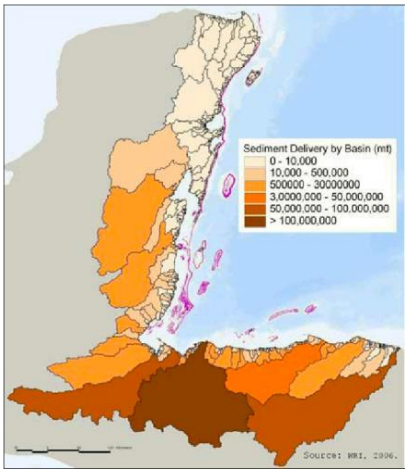
- Revision of National Forest Policy, National Forest Programme and the Forest Act, in process
- Internal policy to reduce short term licenses and move to long term licenses, with integration of sustainable harvesting practices
- Management planning for some Forest Reserves is now incorporating mechanisms for sustainable use by local communities.

The Forest Department has identified a number of policy-based and incentive-based interventions to address this threat:

| Driver | Policy Based Intervention | Incentive Based Interventions |
|---|---|---|
| **Unsustainable and Illegal Logging** | Revise silvicultural system and legislate the change | Wood Certification (reduced wood tax on certified wood) |
| | Legislate enrichment planting post-logging operations | Reduce rate of land tax on forested lands |

| | | |
|---|---|---|
| | Legislate adoption of reduced-impact logging an harvesting code for Belize | |
| | Institute a Wood Tax | Lower Wood Tax rates on certified products |

## *Pollution*

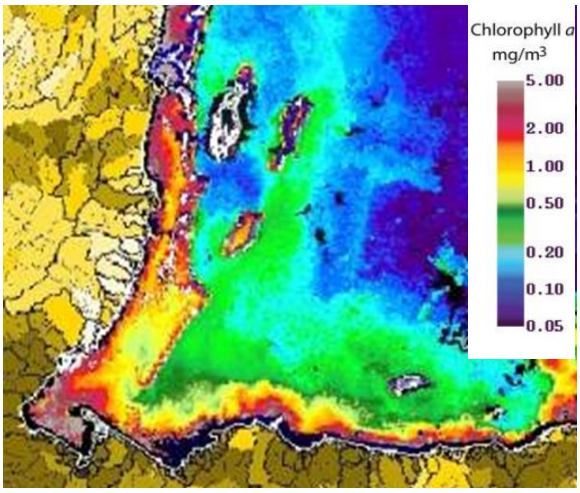



Sediment Delivery by Watershed Basin (Burke et. al. 2006)

Belize has some levels of air and soil pollution in Belize, but concerns are focused primarily on contamination of water, and particularly on its impacts on the coral reef. Sediment, urban and agrochemical contamination from mainland watersheds have been highlighted as perhaps the greatest impacts on the Belize reef after climate change. The World Resources Institute identified the primary sources of land-based pollution impacting the reef (WRI, 2007). Since then, the general trend is for an increase, as agriculture and urban areas expands. There are, however, some exceptions, such as the shrimp farming industry, which has been working to become more environmentally sustainable.

In the north, there are concerns about agrochemical runoff from the sugar cane, rice and cattle areas, as well as urban runoff and poor solid waste and sewage management. Two primary rivers drain the farmlands – the Rio Hondo and the New River – flowing into Corozal Bay, one of the largest estuary systems of the Mesoamerican reef system. Chetumal itself, on the Mexican side of the estuary, has a population of over 150,000, but only limited sewage treatment, with much of its raw sewage also going into the estuary. This acts as a settling pond and filtration for many of the contaminants and sediments, before the water flows out onto the reef. However, this leads to high levels of pollution in the estuary itself.

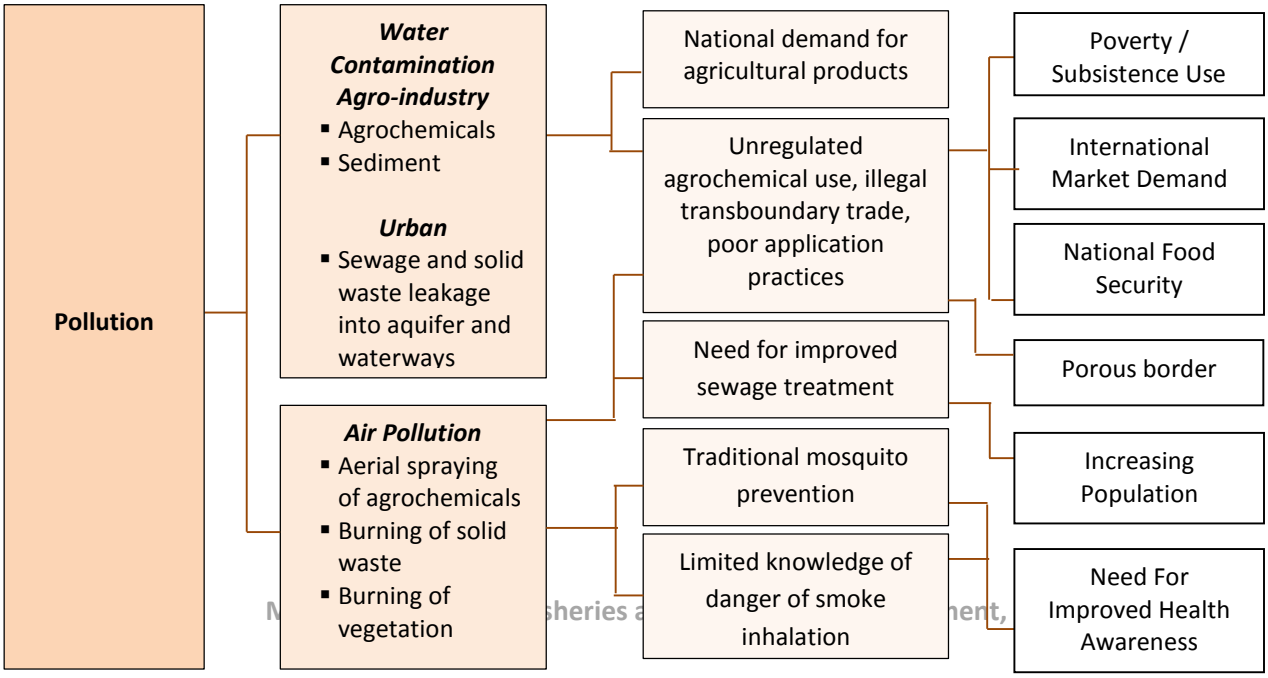
In Central Belize, agrochemicals are generally associated with the citrus and banana industries, and enter the rivers as a result of clearance of riverine vegetation. In the south, five major watersheds drain some of the principal banana growing areas. Following storm events, the increased sediment load of these rivers is also accompanied by an increased pesticide load, as rain washes agrochemicals from the watersheds into the rivers, and from there into the sea. This is overshadowed, however, by the watersheds emptying into the Gulf of Honduras, from Guatemala and Honduras (particularly the Ulua, Motagua, Patuca and Aguan) where land use change has removed much of the natural vegetation from the formerly forested slopes, and replaced it with agriculture (Burke et. al. 2006).




SeaWifs Chlorophyll α. After Shank et. al. 2010/ Soto et. al. 2009

SeaWifs ocean colour images highlights the large pulse of river water that extends from Guatemalan and Honduran rivers, stretching as far north as Gladden Spit, and even out as far as Glover's Reef Atoll, during storm events (Soto et. al. 2009; WRI/ICRAN, 2006; Andrefouet et al. 2002). Connectivity was tracked using the proxy of weekly mean chlorophyll-a concentrations, derived from satellite imagery over a nine-year period. These studies indicated that Honduran river plumes, particularly that of the Ulu´a River, reached the southern part of the Belize Reef 61% of the time, providing further support for the outputs of WRI studies on the origins of impacting watershed run-off on the Mesoamerican Reef (WRI, 2006). Sediment core analysis of two sites within the Belize reef system (Turneffe Atoll and Sapodilla Cayes), indicate that watershed runoff onto the reef has increased relatively steadily over time, consistent with historical and current land use trends. Sediment supply to the reef is greater in the south, in the Sapodilla reef area with greater urgency for action to reduce runoff impacts (Carilli et. al. 2009).

Whilst there have been significant negative impacts on the environment from the establishment of the shrimp farms in the past, the shrimp farm industry, represented by the Belize Shrimp Growers Association, has since moved towards greater environmental sustainability, with settling ponds for farm effluent, replanting of mangroves for filtration, and improved management of feed. The Belize shrimp farming industry is now leading the way globally in environmental certification under the Aquaculture Stewardship Council.



***Pollution: Drivers***

Air pollution is not considered as great a problem as water based pollution, but it is causing some issues – an increase in health issues has been linked to chemical use in the cane farming district, and agrochemical contamination from aerial spraying of crops has been detected throughout the Maya Mountains, despite their isolated nature (Kaiser, 2011). There is concern of the impacts this may have on not only upper elevation amphibians, many of which are critically endangered or endangered, but also on human health in communities supplied from these water catchment areas.

Whilst not included within the assessment, there is also concern at the increasing number of cruise ships and other vessels visiting Belize, the level of pollution they bring with them and the potential for introduction of invasive species, particularly from bilge water. With two new cruise terminals being approved for key manatee areas, there are additional concerns that not only will the solid waste, sewage, bilge water waste, air pollution and noise pollution associated with the berthed and moving cruise ships have a negative impact on the quality of the environment, but that the increased boat traffic in the area will also result in an increase in water craft collisions with marine mammals, in these sensitive areas.

The potential impacts of oil exploration and extraction, particularly in the marine environment has also raised concerns. There has been a significant wave of public opinion against oil exploration in the marine environment, in the wake of the Deepwater Horizon oil spill in the Gulf of Mexico, and the appreciation that Belize does not currently have the capacity to cope with a similar incident, should it occur in its territorial waters.

## *Climate Change*

The long-term effects of climate change are predicted to undermine the resilience of the natural ecosystems and increase human vulnerability, increasing the urgency of tackling the challenge of ensuring Belize builds its resilience and has adaptation strategies in place. Global modelling has predicted that Belize will be one of the countries most at risk to the adverse impacts of climate change (UNFCCC). It is located in the highest risk zone in Central America for tropical storm impacts, with predictions for an increase in the intensity of storm events. It is expected to face more frequent heat waves and droughts, unseasonal rainfalls with increased intensity, and rising sea levels. These impacts will be at their greatest in the north east of Belize where annual rainfall has already decreased significantly over the last 30 years and is predicted to continue decreasing, with lengthened dry seasons and reduced predictability of rainfall. Average accumulated precipitation during July, August and September is predicted to drop from 180mm (the 2008 baseline) to 120mm in 2020 – a reduction of 60mm - over 33% (Anderson et al., 2008).

The average July temperature in the north east of Belize is predicted to rise from 28°C in 2008 to 29°C in 2020…to 33°C in 2080 (Anderson et al., 2008), with associated risks to health, agriculture and fish stocks.

Over the last five years, there has been an increasing frequency of tropical storms - Hurricane Mitch (1998), Hurricane Keith (2000), Tropical Storm Chantal (2001), Hurricane Iris (Category 5, 2001), Hurricane Dean (Category 5, 2007), Tropical Storm Arthur (2008), and Hurricane Richard (Category 1, 2010), as well as smaller tropical cyclones. These cause significant damage to forests, as well as to the banana, sugar cane, papaya, rice, corn and vegetable industries across the country, impacting both local and national economies. These tropical storm events have huge impacts on the rural infrastructure, with roads being destroyed and communities cut off by flood waters for weeks at a time, isolating communities and reducing access to fresh water, health care and schooling (Community consultations, 2014). They have also contributed towards the nation's large fiscal debt, reducing funding availability for investment in areas such as natural resource management.

An assessment of climate change predictions and impacts is included in Annex 2.

### *Invasive Species*

There is considered to be adequate (but by no means complete) information in Belize on invasive species, and for those species causing significant impacts to the economy, pathways have been identified and where feasible, management regimes have been put in place. There aren't, however, the human resources to address every invasive species, and a number have become well established. Where they are a serious cause of concern to human health, agricultural production, or the fisheries industry however, measures have been put into place to control the impacts, where feasible.

In the terrestrial environment, the greatest concern is for vectors of human illness, such as the African yellow fever mosquito (*Aedes aegypti*) (also a vector for dengue), and invasive pests of the primary agricultural industries. The Ministry of Health is responsible for control of mosquito-carried diseases, and conducts spraying in towns and villages when risks are highest. The increased temperatures predicted with climate change will provide conditions favourable for other diseases such as yellow fever and chikungunya virus to spread into Belize.

BAHA is mandated to regulate the import of fruit, vegetables and vegetable material to Belize, to ensure that crop diseases do not enter the country. BAHA also has the authority to prevent the transport of plant material and / or animals within Belize to stop the spread of infection through introduction of invasive vectors. Challenges to control include the porous northern and southern borders, and the constant flow of illegal Mexican and Guatemalan fruit, vegetables and cattle crossing the borders, making regulation difficult.

The Citrus Research and Education Institute (CREI) of the Citrus Growers Association established a monitoring programme in 2004 to conduct pro-active bi-annual surveys for exotic diseases known to be present in the region, but not yet present in Belize. The citrus greening disease, considered the most destructive and lethal of citrus diseases, is caused by bacteria belonging to the genus *Candidatus*, carried by the Asian citrus psyllid (*Diaphorina citri*). This was identified in Belize in 2009, and addressed through emergency funding from OIRSA (the International Regional Organization for Agricultural Health). Diseased trees infected with the greening disease have been identified and sprayed with broad spectrum insecticide, cut down and burnt, and new stock is being grown in screened nurseries approved by BAHA, as legislated in SI 122 of 2009, and operated under the Belize Citrus Certification Programme (BCCP) nursery regulations and guidelines.

The invasive pink hibiscus mealybug (*Maconellicoccus hirsutus*), from South East Asia, can affect many important horticultural and agricultural crops, and has been an issue in Belize in the past. It was detected in 1999, and an emergency plan was implemented, bringing it under control in a few months. Continued monitoring has been ongoing since then, and in 2003, a regional laboratory was established in Belize for production of the parasitoid *Anagyrus kamali*, for control of PHMB in the region.

The Medfly Eradication Programme was initiated in Belize in 1977, and has been able to control this invasive species, preventing its establishment as a crop pest. Belize was officially recognized by the USDA as a medfly free country in 2001, and has been able to maintain this status.

Two non-native herptiles are found in Belize - the Asiatic house gecko arrived in Belize in the late 1980's, and has replaced the smaller dwarf gecko in urban areas and rural communities, the dwarf gecko now being marginalised to its natural environments. Asian tokay geckos (*Gecko gecko*), originating from South East Asia, and common in the US pet trade, were introduced onto South Water Caye, in the South Water Caye Marine Reserve, in the early 1990's, and were first recorded in 1994. It is thought to be the cause of declines in the local gecko population, as well as the local extinction of tuberculate leaf-toed gecko (*Phyllodactylus tuberculosus*) on that caye (Meerman et al., 2002). There have not been any attempts made to eradicate either of these two species. For the Asiatic house gecko, the potential for eradication is low, with this species now wide spread throughout the country, and in neighbouring countries.

For the marine and freshwater, the high connectivity of the aquatic environment means that control of invasive species has not been possible. Invasive lionfish (*Pterois volitans*) have had the most impact. First recorded in Belize in 2008, and spreading rapidly since then, this species is native to the Indian and Pacific Oceans. It is a voracious feeder, eating both juvenile fish and crustaceans, including commercial species such as grouper and lobster – a single lionfish on a small patch reef has been demonstrated to reduce fish recruit biomass by 80% in five weeks (Albins et al., 2008). The Belize Fisheries Department and NGOs are using organised lionfish fishing tournaments to help regulate this species, encouraging active fishing of this species and have located an export market for fillet. However, despite this, it is now acknowledged that this species is in Belize waters to stay. Fishermen are therefore now being encouraged to fish for this species as an alternative to the regular finfish species, and as a mechanism for controlling numbers.

Shrimp farms in Belize utilise Whiteleg, or Pacific white Shrimp (*Litopenaeus vannamei*), and successive storm events have led to this species now being common in coastal waters in southern Belize, and utilized by local communities. Black tiger prawns (*Penaeus monodon*) have also recently appeared in the catches, first reported in 2013, and are thought to have originated as a result of an accidental release from a South Carolina research facility in 1988 (TISI, 2014). There are concerns of the potential threat that native crustaceans – shrimp, lobster, and crabs - may be susceptible to diseases carried by this new species. Strategies for control are similar to those for lionfish…targeted fishing and market creation. One shrimp farm in Belize is investigating the potential to breed this species.

In the freshwater environment, *Tilapia* has largely replaced the native cichlids as the dominant species in many rivers and freshwater bodies. This species originated from Tilapia fish farms both in Belize and in neighbouring Guatemala and Mexico, with fish stocks washing into the rivers during storm events as a result of flooding. As with lionfish, removal of *Tilapia* is not considered realistic, through preferential fishing is encouraged.

Armoured catfish were first reported in the Rio Bravo in 2012 and in the Rio Hondo in 2013. This species is of concern as it disturbs the substrate, impacting local, native species by destroying nesting areas and food resources. This species also destabilizes river beds and banks, burrowing into banksides and removing riverine vegetation, increasing sedimentation, placing further strain on freshwater fish species already impacted by *Tilapia*. Efforts to remove this species from the waterways have not so far been successful.

### *Transboundary Incursions*

Between 2010 – 2012, 93% of deforestation in Belize occurred outside the protected areas. However, 6.4% (1,603ha) of forest clearance between 2012 – 2012 occurred within the National Protected Areas System, primarily in those protected areas that lie against the western border with Guatemala – Chiquibul National Park, Columbia River Forest Reserve, Caracol Archaeological Reserve and Vaca Forest Reserve. The origins of these incursions are communities in Guatemala, driven into Belize to farm by limited access to land and rising poverty along the Guatemalan side of border.

Over 63 communities with over 52,700 people live along the Chiquibul border in Guatemala, with an average annual population growth of 2.9%. These high-poverty communities have limited to no access to land in Guatemala, and as a result have started farms in Belize. In 2013, 43 milpas (small slash and burn farms) were documented within the Chiquibul National Park in Belize, with over 7,400 acres actively in use (FCD, 2013). Loggers have reached as far as 15km inside Belize, impacting an area of over 35,000 hectares, with losses of timber estimated at over $30 million (FCD, 2013). Xateros have swept through the forest, harvesting xaté at unsustainable levels, removing leaves valued at Bz$1.2 million, for sale to suppliers in Guatemala. In 2013, 4 of the 11 known scarlet macaw nests were poached, with young being taken across the border illegally for the pet trade (FCD, 2013).

The scale of the incursions is beyond the ability of the co-management partner, Friends for Conservation and Development, to control, even with partnerships with the police and Belize Defence Force, particularly in view of the current border conflict that exists between Belize and Guatemala. FCD is, however, starting to make some impact through transboundary partnerships with environmental organizations in Guatemala, working with these communities, to seek solutions to these issue.

## 4. IMPACTS OF THE CHANGES IN BIODIVERSITY FOR ECOSYSTEM SERVICES, AND THE SOCIOECONOMIC AND CULTURAL IMPLICATIONS OF THESE IMPACTS

As part of the national assessment of the threats to biodiversity, the impacts of the threats on both biodiversity and human livelihoods were also assessed.

| **Land Use Change** | |
|---|---|
| **Impacts of Agricultural Expansion** | |
| **Ecosystems Impacted** | ▪ Tropical Forest<br>▪ Pine Savanna<br>▪ Riparian Vegetation |
| **Biodiversity Impacts** | **Socio-economic Impacts** |
| ▪ Reduced extent of forest cover<br>▪ Forest degradation<br>▪ Land degradation<br>▪ Reduced forest connectivity<br>▪ Impacts on forest species<br>▪ Impacts on savanna species – endemic plants, pine trees, yellow-headed parrots<br>▪ Increased fire risk<br>▪ Increased wildlife / livestock conflict<br>▪ Loss of genetic diversity | ▪ Reduced water security (removal of water catchment cover)<br>▪ Increased flood risk, with threat to life and property<br>▪ Increased livelihood vulnerability to climate change impacts<br>▪ Reduced availability of non-timber forest products – medicinal plants, (thatch leaves, construction posts), game species. Increased expense.<br>▪ On steep slopes, reduced soil stability and increased risk to life and property<br>▪ Loss of livestock to large predators reducing household income |

| **Land Use Change** | |
|---|---|
| **Impacts of Aquaculture** | |
| **Ecosystems Impacted** | ▪ Mangrove<br>▪ Littoral Forest<br>▪ Short Grass Savanna<br>▪ Coastal Waters<br>▪ Lagoon |
| **Biodiversity Impacts** | **Socio-economic Impacts** |
| ▪ Reduced extent of mangrove cover<br>▪ Reduced extent of littoral forest<br>▪ Reduced extent of short grass savanna<br>▪ Reduced water quality, impacting aquatic and marine biodiversity | ▪ Reduced protection of life and property from tropical storms<br>▪ Reduced mangrove nursery areas for juvenile fish – impacts on fishing industry and household income of fishermen<br>▪ Increased erosion of coastal land – reduced aesthetic beauty of reef – reduced tourism<br>▪ Reduced aquatic biodiversity |

| Land Use Change | |
|---|---|
| **Impacts of Coastal Development** | |
| **Ecosystems Impacted** | ▪ Mangrove<br>▪ Littoral Forest<br>▪ Herbaceous Beach Vegetation<br>▪ Coral Reefs |

| Biodiversity Impacts | Socio-economic Impacts |
|---|---|
| ▪ Reduced extent of mangrove, littoral forest and beach communities<br>▪ Potential for reduction and fragmentation of littoral forest to non-viable levels<br>▪ Impacts on sea turtle and crocodile nesting beaches<br>▪ Reduced availability of staging points for migratory birds and nesting areas for resident birds<br>▪ Modification of seabed – dredging / filling, removal of seagrass<br>▪ Removal of live and dead coral for caye reclamation<br>▪ Beach reclamation<br>▪ Filling of mangrove areas with marl landfill<br>▪ Reduced health of coral from coastal and caye development impacts (sediment, swimming pool water, sewage) | ▪ Reduced mangrove nursery areas for juvenile fish – impacts on fishing industry and household incomes in coastal communities<br>▪ Increased erosion of coastal land, reducing water quality on the reef, with reduced water visibility for fishing. Negative impact on household incomes<br>▪ Reduced stability of cayes – potential for removal by tropical storms<br>▪ Reduced protection of life and property from tropical storms<br>▪ Reduced aesthetic beauty of coral reefs with increased sediment in water, resulting in reduced tourism demand / market |

| Land Use Change | |
|---|---|
| **Impacts of Inland Development** | |
| **Ecosystems Impacted** | ▪ Tropical Forest<br>▪ Pine Savanna |

| Biodiversity Impacts | ▪ Socio-economic Impacts |
|---|---|
| ▪ Reduced extent of forest cover and connectivity near communities<br>▪ Impacts on forest species<br>▪ Increased forest fragmentation<br>▪ Increased access, with associated impacts<br>▪ Impacts on savanna species – endemic plants, pine trees, yellow-headed parrots<br>▪ Increased fire risk<br>▪ Increased pollution (solid and liquid waste) | ▪ Reduced water security for communities (removal of forest cover)<br>▪ Increased temperature in and around communities with increasing health issues<br>▪ Reduced access to non-timber forest products – medicinal plants, (thatch leaves, construction posts), game species<br>▪ Reduced aesthetic appeal of landscape impacting tourism potential and quality of life |

| Unsustainable Harvesting of Natural Resources | |
|---|---|
| **Impacts of Unsustainable Fishing** | |
| **Ecosystems Impacted** | ▪ Coral Reef<br>▪ Seagrass<br>▪ Lagoons and Rivers |

| Biodiversity Impacts | Socio-economic Impacts |
|---|---|
| ▪ Reduced populations of all commercial species, with fewer large fish and skewed population structures<br>▪ Reduced populations of parrotfish (illegal fishing) – increase in macroalgal competition with corals<br>▪ Reduced number of key predators (particularly sharks), impacting trophic stability<br>▪ Reduced creation of sand for replenishment of beaches (overfishing of sea cucumbers) | ▪ Reduced incomes for fishermen – increased poverty in coastal communities<br>▪ Reduced export earnings, leading to reduced prioritisation of central finance for support of marine protected areas and fishermen<br>▪ Reduced aesthetic beauty of reef, with associated reduced tourism demand, and reduced income from tourism |

| Unsustainable Harvesting of Natural Resources | |
|---|---|
| **Impacts of Unsustainable Logging / Non-timber Forest Products** | |
| **Ecosystems Impacted** | ▪ Tropical Forest<br>▪ Pine Savanna |

| Biodiversity Impacts | Socio-economic Impacts |
|---|---|
| ▪ Reduced viability of harvested species<br>▪ Changes in species composition with selective removal of species such as cedar, mahogany etc.<br>▪ Over-harvesting of seed and fruit trees in areas of hurricane damage, under salvage permit<br>▪ Fragmentation of forest structure and reduced forest connectivity from large logging roads, impacting more sensitive forest species<br>▪ Logging roads provide entry points and increased accessibility to forests, increasing illegal hunting / harvesting activities<br>▪ Logging roads reduce forest resilience to tropical storm impacts<br>▪ Increased risk of erosion in riparian belt | ▪ Reduced long term sustainability of timber and non-timber forest products, reducing potential income and resource availability for adjacent communities<br>▪ Reduced resilience of forests to tropical storms, increasing susceptibility to landslides on steep slopes, with potential for loss of life and property |

# PART II: THE NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS, ITS IMPLEMENTATION AND THE MAINSTREAMING OF BIODIVERSITY

## 5. BELIZE'S BIODIVERSITY TARGETS

Belize is in the process of developing measurable national targets and indicators as part of the revision of its National Biodiversity Strategy and Action Plan (NBSAP), tied into the National Biodiversity Strategy and Action Plan, providing a measures of success framework based on the objectives of the NBSAP. It also needs to be linked to the Aichi Targets, providing information on Belize's contribution to these global CBD targets. This is being achieved in 2015 under the ***National Biodiversity Planning to Support the implementation of the CDB 2011 - 2020 Strategic Plan in Belize (National Biodiversity Enabling Activities***).

To achieve a fully integrated set of National Targets, the following steps need to be taken:

***Step 1.*** Revision of the objectives of the 1998 National Biodiversity Strategy and Action Plan, with widespread stakeholder participation - these revised objectives will provide the framework for the national targets and indicators

***Step 2.*** Identification of Targets linked to the Objectives

- One or more targets should be developed for each objective. The objectives and targets should be driven by national priorities.
- National targets should be linked to specific global Aichi targets, but not driven by them. Not all global targets will be relevant in the national context

***Step 3.*** Development of Indicators

- Once the objectives have been identified, indicators can be adopted or developed to provide information on Belize's success in meeting the targets, and to feed into Belize's reporting on is contribution towards the global targets.

The development of targets, objectives and indicators will be a fully participatory process, involving cross-sectoral input at all levels, and integrating initiatives such as the National Biodiversity Monitoring Framework. A Stocktaking Report has been developed reviewing potential indicators for measuring Belize's contribution towards the Global Aichi Targets and providing information for discussions on potential national targets and indicators, supporting the revision of the National Biodiversity Strategy and Action Plan and the objectives and targets that are developed during the NBSAP revision process. It also provides information on available indicators, with baselines where feasible, for adaptation once national NBSAP objectives and targets have been formulated, providing a measure of Belize's fulfilment of its commitment to the CBD.

## 6: STATUS OF THE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN, INCORPORATION OF BIODIVERSITY TARGETS AND MAINSTREAMING OF BIODIVERSITY.

The original National Biodiversity Strategy and Action Plan (NBSAP) was developed in 1998, but was never formally endorsed, and funding for implementation was limited in the five years following its development. It has, however, provided an informal framework for the guidance of biodiversity conservation in Belize, and has been used to some extent by the Government, NGOs and CBOs in the justification and prioritisation of biodiversity conservation activities. The original plan was framed by a number of overarching objectives, but did not incorporate national biodiversity targets, and has not been updated to support the global Aichi Targets.

Over the last five years, there has been a gradual increasing of recognition of the importance of the environment in Belize's national development, in its adaptation mechanisms for climate change, and the need for cross sectoral integration of the environment into mainstream policies and planning. The revision of the National Biodiversity Strategy and Action Plan is therefore being conducted under the National Biodiversity Enabling Activities, as part of the "National Biodiversity Planning to Support the implementation of the CDB 2011 - 2020 Strategic Plan in Belize" project, and in recognition of its commitments under the CBD.

This provides Belize with the opportunity to:

- strengthen the Plan through the incorporation of the new Aichi objectives, actions and targets, modified to the national context,
- integrate a framework for effective monitoring and evaluation of implementation,
- reinforce the importance of ecosystem services to national development
- address the issues of climate change impacts on ecosystems and biodiversity, and the need to build resilience

Belize will have an opportunity to use the process itself to improve mainstreaming of biodiversity across government and society, to strengthen Belize's commitment to maintaining its natural resources, ecosystem services and species diversity, and as a tool to ensure Belize moves forward with strategies that will assist in reducing poverty and increasing resilience and adaptation to climate change.

A full review of implementation of the first, draft NBSAP (1998) has been produced as part of Belize's Stocktaking Exercise (Belize's National Biodiversity Strategy and Action Plan (1998): A Review. Forest Department / Wildtracks, 2014).

## 7. ACTIONS BELIZE HAS TAKEN TO IMPLEMENT THE CONVENTION SINCE THE FOURTH REPORT, AND THE OUTCOMES OF THESE ACTIONS.

Since the submission of the 4th National Report, Belize has continued to take actions to implement its obligations under the Convention on Biological Diversity. A number of environmental resource management policies and plans have been developed, and have either been endorsed or are awaiting endorsement. These include:

- National Integrated Water Resources Management Policy (Endorsed 2009)
- National Policy on Responsible Tourism (2010)
- National Sustainable Tourism Master Plan of 2030 (Endorsed 2012)
- Revision of the outdated Fisheries Act as the Fisheries Resource Bill (Draft - awaiting endorsement)
- Integrated Coastal Zone Management Plan (Draft - awaiting endorsement)
- National Environmental Policy and Strategy (2014 – 2024) (Draft - awaiting endorsement)

Legislation and policies currently in revision include the:

- Wildlife Protection Act
- National Parks System Act
- Forest Policy
- National Protected Areas Policy and System Plan

…as part of Belize's focus on strengthening the legislative framework.

The primary policies and plans developed or revised since 2010 have been assessed as to their contribution to Belize's commitments under the CBD Programmes of Work – both the Thematic Areas and the Cross Cutting Areas. Also assessed are the outputs of each of these policies / plans, linked to the threats they address (either partially or entirely).

| National Policy / Plan | Outcomes | Threats Addressed |
|---|---|---|
| *CBD Programmes* | | |
| **National Development Framework 2010 – 2030 (Horizon, 2030)**<br><br>***CBD Thematic Programmes***<br>▪ *Forest Biodiversity*<br>▪ *Marine and Coastal Biodiversity*<br>▪ *Island Biodiversity*<br>▪ *Inland Waters Biodiversity*<br>▪ *Mountain Biodiversity*<br><br>***Cross cutting Programmes***<br>▪ *Sustainable use*<br>▪ *Ecosystem approach*<br>▪ *Protected areas*<br>▪ *Tourism*<br>▪ *Economics*<br>▪ *Impact Assessment* | ▪ Provides a framework for national development<br>▪ The Plan does not present respect for the environment as one of the core values of Belize, but as a foundation on which the country is built<br>▪ Horizon 2030 seeks to ensure a healthy environment through:<br>▪ Incorporating environmental sustainability into development planning<br>▪ *Output: National Land Use Policy and Planning Framework (Endorsed, not yet implemented)*<br>▪ *National Sustainable Tourism Master Plan of 2030 (Endorsed 2012)*<br>▪ *National Policy on Responsible Tourism Policy (2010)*<br>▪ Comprehensive natural resources and environmental policy<br>▪ *Output: National Environmental Strategy and Action Plan (cross-cutting, draft)*<br>▪ *Output: Integrated Coastal Zone Management Plan (cross cutting, draft)*<br>▪ Introducing natural resource accounting into GDP<br>▪ *Output: National Integrated Water Resources Management Policy (endorsed)*<br>▪ Enforcing environmental protection laws in a fair and just manner<br>▪ *Output: Revision of Fisheries Act and Regulations (draft)*<br>▪ *Output: Revision of Wildlife Protection Act (draft)*<br>▪ *Output: Revision of Mangrove Protection Act (draft)*<br>▪ *Output: Revision of Forest Policy (Draft)*<br>▪ *Outputs: Amendments to Environmental Protection Act*<br>▪ Provide incentives for reforestation<br>▪ *Output: Revision of Forest Policy (Draft)*<br>▪ *Output: National REDD+ initiative*<br>▪ Develop and implement a long term strategy for solid waste management<br>▪ *Output: Modern Solid Waste Management Project*<br>▪ Implement a disaster management strategy<br>▪ Strengthening Protected Areas Management<br>▪ Adopt and implement the National Protected Areas Policy and Action Plan<br>▪ *National Protected Areas Policy and System Plan (Endorsed)*<br>▪ Build capacity in Belize in environmental professions<br>▪ *Capacity building of ERI-UB for improved training*<br>▪Promoting green energy | ***Deforestation***<br>▪ *Reduced forest cover / forest fragmentation*<br>▪ *Land degradation*<br>▪ *Reduced water security*<br>***Pollution***<br>▪ *Erosion of riverbanks / coastline*<br>▪ *Agrochemical runoff into rivers*<br>▪ *Sedimentation impacts on reef*<br>***Unsustainable Natural Resource Use***<br>▪ *Unsustainable / illegal:*<br>▪ *logging*<br>▪ *hunting*<br>▪ *fishing*<br>▪ *tourism*<br>***Climate Change*** |

| National Policy / Plan | Outcomes | Threats Addressed |
|---|---|---|
| *CBD Programmes* | | |
| **National Land Use Policy and Planning Framework (2011)**<br><br>***CBD Thematic Programmes***<br>▪ *Forest Biodiversity*<br>▪ *Mountain Biodiversity*<br><br>***Cross cutting Programmes***<br>▪ *Climate change*<br>▪ *Sustainable use*<br>▪ *Ecosystem approach*<br>▪ *Protected areas*<br>▪ *Tourism* | ▪ Provides a framework to ensure biodiversity values and ecosystem services are taken into account in land use planning. Identifies:<br>▪ Protected areas<br>▪ Key forest nodes and biological corridors<br>▪ Key Biodiversity Areas<br>▪ Agricultural land value<br>▪ Land degradation<br>▪ Flood risk<br>…as part of the integrated land planning process<br>▪ Identifies the need for improved coordination between Government agencies in planning of best land use at national level<br>▪ Task force included representation from all relevant Government sectors<br>▪ Funded through GEF / FAO / PACT<br>▪ Endorsed but not yet implemented | ***Deforestation***<br>▪ *Reduced forest cover / forest fragmentation*<br>▪ *Land degradation*<br>▪ *Reduced water security*<br>***Pollution***<br>▪ *Erosion of riverbanks / coastline*<br>▪ *Agrochemical runoff into rivers*<br>▪ *Sedimentation impacts on reef*<br>***Climate Change*** |
| **National Protected Areas Policy and System Plan (revision in progress)**<br><br>***CBD Thematic Programmes***<br>▪ *Forest Biodiversity*<br>▪ *Marine and Coastal Biodiversity*<br>▪ *Island Biodiversity*<br>▪ *Mountain Biodiversity*<br><br>***Cross cutting Programmes***<br>▪ *Climate change*<br>▪ *Sustainable use*<br>▪ *Ecosystem approach*<br>▪ *Protected areas*<br>▪ *Tourism* | ▪ Strengthened natural resource management and biodiversity conservation through the mitigation of threats to Key Biodiversity Areas, through funding from the Global Environment Facility (in process)<br>▪ Supporting Forest Protection and Sustainable Forest Management Activities<br>▪ Improved monitoring of biodiversity<br>▪ Strengthened legal and administrative framework for protected areas<br>▪ Improved coordination among Government agencies charged with environmental management<br>▪ Strengthened capacity for the EIA process<br>▪ Capacity building of protected area management through GEF "Strengthening Capacities for the Operationalization, Consolidation and Sustainability of Belize's National Protected Areas System Project"<br>▪ Development of co-management Framework - strengthened management of protected areas through co-management agreements between GoB and NGOs / CBOs for maintenance of forest cover<br>▪ Funding through the "National Biodiversity Planning to Support the Implementation of the CDB 2011 - 2020 Strategic Plan in Belize (National Biodiversity Enabling Activities)" for revising / updating the NBSAP (2014)<br>▪ Improved public participation in protected area management | ***Deforestation***<br>▪ *Reduced forest cover / forest fragmentation*<br>▪ *Land degradation*<br>▪ *Reduced water security*<br>**Unsustainable Natural Resource Extraction**<br>▪ *Unsustainable logging*<br>▪ *Unsustainable hunting*<br>▪ *Unsustainable fishing* |

| National Policy / Plan | Outcomes | Threats Addressed |
|---|---|---|
| *CBD Programmes* | | |
| **National Climate Change Adaptation Policy (2010)**<br><br>***CBD Thematic Programmes***<br>▪ *Forest Biodiversity*<br>▪ *Marine and Coastal Biodiversity*<br>▪ *Island Biodiversity*<br>▪ *Mountain Biodiversity*<br><br>***Cross cutting Programmes***<br>▪ *Climate change* | ▪ All government agencies that execute policies or provide services have prepared adaptation options.<br>  ▪ Coastal Zone<br>  ▪ Tourism<br>  ▪ Health<br>  ▪ Agriculture<br>  ▪ Fisheries and Aquaculture<br>  ▪ Water<br>▪ Ensures that climate change is integrated into planning across all sectors | ***Deforestation***<br>▪ *Reduced forest cover / forest fragmentation*<br>▪ *Land degradation*<br>▪ *Reduced water security*<br>***Climate Change*** |
| **National Integrated Water Resources Management Policy (2009)**<br><br>***CBD Thematic Programmes***<br>▪ *Forest Biodiversity*<br><br>***Cross cutting Programmes***<br>▪ *Sustainable use*<br>▪ *Ecosystem approach*<br>▪ *Protected Areas*<br>▪ *Economics* | ▪ Provides for protection of forest integrity in water catchment areas<br>▪ Overlaps with, and supersedes, the Forest Act - most water catchment areas are within protected areas<br>▪ Provides a mechanism for creating lowland water catchment protection in key areas, focused on maintaining intact forest cover<br>▪ Addresses PES for water – first national PES mechanism (though not yet implemented)<br>▪ Established through the Global Climate Change Alliance Project | ***Deforestation***<br>▪ *Reduced forest cover / forest fragmentation*<br>▪ *Reduced water security*<br>***Unsustainable Resource Extraction***<br>▪ *Unsustainable water extraction* |
| **National Environmental Policy and Strategy (2014 – 2024)**<br><br>***CBD Thematic Programmes***<br>▪ *Forest Biodiversity*<br>▪ *Marine and Coastal Biodiversity*<br>▪ *Island Biodiversity*<br>▪ *Mountain Biodiversity*<br><br>***Cross cutting Programmes***<br>▪ *Sustainable use*<br>▪ *Ecosystem approach*<br>▪ *Protected areas*<br>▪ *Tourism*<br>▪ *Climate change* | ▪ Draft Ten year National Environmental Strategy and Five-year Action Plan, developed with funding from the World Bank.<br>▪ A cross cutting policy that rationalizes the different environmental policies under different Ministries and Government departments<br>▪ The Policy promotes:<br>  ▪ Improved solid and liquid waste management<br>  ▪ Reducing air and marine pollution<br>  ▪ Support for effective implementation of key policies and plans for natural resource management<br>  ▪ Disaster risk reduction – building resilient communities<br>  ▪ Strengthened capacity for environmental governance | ***Deforestation***<br>▪ *Reduced forest cover / forest fragmentation*<br>▪ *Land degradation*<br>▪ *Reduced water security*<br>***Pollution***<br>▪ *Erosion of riverbanks / coastline*<br>▪ *Agrochemical runoff into rivers*<br>▪ *Sedimentation impacts on reef*<br>***Unsustainable Natural Resource Use***<br>▪ *Unsustainable / illegal:*<br>  ▪ *logging*<br>  ▪ *hunting*<br>  ▪ *fishing*<br>  ▪ *tourism*<br>***Climate Change*** |

| National Policy / Plan | Outcomes | Threats Addressed |
|---|---|---|
| *CBD Programmes* | | |
| **Integrated Coastal Zone Management Plan (Draft – 2014)**<br><br>***CBD Thematic Programmes***<br>▪ *Marine and Coastal Biodiversity*<br><br>***Cross cutting Programmes***<br>▪ *Sustainable use*<br>▪ *Ecosystem approach*<br>▪ *Protected areas*<br>▪ *Tourism*<br>▪ *Climate change* | ▪ Promotes the "wise, planned use of Belize's coastal resource"<br>▪ Provides a framework for implementation, but is not, itself an implementing agency. It is focused on four strategic areas:<br>  ▪ Encouraging sustainable coastal resource use<br>  ▪ Supporting integrated development planning<br>  ▪ Building alliances to benefit Belizeans<br>  ▪ Adapting to climate change<br>…and based on sound information, with…<br>  ▪ Updating of mapping of coastal mangrove and defining of areas of high protection values, areas at high risk<br>  ▪ Assessment of environmental values in the coastal zone<br>  ▪ Assessment of both land-based and marine-base threats, as well as vulnerabilities to climate change<br>▪ Recommends interventions by different implementing agencies, providing coordination between lead agencies<br>▪ Awaiting endorsement | ***Coastal Development***<br>▪ *Reduced extent of mangroves*<br>▪ *Reduced extent of littoral forest*<br>▪ *Coastal erosion – sediment impacts on reef*<br>***Land-based Pollution***<br>▪ *Agricultural expansion*<br>▪ *Increased agrochemical use*<br>***Climate Change*** |
| **National Food and Agriculture Policy (2002 – 2020)**<br><br>***CBD Thematic Programmes***<br>▪ *Forest Biodiversity*<br>▪ *Marine and Coastal Biodiversity*<br>▪ *Agricultural Biodiversity*<br><br>***Cross cutting Programmes***<br>▪ *Sustainable use*<br>▪ *Climate change* | ▪ The National Food and Agriculture Policy seeks to achieve "A transformed/modern sector that is fully competitive, diversified and sustainable"<br>▪ Key points of this policy focus on:<br>  ▪ Diversification of both local and export-orientated agriculture<br>  ▪ Promotion of agro-processing<br>  ▪ Establishment of an Organic Agriculture Industry<br>  ▪ Improve and conserve natural and productive resource base to ensure long-term sustainability<br>▪ All major agricultural investments are required to submit a business proposal complete with an environmental impact assessment (EIA)<br>▪ Promotion of Integrated pest management and rational use of pesticides<br>▪ This policy is currently under review, and focussing on five proposed pillars:<br>  ▪ food security and nutrition,<br>  ▪ rural prosperity,<br>  ▪ agriculture and food production as an engine to economic growth,<br>  ▪ sustainable management of agro-ecological system that contributes to environmental services, and<br>  ▪ agricultural innovation for competitiveness. | ***Deforestation***<br>▪ *Reduced forest cover / forest fragmentation*<br>▪ *Land degradation*<br>▪ *Reduced water security*<br>***Pollution***<br>▪ *Sedimentation from erosion of riverbanks / coastline*<br>▪ *Agrochemical runoff into rivers*<br>▪ *Sedimentation impacts on reef*<br>***Climate Change*** |

| National Policy / Plan | Outcomes | Threats Addressed |
|---|---|---|
| *CBD Programmes* | | |
| **National Sustainable Tourism Master Plan 2030 (Endorsed 2012)**<br><br>***Thematic Programmes***<br>▪ *Forest Biodiversity*<br>▪ *Marine and Coastal Biodiversity*<br>▪ *Island Biodiversity*<br>▪ *Mountain Biodiversity*<br><br>***Cross cutting Programmes***<br>▪ *Sustainable use*<br>▪ *Protected areas*<br>▪ *Tourism*<br>▪ *Climate change* | ▪ The Sustainable Tourism Market Plan recognizes Belize's reliance on natural and cultural based tourism, and seeks to promote Belize as a "sustainable, authentic, unique and competitive" destination<br>▪ The Plan identifies inadequate management effectiveness of the natural resources as a key limitation to the further development of Belize's sustainable tourism industry<br>▪ Conservation strategies for tourism include:<br>  ▪ Creating a conservation ethic in Belize – consensus among stakeholders that effective conservation is necessary for both tourism and the long term health of the economy.<br>  ▪ Identifying and mapping the natural and cultural resources that draw visitors to Belize<br>  ▪ Creating an over-arching conservation vision and policy to protect these resources.<br>  ▪ Giving conservation an economic base – a strategy for conservation and stewardship on private and public lands that can be funded by limited development.<br>  ▪ Preventing urban sprawl and instituting methods that will cluster development in higher intensity areas<br>▪ Plan is endorsed, but strategies and guiding principles are not being used by Government | ***Deforestation***<br>▪ *Reduced forest cover / forest fragmentation*<br>***Coastal Development***<br>▪ *Reduced extent of mangroves*<br>▪ *Reduced extent of littoral forest*<br>▪ *Coastal erosion – sediment impacts on reef*<br>***Climate Change*** |

### *Assessment of Implementation in Key CBD Thematic Areas for Belize*

### *Marine and Coastal Biodiversity*

Belize has instituted a series of complementary management strategies to address identified issues in the marine environment, allowing Belize to largely avoid the catastrophic collapse of fish stocks experienced by adjacent countries in the region. These include:

- Ecosystem-based management through the establishment of a network of eight marine reserves in key locations, with general use, conservation and strict replenishment zones, managed under the Fisheries Department (linked to CBD Marine and Coastal Biodiversity Element: Marine and Coastal Protected Areas)
- A further five marine protected areas established as full no-take reserves, under the Forest Department, strengthening replenishment zones in the marine sector
- Protection of critical spawning aggregation sites and support of the Government / NGO Spawning Aggregation Working Group

- Support of the National Coral Monitoring Working Network, a Government / NGO working group
- Ongoing monitoring of reef health through the Healthy Reefs Initiative
- Strong legal framework for fishing industry
  - Requirement for fishermen to have valid fishing licenses
  - Enforced seasonal closures and size limits (lobster, conch, Nassau grouper), quotas (conch), and gear restrictions, with realistic fines
  - Species-specific protection of grazers (parrotfish and surgeonfish), with requirement for skin patch to be left on fillet for ease of species identification
  - Full protection for sea turtles and key sport fishing species (permit, tarpon and bonefish).
  - Nation-wide ban on trawling
- Diversification of fisher livelihoods into deep slope fishing and community-based initiatives such as seaweed farming
- Site-specific partnerships between the Belize Fisheries Department and NGOs to strengthen protected area management
- Management plans exist for each marine reserve – either up-to-date or about to be revised
- System-level Conservation Action Plans to strengthen system level management through improved communication and collaboration between marine protected areas – Southern Belize Reef Complex (completed) and Northern Belize Coastal Complex (in process)
- Both site specific management plans and system level plans are based on biodiversity viability and threat identification and assessment, with strategies to improve the first and address the second (linked to three CBD Marine and Coastal Biodiversity Elements: Marine and Coastal Living Resources; Integrated Marine and Coastal Management; Marine and Coastal Protected Areas)

Since the last reporting period, Belize, through the Belize Fisheries Department, has been piloting Managed Access under its Sustainable Fisheries Initiative, in collaboration with protected area managers (both Government and co-management NGOs), fishermen and environmental organizations. The target is the implementation of rights-based Managed Access as part of a national fisheries management policy for Belize, to address overfishing, unregulated and illegal fishing, leading to restoration and recovery of the fishing industry, and protection of the health of Belize's marine ecosystem (Linked to CBD Marine and Coastal Biodiversity Element: Marine and Coastal Living Resources).

Rights-based Managed Access is currently being successfully piloted in two of the marine protected areas (Port Honduras and Glover's Reef Marine Reserves), with a national roll-out to include the territorial waters through the establishment of 9 fishing zones, over the next five years. This is being launched in conjunction with the launch of the Economic Alternatives and Fisheries Diversification Plan (2014 – 2019), developed to guide implementation of international investments into those coastal communities most tightly linked to the declining fisheries resources.

In 2011 / 2012, Belize revised (and modernized) it's Fisheries Act of 1948, as well as the subsidiary legislation, to bring them into line with the needs of the traditional fishing industry supported by Belize's coastal waters. The draft Fisheries Resources Bill is currently awaiting endorsement by Cabinet, and is

guided by the precautionary approach, ecosystems approach and the protection of biodiversity. It also includes provisions for fisheries management planning (including species protection), covers different types of fishing, the role of a fisheries advisory board (or council),the role of cooperatives, monitoring, control and surveillance, jurisdiction and evidence issues, and offences and effective penalties.

The Bill addresses issues that include binding international treaties, in particular the 1982 UN Convention on the Law of the Sea, the FAO Compliance Agreement, the 1995 UN Fish Stocks Agreement, the International Convention on the Regulation of Whaling, the FAO Port Measures Agreement, the Convention on Biological Diversity, CITES, the Bonn Convention, the RAMSAR Convention, and the World Heritage Convention. Non-binding instruments are also considered, including the Code of Conduct for Responsible Fisheries, the International Plans of Action adopted by FAO, and UN General Assembly resolutions addressing fisheries issues (draft Fisheries Resource Bill, 2014).

In support of improved management of the marine resources and strengthening resilience to climate change, a National Replenishment Zone Project is working to expand replenishment zones to meet the 10% national target for no-take areas in the marine environment. Through the new Act, once it has been endorsed, the Fisheries Department will also be addressing surveillance, enforcement and management issues in freshwater bodies and rivers, identified as under-represented within the NPAS.

Belize has also drafted the Integrated Coastal Zone Management Plan (Clarke et al., 2013) (currently awaiting endorsement), a cross-sectoral framework for ensuring effective planning for development in the coastal zone and cayes (linked to CBD Marine and Coastal Biodiversity Element: Marine and Coastal Living Resources). This promotes the wise, planned use of Belize's coastal resources, and sets recommended development limits, based on an in-depth assessment of coastal values, ecosystem mapping and current / future use, and predictive modelling of development impacts under three scenarios - Conservation, Informed Management, and Development, recommending the Informed Management scenario as the most effective route forward. It provides a planning framework that strengthens coastal management through integration of existing legislation and other national planning initiatives, and recommends additional strategies for meeting current and future challenges.

Belize currently has no mariculture in the marine environment (the frequency and intensity of tropical storms has disrupted past mariculture efforts), but does have shrimp farming on the central and southern coastal strand. The environmental impacts have been mitigated through actions from within the industry in its move towards certification (Belize will be the first country to have 75% of its shrimp farms certified under the Aquaculture Stewardship Council), and through requirements under the Department of the Environment for effective management and mitigation of effluent issues (linked to CBD Marine and Coastal Biodiversity Element: Mariculture).

A recent addition to the threats to the fishing industry has been the appearance of the invasive lionfish, which has reached plague proportions throughout the reef. This species is a voracious predator, and is thought to be having a significant impact on fish stocks, with a diet of juvenile fish and crustaceans – both commercial species (including grouper and lobster) and grazers such as parrotfish. The pathway for this

species is well known, but eradication is considered impossible, with activities focused on management through targeted fishing, and development of internal and export markets.

The black tiger prawn has entered Belize waters in a similar way, gradually spreading from its original release site in the USA, and is being addressed through similar mechanisms. Other alien species have been noted in Belize, assumed to have arrived with ship ballast water, but are not currently considered a national cause for concern (Linked to CBD Marine and Coastal Biodiversity Element: Invasive lien Species).

***Forest Biodiversity***

Belize plays a key role in the maintenance of forest biodiversity in Central America. It still retains large blocks of forest, though the integrity of these areas is increasingly threatened by advancing agriculture, the establishment of new settlements, illegal logging and transboundary incursions. Despite the importance of forest cover for building Belize's resilience to climate change, and the recent recognition of this in national policies and goals, national investment into maintenance of these forests has been decreasing year by year.

Much of the remaining forest cover lies within the protected areas system, and as such, management is guided by the National Protected Areas Policy and System Plan (2005/2006, currently being revised), and follows the ecosystem approach. It seeks to address protected areas and other forested areas within a landscape context, through the use of system-level Conservation Action Plans (Linked to CBD Forests Element 1: Conservation, Sustainable Use and Benefit Sharing). For those forest reserves under extractive management, Belize is implementing long term forest licences, (20 and 40 year licenses) to logging companies, focused on the principles of sustainable management. The licence agreements have been significantly strengthened in the last few years to ensure greater sustainability of stocks, watershed protection, and biodiversity protection.

Belize's draft revised Forest Policy statements also support CBD Forests Element 1: Conservation, Sustainable Use and Benefit Sharing

- The national forest estate shall be protected and managed sustainably and in perpetuity
- The development and management of natural forests on community-owned and managed land by indigenous people and rural communities will be promoted
- Collaborative partnerships and strategic alliances with the private sector shall be developed and strengthened for the sustainable management of forests
- Increased competitiveness in the forest sector through the manufacture of value added timber products will be encouraged and fostered
- The Government shall encourage the sustainable use of those Non Timber Forest Products (NTFPs) with the potential for commercial exploitation while respecting their traditional and cultural use
- The development and management of natural forests on private land will be promoted.
- The competitiveness and dynamic development of all aspects of forest management and the forest sector will be promoted through forest education and science and enhancement of professional expertise in forest related disciplines

- Forest biodiversity will be conserved and managed in support of social and economic well-being and international obligations
- The Government shall endeavour to reduce deforestation and forest degradation
- The protection, improvement and rehabilitation of watersheds will be integrated into the sustainable management of forests
- The Government shall have special regard for preservation of those vegetated areas not traditionally considered productive forests but which play a significant role in providing valuable ecological services and maintaining biodiversity
- The Government shall, recognizing the importance of fires as an ecological process, encourage its proper use and management in the protection and enhancement of terrestrial ecosystems, giving special consideration to human welfare and safety
- The Government shall create appropriate regulatory frameworks for forest financing schemes and the sustainable generation and equitable distribution of benefits derived from those schemes
- Adaptation and mitigation to climate change will be mainstreamed into the management objectives of Government's national forest program
- A platform for information sharing will be provided to serve as a basis for reliable data on national forest conservation status, management and the forest products market

***Forest Department, Draft, 2014***

With the current predictions for an increasing deforestation rate outside of the protected areas system, and increasing pressures for access to the land within protected areas, the Forest Department is working towards strengthening its position through a number of initiatives, including:

- The revision and updating of the Forest Policy (ongoing),
- The revision and updating of the National Protected Areas Policy (ongoing)
- Medium term project for the management and protection of Key Biodiversity Areas (KBAs):
  - Supporting forest protection and sustainable management activities
  - Promoting effective management of KBAs
  - Building institutional strength and capacity for enhanced enforcement of environmental regulations
- The recognition and addressing of the need for improved revenue generation from royalties and fines – current levels do not contribute towards financial sustainability for management activities
- The development of Belize's REDD+ strategy to support the global REDD initiative, and as a vehicle for achieving sustainable land use and improved forest management, with a reduction in emissions from deforestation and forest degradation, towards Belize's sustainable development agenda - Horizon 2030. With support from the German Technical Co-operation (GIZ), Belize developed and presented its position on REDD+ in 2014.
- Acceptance of the REDD+ Readiness Preparation Proposal resulted in Belize entering the Forest Carbon Partnership Facility (FCPF), with allocation of funding to support Belize's proposal, subject to signing of the REDD Country Participation Agreement between Belize and the Trustee of the Readiness Fund

These institutional strengthening initiatives are closely linked to CBD Forests Element 2: Institutional and Socio-Economic Enabling Environment.

***Key CBD Cross-cutting Issues***

***Protected Areas***

Belize has a National Protected Areas System that meets the global standards for representation and protection. This is now being strengthened through the current revision of the National Protected Areas Policy, and through a number of ongoing initiatives under both Forest and Fisheries Departments, including Managed Access and REDD+ (Linked to CBD Protected Areas Programme Element 1:Direct Actions for Planning, Selecting Establishing, Strengthening and Managing Protected Area Systems And Sites)

The National Protected Areas Secretariat (Government of Belize) received funding from the Global Environment Facility via the United Nations Development Programme in 2012 to implement the project entitled *"Strengthening National Capacities for the Operationalization, Consolidation, and Sustainability of Belize's Protected Areas System*". The project was aimed at ensuring that Belize effectively developed the legal, financial, and institutional capacities to ensure the sustainability of the existing National Protected Areas System (NPAS).

A rationalization exercise of the National Protected Areas System was conducted within the scope of the larger project, towards the operationalization, consolidation, and sustainability of Belize's NPAS. The exercise outputs verified and validated the inclusion of individual protected areas within the existing protected areas network with the main focus being on ecosystem representation and interconnectivity of the various protected areas that comprise the NPAS, and their socio-economic values (Walker et al., 2013). The Rationalization exercise also reviewed protected area contribution to building Belize's resilience to climate change, both in the marine and terrestrial environments (Annex 1).

The exercise provided guidance to Forest Department, NGO co-management partners and other agencies for the strengthening of the National Protected Areas System. It also verified the recommendations regarding the establishment of an effective administrative structure for the NPAS. This latter process of defining the NPAS administration structure is still being finalized.

The movement of the Departments of Forestry, Fisheries and Environment, three of the primary Government agencies involved in natural resource management, to the same Ministry (the Ministry of Forestry, Fisheries and Sustainable Development) in 2012, has greatly strengthened coordination and collaboration. This was a significant step forward in facilitating the strengthening of the administration of the NPAS, assisting rationalization and harmonization of decision-making and resulting policies. The creation of a single administrative authority for management of the system is currently being finalized. Whilst this very positive development has already achieved many desired outcomes, it is not irreversible – progress made in the consolidation of the administration of the NPAS could be lost with a single Ministry realignment or cabinet re-shuffle in the future (Wildtracks, 2013b).

A primary focus of the National Protected Areas System is to ensure benefits for local communities – whether through water security, access to tourism opportunities, linked livelihood diversification opportunities or access for sustainable resource extraction (Linked to CBD Protected Area Programme Element 2: Promoting Equity and Benefit Sharing). As such, a number of initiatives are ongoing to increase benefits to stakeholders, including:

- Managed Access: improving traditional fishing incomes
- Integrated Landscape Management in the Maya Golden Landscape, combining community outreach and livelihoods with protected area

***Terrestrial Prioritization Criteria***

***1.0 Environmental Values***
- 1.1 Watershed Catchment and Protection
- 1.2 Wetland Flood Sink Function
- 1.3 Coastal / River Bank Protection
- 1.4 Steep Slope Erosion Control

***2.0 Biodiversity Status***
- 2.1 Global Recognition for Biodiversity Values
- 2.2 Value for Under Represented Ecosystems or Ecosystems of Limited Extent

***3.0 Socio-Economic Value***
- 3.1 Value for Commercial Extractive Use (timber / non-timber forest products)
- 3.2 Value for Non-Renewable Resource Extraction - minerals
- 3.3 Value for Non-Renewable Resource Extraction – petroleum
- 3.4 Importance for Water Security
- 3.5 Value for Hydro-electricity Generation
- 3.6 Traditional Resource Use Dependence
- 3.7 Tourism / Recreational / Cultural Values

***4.0 Key Resilience Features***
- 4.1 Forest Connectivity
- 4.2 Altitudinal / Lateral Connectivity

***Marine Prioritization Criteria***

***1.0 Fisheries Management***
- 1.1 Commercial Value
- 1.2 Artisanal / Subsistence Value
- 1.3 Presence of Protected Spawning Aggregation Site(s)
- 1.4 Nursery Value for Conch and Lobster

***2.0 Connectivity***
- 2.1 Ecosystem Connectivity
- 2.2 Watershed to Reef Connectivity
- 2.3 Protected Area to Protected Area Connectivity

***3.0 Key Resilience Features***
- 3.1 Reef Diversity
- 3.2 Reef Health – SIRHI / IRHI Average
- 3.3 Reef Health - SIRHI / IRHI Highest

***4.0 Biodiversity Status***
- 4.1 Ecosystem Status
- 4.2 International Species of Concern
- 4.3 National Species of Concern

***5.0 Other Ecosystem Values***
- 5.1 Storm Surge Protection
- 5.2 Recreational / Tourism Values

management, and enabling decision makers, and society as a whole to set and achieve landscape level objectives for sustainable development.

- Corozal Bay Wildlife Sanctuary: Establishment of a community-managed sustainable fishery by the CBO co-management partner and local, traditional fishermen
- Integration of rights-based sustainable use by local communities in Forest Reserves, e.g. in the Columbia River Forest Reserve management plan
- In terrestrial protected areas, there is a sustainable use framework for Forest Reserves for logging and non-timber forest products. However other protected area designations are non-extractive, reducing flexibility for incorporating community sustainable use initiatives, other than tourism.
- Legislative barriers have been discussed during the Rationalization process, with the identification of the need to revise the Wildlife Sanctuary designation – a non-extractive designation - to formalise and regulate traditional, sustainable access to use of natural resources where relevant, and where it is felt this use can be environmentally sustainable.

The National Protected Areas System Plan sets minimum standards, defining frameworks for both management planning and management effectiveness assessment for protected areas (linked to CBD Programme Element 4: Standards, assessment and monitoring). Belize has a well-established co-management framework for many of its protected areas, through either co-management agreements or sustainable forest management agreements, depending on the designation of the protected area in question. The co-management agreement provides the framework for standards and reporting requirements by co-management agencies, and opportunities for effective stakeholder participation in management by NGOs and CBOs and private sector. In many cases, the NGO or CBO has direct day-to-day management of the protected area, and is responsible for locating management funds, with the support of the management authority.

The Fisheries Department has also established legislated Advisory Committees composed of key stakeholders – local communities, indigenous people and traditional users - for input into management of the marine protected areas. There are also strong partnerships with NGOs, providing technical support in both the marine and terrestrial sector.

***Climate Change***

As a nation that is predicted to face significant climate change impacts, Belize has taken steps to integrate climate change into national planning, and also into planning for protected areas.

In the terrestrial environment, the National Protected Areas System provides Belize with some level of resilience against climate change. Water catchment and water security are high on the list of ecosystem services, but even with the large expanses of intact forest cover, there will still be issues of water catchment with the increasing clearance of lowland forests on the coastal plain. This is an area where development is starting to come into conflict with provision of ecosystem services, as seen with the clearance of hurricane damaged forests for farmland within a national Forest Reserve, by one of the southern communities.

The marine environment is particularly vulnerable, as are those sectors that depend on these resources – fishing and tourism. Fisheries management is under the Belize Fisheries Department, which has an effective network of marine protected areas with zones and regulations in place. It is recognised that the priority requirement is addressing human pressures on the reef fishery and reducing land based threats. Bottom trawling has been banned, as has the use of nets on the reef, and the fishing of grazers critical to reef health. Managed Access (rights based access) is being introduced as a management tool to reduce overall fishing pressure, and will be implemented throughout the territorial waters through the establishment of 9 fishing zones or fisheries management areas.

Whilst there are policies and regulations in place to reduce land–based pollution, these are not always practiced, and often, short term financial gain outweighs long term sustainability. This is particularly true for mangrove clearance, clearance of riverine vegetation, and reduction of agricultural and aquaculture runoff. The recent move towards certification of the largest agricultural industries will address some of the land based pollution issues, but much of the pollution in southern Belize waters has been demonstrated to come from neighbouring countries (WRI, 2006), and is therefore outside the ability of Belize to make direct interventions.

An assessment has been conducted of potential climate change impacts on ecosystems and ecosystem services, as part of the Rationalization exercise (Annex 2).

## 8. BIODIVERSITY MAINSTREAMING INTO RELEVANT SECTORAL AND CROSS-SECTORAL STRATEGIES, PLANS AND PROGRAMMES

National development planning is geared towards achieving the Millennium Development Goals, and articulated through the National Poverty Eradication Strategy and Action Plan, 2009-2013 (NPESAP), and through the Medium-Term Development Strategy (MTDS: Building Resilience against Social, Economic and Physical Vulnerabilities; 2010-2013). Both the NPESAP and the MTDS are guided by Horizon 2030 (2010-2030), a long-term national development plan, endorsed by Government in 2013. Horizon 2030 recognizes the importance of the environment as one of its two core thematic areas - "*caring for the environment as the source and basis of economical and social progress*", and reflects this in the first statement of its vision…

> *"Belize is a country of peace and tranquillity, where citizens live in harmony with the natural environment …."*

> *"The management of Belize's natural resources including its natural habitats, water ways, and archeological sites is a key feature of sustainability and a societal responsibility with government charged as the steward. In the Belizean context, taking into account the needs of future generations has involved questions concerning the exploitation today of natural resources such as oil, the forests, and the reef to help raise the living standard of current generations vs. policies that support conservation aimed at positioning Belize's future generations for an improved standard of living."*
>
> **Belize Central Bank, 2012**

The **Horizon 2030** plan provides a revised sustainable development context for the country, with a clear strategic focus on social and economic development. Environment is seen as the "bricks and mortar" on which development is founded. The plan has a number of key statements regarding the environment:

- *"people and the environment are at the core of the long term development framework. The health of citizens throughout their lives and the health of the natural environment in which they live are the critical factors that will help to determine their quality of life."*
- As its vision for the environment, Horizon 2030 states "*Belizeans have a deep appreciation and love for Belize's natural resources and work collectively to protect the natural heritage and the economic value of these natural resources is quantified and officially recognized."*
- An integrated key stakeholder statement on the natural environment is that it is *"valued and protected as the basis for all economic activity and therefore development planning is based on the principles of environmental sustainability."*

The Horizon 2030 framework and the key environmental sustainability initiatives linked to it are being used as the framework to guide international investment into Belize's development - these include the:

- National Protected Areas Policy and System Plan (Endorsed 2006)
- National Integrated Water Resources Management Policy (Endorsed 2009)
- National Sustainable Tourism Master Plan of 2030 (Endorsed 2012)
- Revision of the outdated Fisheries Act as the Fisheries Resource Bill (Draft - awaiting endorsement)
- Integrated Coastal Zone Management Plan (Draft - awaiting endorsement)
- Revision of the Forest Policy (Draft)
- Environmental Policy (Draft)

The **National Poverty Elimination Strategy and Action Plan (NPESAP)** provides a comprehensive plan for policy and programmatic actions, and is focused on facilitating coordination between the relevant public institutions and between the public and private sectors to achieve the Millennium Development Goals for Belize (NHDAC, 2007). For the environment, this focuses on MDG7. With relevance to biodiversity, the NPESAP has sought to support improvement in the land management framework and in natural resource management practices. As such, its strategies target:

1. Supporting development of an articulated policy for comprehensive land management
2. Modernisation of forest management legislation
3. Supporting land management legislation inclusive of planning and self-enforcing provisions and strengthening land management practices
4. Ensuring that indigenous land practices are mainstreamed into the national land management framework
5. Increasing value and sustainability levels of alternative livelihood activities implemented in and by rural communities
6. Ensuring that sustained levels of fresh water are available to all

In a revision of the strategy in 2009, biodiversity and the environment are also integrated into disaster management strategies, with the recognition that natural ecosystems provide one of Belize's primary defences in building resilience to climate change impacts:

> *"…a need for adequate mitigation and adaptation measures such as rehabilitation of land and marine systems and shifts toward sustainable land, water and other natural resource use practices. The latter would include changes in farming and water extraction practices, and continued focus on improving ecosystems through biodiversity protection."*
>
> ***NPESAP 2009 - 2013***

Poverty alleviation programmes now integrate disaster risk management in environmental, social and infrastructure projects to minimize vulnerability of poor and marginalized persons to natural disasters, with targets that include reducing the rate of biodiversity loss, and improving water quality and water security.

As with all Governments, Belize is faced with the challenge of balancing economic progress with environmental sustainability (NHDAC, 2013), and the environment is often marginalised or ignored in national decisions. There is still a perception, even in some levels of Government, that environmental protection and protected areas are a luxury of the rich, in direct competition for resources being sought by the poor to alleviate poverty. There is little recognition of the critical importance of the environmental services provided, particularly in ensuring water security and in building Belize's resilience to climate change.

This has led to a position of conflict between the two stands, with conservation being seen as a barrier to development. Limited understanding at cabinet level of the critical importance of the interconnectivity between the environmental services that support Belize's economy and the health and wealth of its people, combined with political and personal interest agendas, have marginalised the environmental agenda, with little effort to truly integrate it into the national development agenda. This is gradually changing as Belize accepts the need to adapt to climate change, and recognizes the resilience that can be provided by its relatively unfragmented forests, ecosystem services and biodiversity.

Despite the statements of Horizon 2030 and the investments in the drafting and revision of key environmental policies and legislation, integration of the environment into the national budget and focus on reviewing and endorsing environmental policies at Cabinet level are not prioritised, resulting in significant challenges in effective implementation. This gap is partially addressed through external funding and through partnerships with the NGO community and ERI (University of Belize) - through co-management agreements for management of protected areas, scientific research and monitoring, wildlife rehabilitation and environmental education and awareness. The Belize Government has, to a certain degree, developed a reliance on external funding and local partners in the management of its natural resources that has allowed it to consistently cut national budgets and human resources in those departments associated with the environment, impacting effective implementation of existing legislation.

Sector-specific plans, strategies and policies in different ministries provide the operational direction and the framework for national sustainable development action. These include the

- Agriculture Development Management and Operational Strategy (ADMOS),
- Belize Rural Area Development Strategy (BRADS)
- National Land Use Policy and Planning Framework (NLUPP)
- National Sustainable Tourism Master Plan (NSTMP)
- National Integrated Water Resources Management Policy
- National Environmental Action Plan (NEAP)
- National Environmental Policy and Strategy
- National Protected Areas Policy and Systems Plan (NPAPSP)
- National Health Plan and Policy

The **Belize Rural-Area Based Development Strategy (BRADS)**, developed under the Ministry of Labour, Local Government, Rural Development, NEMO and Immigration (MLLRD), and approved in 2013, has as its Vision:

> *The rural areas of Belize have significantly improved quality of life; both human and of the ecosystems, through innovation, and informed decision-making capabilities of their populations, while appreciating and respecting their cultural identities and the potential of each rural area with robust and integrated institutions responsible for inclusive and sustainable development.*

The policy, part of a larger, regional initiative - the 2010-2030 Central American Strategy for Rural Area-based Development (ECADERT) - focuses on addressing the issue of limited employment opportunities in the rural communities and reducing the associated migration of people to more urban areas. It promotes broad-based rural economic growth and the reduction of the incidence of poverty through capacity building, strategic infrastructure development, and micro-enterprise. Whilst this policy does not specifically integrate the environment directly, it is addressed within the larger, ECADERT project ("ECADERT Strategic Objective 5…*foster improved environmental management…adapting their practices to the requirements for renewal of ecosystems and biodiversity conservation*"), and international funding agencies are linking this with strengthening natural resource use management within their funding strategies for Belize. Resource mobilisation and implementation will require the active and sustained efforts of the government, international development partners, the private sector, civil society and the citizens in the rural areas of Belize to achieve the strategy vision.

The **National Land Use Policy and Integrated Framework for Land Resource Development** (endorsed in 2011) serves as the planning framework to guide Belize in the environmentally and socially responsible use of its land resources. It integrates policies dealing with forests, agriculture and human settlements to facilitate the integration of land use planning into development planning. It provides the guidance for management of Belize's land resources in an equitable, sustainable, fully representative and accountable manner. The Policy recognizes as part of its guiding principles that:

- the "*management and protection of the integrity of natural resources and the natural environment in general is essential for the long-term, sustainable utilization of land*"
- the "*development of land should be undertaken on the basis of sustainability*"
- *"there are certain lands where the best use is conservation due to a variety of factors ranging from watershed protection, to landscape values, to ecosystem importance."*
- *conservation of biodiversity and natural resources as well as the associated retention of a variety of environmental services required is harmed by fragmentation and thus requires large blocks of land.*
- *climate change adaptation and mitigation issues must be considered and mainstreamed into land use planning*

***National Land Use Policy, 2011***

The policy also recognizes the weaknesses of fragmented and uncoordinated implementation of past policies across Ministries, and attempts to ensure that it integrates cross-sectoral policies where relevant, supporting other policies rather than replicating them.

Fifteen strategies are included specifically for effective land use planning for natural resources and conservation. These include:

- The recognition and maintenance of the intrinsic value of the land and of Belize's biodiversity and ecosystems.
- The need to ensure the maintenance of key environmental services - maintaining the integrity of key watersheds, sustainable supply of timber and non-timber resources, and of mangroves, in their roles in mitigating the storm impacts and as nurseries for many economically important marine species.
- The effective maintenance of the National Protected Areas System
- The development and implementation of policies for effective management of the seabed and cayes
- The establishment of biological corridors for ensuring ecosystem connectivity
- Maintenance of the 66 foot reserve along watercourses, of natural cover on slopes steeper than 25 degrees, and of caves and sink holes

The Policy also recognizes the importance of adaptation to climate change, and of the endorsement and implementation of the Integrated Coastal Zone Management Plan. Despite its national acceptance in 2011, and its strengths, the framework and policy is not yet being implemented, and is currently being revised to reflect the separation of the Forest Department from the Ministry of Natural Resources to a new Ministry – the Ministry of Forest, Fisheries and Sustainable Development.

The **Belize Climate Change Adaptation Policy (2010)** is directed at all government agencies that execute policies or provide services in sectors that will be impacted by global climate change including agriculture, coastal zone, energy, environment, fisheries, forestry, health, housing, local government, tourism, transportation, and water resources. Based on vulnerability assessments of major productive sectors, it mandates the various responsible Government agencies with preparing adaptation options (Annex 2). A

series of vulnerability and adaptation studies have therefore been conducted in Belize focused on these different sectors and identifying climate change issues. This Policy is currently being revised and updated by the National Climate Change Office to better reflect the current understanding of climate change and its impacts to Belize.

As a result of the Policy, the **Belize National Climate Change Committee (BNCCC)** was established in 2012 to provide economic, social and environmental expertise to meet the Government's objectives. Climate change adaptation is now being mainstreamed across Government to prepare Belize for projected climate change impacts. The BNCCC is chaired by the MFFSD, and is composed of cross-sectoral membership from all related Government Ministries and Agencies, including the Prime Minister's office, private sector, academia and civil society. The Committee is tasked with advising the government on national responsibilities with respect to climate change, including relations with the UNFCCC and the Kyoto Protocol. It also guides the implementation of appropriate policies and strategies to address climate change while still ensuring economic development.

The Belize Climate Change Committee has the role of:

- Developing an Integrated National climate change policy, strategy and action plan
- Developing national positions on Climate Change issues
- Adopting and effecting a strategy for inclusion of climate change in national development plans
- Capacity building, institutional and other resources needs
- Maintaining a register of climate change related projects, programmes and research activities
- Coordinating UNFCCC national communication to ensure compliance with Convention
- Facilitating Belize's participation in the Convention and its mechanism

Three functioning sub-committees have been established: the Mitigation Sub-committee, Vulnerability and Adaptation Sub-committee, and the Public Education and Outreach Sub-committee.

Belize is an active participant in the Intergovernmental Panel on Climate Change, in the Conference of Parties of the UNFCCC, and in meetings at regional level focused on addressing climate change issues in the region.

The primary tool for biodiversity planning and management is **the National Protected Areas Policy and System Plan (NPAPSP).** This document, endorsed by the Government of Belize in 2005/6, provides the framework for ongoing effective management of Belize's natural resources within protected areas, through the Ministry of Forestry, Fisheries and Sustainable Development. As part of this national initiative, Belize has:

- developed a strengthened co-management agreement with co-management partners, a protected area management planning framework and a framework for assessment of protected area management effectiveness at the system level

- conducted a gap analysis to ensure that the NPAS includes representative ecosystems and maintains ecosystem services
- assessed protected areas (including private protected areas) for their contribution and prioritisation to the NPAS
- used system-level planning to ensure protected areas are better managed within the landscape / seascape complex

The Forest Sector, managed through the Forest Department, is in the process of revising the Forest Policy. With the focus on Long Term Forest Licenses, it is shifting to 20 to 40 year timber concession agreements for the Forest Reserves, based on long term sustainability, encouraging investment in replanting and effective management of timber stocks. These new agreements include conservation of biodiversity within their remit, strengthening biodiversity conservation within the extractive Forest Reserves of the National Protected Areas System.

Belize has established the **National Integrated Water Resource Act (2010)** and created the Water Authority to implement the Act. This is focused on the protection and regulation of water catchment areas, aquifers, and surface water, with the responsibility of controlling water quality and quantity. It is also working to harmonize relations with Mexico, and, to a lesser extent, Guatemala in the areas of recharge rates and impacts. The Mexico / Belize harmonization process includes early warning systems for floods in the Rio Hondo system.

Management of the water resource is considered of increasing importance following recent droughts, which have had significant effects on the agricultural sector. The Environmental Impact Assessment process has been strengthened, with large scale agricultural, industrial and tourism developers being required to provide more information on water extraction and water use. The issues of large scale removal of forest and the impacts on rainfall are now being investigated, with a recognised need for the development of guidelines. The Act has extensive implications, especially with the inclusion of a clause that states "…this act supersedes other acts. "This overlaps with the Forest Department which has the mandate for managing the headwaters through the Forest Act, and the National Protected Areas Policy, guiding management of the National Protected Areas System within which the majority of the watersheds lie.

As a signatory to the Cartagena Convention, Belize has ratified the Land-Based Sources of Pollution Protocol as part of a concerted global effort to address the potential impacts of land-based sources of pollution on the marine environment. As part of its obligations, it produced the **National Program of Action for the Control of Land Based Sources of Pollution in Belize (NPA LBS)** in 2008, under the Department of the Environment. The plan addresses the issues of domestic sewage and waste water, reduction of bilge and sewage discharge into the marine environment, nutrient runoff, deforestation / land use change, and solid waste management. Belize is also a signatory of the Specially Protected Areas and Wildlife Protocol.

The Environmental Impact Assessment (EIA) system is being significantly strengthened under the Key Biodiversity Project, and is identified as a critical strategy in the Government toolbox of environmental

management. The Department of the Environment has also drafted a cross-cutting **National Environmental Strategy and Action Plan** with multi-sectoral participation. This has as its Vision "*To be leaders in environmental stewardship for sustainable development both nationally and regionally",* with the Mission of "*ensuring that Belize's development is sound through effective environmental management for present and future generations."* The draft Action Plan is being developed as an operational and management tool for the mobilization of resources, development of capacity (both institutional and legal), and as guidance for addressing gaps and improving the execution of the of GOB's environmental protection and natural resources management efforts (BET, 2014).

The **Coastal Zone Management Authority and Institute (CZMAI)** has the mandate to design a National Integrated Coastal Zone Management (ICZM) Plan, completed in 2013 but still waiting endorsement. The Plan recommends actions that will ensure sustainable coastal resources use by balancing conservation ideals with the economic and social needs of the country. It should be noted, however, that the CZMAI, established as a Statutory Authority under the CZM Act in 1988, has no mandate for implementation, so relies on mainstreaming the plan, with adoption and implementation by the respective Government and NGO agencies. The plan presents an "*Informed management scenario, balancing conservation and development, based on assessments of use, value, ecosystems, socio-ecological vulnerability and resilience, socio-economic vulnerability, ecosystem adaptation*" and has support from the general public in Belize for its implementation.

The Fisheries Department and NGO partners are leading the region in establishing Managed Access – a rights-based fishery management tool, to increase sustainability of commercial fishing and strengthen ecosystem-based management within Belize's Marine Reserves. The framework for fisheries management is being strengthened through the revision of the Fisheries Act, expected to be signed into law in 2014. This new **Fisheries Resources Bill** incorporates the main elements of a modern and robust fisheries law, including:

- improved definitions,
- strengthening of principles governing conservation and management (including the Precautionary Approach, Ecosystems Approach and the protection of biodiversity),
- fisheries management planning (including species management and development of species recovery plans),
- better defining the role of cooperatives,
- better defining the role of a fisheries advisory board (or council),
- strengthening of surveillance and enforcement, jurisdiction and evidence issues, offences and penalties

The **National Institute of Culture and Heritage (NICH),** the statutory body responsible for the archaeological reserves and cultural heritage of Belize is drafting a National Cultural Policy that integrates the environment.

> "*Attention is called to the pivotal importance of environmental awareness and protection in the global environmental system, for example climate change. Cultural practices impact the environment in both positive and negative ways and should therefore be evaluated*."

The draft Policy stresses the need to ensure that "culture policies and those policies related to industrial development, environmental protection and tourism product enhancement are linked and integrated." The policy:

- supports efforts to develop in the individual an appreciation of and respect for the aesthetic and functional values of the natural surroundings.
- urges greater recognition of the significance of micro-environments (land and sea national parks, ecosystems and others) in the national context and the importance of cultural beliefs and practices in their preservation.
- urges greater sensitivity to the cultural considerations and implications in attempting to work out solutions to environmental problems, and in so far as is feasible, encourages that the solutions should be culturally compliant.
- supports through its relevant government agencies and private entities research on the link between cultural practices and the environment, especially where those environments are valuable and fragile.
- supports initiatives that promote cultural practices which allow for sustainable livelihood and helps to protect the environment.

This recognition of the importance of environmental protection, and in fact the environment in general, in the Cultural Policy is a demonstration of the increasing mainstreaming of environment across Ministries. It is also interesting to note, however, that the environment is not mentioned in the NICH 2010 – 2015 Strategic Plan, and that biodiversity protection is not a focus of planning for the archaeological reserves.

## 9. STATUS OF IMPLEMENTATION OF THE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN

The original National Biodiversity Strategy and Action Plan (NBSAP) was developed in 1998, but was never formally endorsed, and funding for implementation was limited in the five years following its development. It has, however, provided an informal framework for the guidance of biodiversity conservation in Belize, and has been used to some extent by the Government, NGOs and CBOs in the justification and prioritisation of biodiversity conservation activities. The original plan was framed by a number of overarching objectives, but did not incorporate national biodiversity targets, and has not been updated to support the global Aichi Targets.

**GOAL**

To promote the sustainable use of Belize=s biological and cultural resources by educating society to properly conserve biological diversity in order to maintain and enhance the quality of life for all Belizeans. This will be achieved by ensuring local participation and equitable access to benefits, through adequate institutional and human capacity building and collaborative research and development

***Belize NBSAP, 1998***

Over the last five years, there has been a gradual increasing of recognition of the importance of the environment in Belize's national development, in its adaptation mechanisms for climate change, and the need for cross sectoral integration of the environment into mainstream policies and planning. The revision of the National Biodiversity Strategy and Action Plan is therefore being conducted under the National Biodiversity Enabling Activities, as part of the "National Biodiversity Planning to Support the implementation of the CDB 2011 - 2020 Strategic Plan in Belize" project, and in recognition of its commitments under the CBD and a workplan will be developed for updating the plan.

### Success of Implementation

Analysis of the level of implementation of the actions identified in the NBSAP (1998) shows that it is poor: of the 353 activities, 60% have a score of only 1 or 2 out of 4 on the scale:

1. No long term output
2. Limited success of output
3. Largely successful output
4. Fully successful output

….based on the current status.

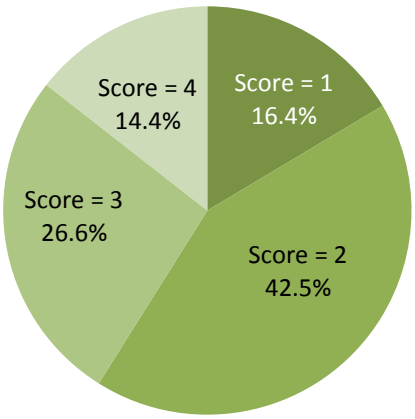



***Diagram 2: Implementation scores for all 353 activities identified in the NBSAP (1998).***

***16.4% of strategic activity outputs have an output success rating of 1: they are not considered to have been achieved in the long term (no visible outputs in 2014)***

***42.5% of strategic activity outputs have an output success rating of 2: Partial Success of Outputs***

Much has changed since 1998. Some activities are tied to legislation, plans and strategies that are not being implemented in today's context or were very specific to activities ongoing in 1998 – for example "*Amend the Land Utilization Act to address the definition, establishment process and management of Special Development Areas*" and "*Explore agreements with private landowners to obtain access for game hunting in areas adjacent to protected areas or 'buffer zones'*.

Some activities have not been achievable without changes to the legislative framework – game farming, for example, requires changes to the Wildlife Protection Act, which have been discussed at length since 1998. These changes have been included in the draft amendments to the Wildlife Protection Act, but are still to be passed by Cabinet before game farming becomes a legal option.

The thematic area of Medicinal Plants, in particular, appears to be weak in terms of implementation, with over 87% of strategic activities rating as either 1 or 2. This is an area that benefitted from the input of many active participants during the planning process, but has weakened over the years without the support of a specific Government agency to move it forward. Under current approach, medicinal plants would be addressed as specific activities relating to traditional knowledge, rather than being encapsulated at the level of a Thematic Area. The inclusion of traditional healers and medicinal plants in the draft National Cultural Policy should provide the support required to revitalize this area.

Despite its limited implementation and dormancy, a number of the activities identified within the Strategic Plan have nevertheless been implemented over recent years. Critical plans, policies and legislative revisions have been achieved, but many are still awaiting endorsement from Cabinet (key among them, the National Land Use Policy and Integrated Framework for Land Resource Development and the Integrated Coastal Zone Management Plan, both important cross sectoral land use planning frameworks). A full assessment is presented in the Stocktaking report on Belize's National Biodiversity Strategy and Action Plan (1998): A Review, submitted by the Forest Department, Ministry of Forestry, Fisheries and Sustainable Development, Belize. 2014.

| Outputs Linked to the National Protected Areas Policy and System Plan | | |
|---|---|---|
| **NBSAP Sections** | **Outputs linked to NBSAP targets (1998)** | **Linked CBD Articles** |
| ***In-situ and ex-situ conservation*** | ▪ National Protected Areas Policy and System Plan (2005 / 2006)<br>▪ Rationalization Report (NPAPSP) (2013)<br>▪ Integrated Coastal Zone Management Plan (2013, to be endorsed)<br>▪ Integrated Water Resources Act (2010)<br>▪ Establishment of the Protected Areas Conservation Trust – Statutory body for funding protected areas<br>▪ Upgrade of National Herbarium<br>▪ Establishment of BAPPA – Belize Association of Private Protected Areas<br>▪ Ex-situ Conservation:<br>  ▪ Establishment of two private botanic gardens<br>  ▪ 4 mandated Wildlife Rehabilitation Centres<br>  ▪ Belize Bird Rescue / Belize Raptor Centre<br>  ▪ Belize Primate Rehabilitation Centre (Wildtracks)<br>  ▪ Belize Manatee Rehabilitation Centre (Wildtracks)<br>  ▪ American Crocodile Education Sanctuary<br>  ▪ Belize Zoo – Problem Jaguar Programme<br>  ▪ 2 private botanical gardens<br>  ▪ Belize Botanical Gardens<br>  ▪ Caves Branch Botanical Gardens | 8,9 |

| Outputs Linked to the National Protected Areas Policy and System Plan | | |
|---|---|---|
| **NBSAP Sections** | **Outputs relevant to specific NBSAP targets** | **Linked CBD Articles** |
| ***Laws and policy*** | ▪ Integrated Coastal Zone Management Plan (2013)<br>▪ National Protected Areas Policy and System Plan (2005 / 2006)<br>  ▪ National Protected Areas Secretariat and NPAS Office in place<br>  ▪ Rationalization Report (NPAPSP) (2013)<br>▪ National Land Use Policy and Integrated Framework for Land Resource Development (2011)<br>▪ National Integrated Water Resources Act and Management Policy (2010)<br>▪ National Sustainable Tourism MasterPlan for Belize 2030(2011)<br>▪ National Biosafety Policy (2009)<br>▪ National Plan of Action for the Control of Land-Based Sources of Marine Pollution (2010)<br>▪ Revision of Environmental Protection Regulations<br>  ▪ Amendment of EIA Act to strengthen environmental protection in key areas Effluent Regulations exist<br>  ▪ Mining activities are included in the EIA schedule if over a certain limit<br>  ▪ NEAC and EIA process being strengthened<br>  ▪ Department of the Environment followed standard policies of 66' riparian / coastal vegetation when issuing clearance.<br>▪ Other outputs achieved:<br>  ▪ Banning of trawling<br>  ▪ Special constable system in place<br>  ▪ BAPPA included in NPAPSP (but not yet legally integrated)<br>▪ Belize Mid-Term Development Strategy (2010) | 6,11,14 |
| ***Human and institutional capacity building*** | ▪ Ongoing, effective capacity building in all Government departments and NGOs<br>▪ GIS capacity built where necessary<br>▪ Lands Information Centre strengthened<br>▪ Capacity building of National Environmental Appraisal Committee (NEAC) members – cross sectoral review of Environmental Impact Assessments<br>▪ Capacity building of fishers – Managed Access<br>▪ Capacity building of logging industry – sustainable forest management, added value products<br>▪ Upgrading of National Herbarium<br>▪ Species inventories of protected areas integrated into management plans<br>▪ Needs assessment of Forest Dept. staff addressed<br>▪ Training of farmers in pesticide use under Pesticide Control Board<br>▪ Green Laws training provided to co-management agencies / special constables<br>▪ Special constables licensed to enforce site-specific environmental legislation | 12,13,18 |

| Outputs Linked to the National Protected Areas Policy and System Plan | | |
|---|---|---|
| **NBSAP Sections** | **Outputs relevant to specific NBSAP targets** | **Linked CBD Articles** |
| ***Research, monitoring and sustainable use*** | ▪ National Environment and Natural Resource Management Agenda (ERI, 2011) has identified priority research needs and provides a framework for collaboration<br>▪ National Biodiversity Monitoring Framework currently developing national indicators (ERI-UB)<br>▪ National Land Use Policy and Integrated Framework for Land Resource Development (2011)<br>▪ National Management Effectiveness assessment assesses protected area effectiveness in key areas, including information availability, operational success, governance, socio economic benefit, institutional and financial management<br>▪ Fisheries Department protocols for pre- and post-season monitoring conch and lobster<br>▪ Healthy Reef protocols for monitoring reef health<br>▪ Gap Analysis and draft national threatened species list developed as part of NPAPSP (2005)<br>▪ Socio-economic assessment of Managed Access impacts in the fisheries sector<br>▪ Managed Access catch assessment<br>▪ Ongoing assessment of deep slope fishery<br>▪ Assessment of Central American river turtle<br>▪ Annual assessment of key spawning aggregation sites<br>▪ Assessment of deforestation – tropical forests and mangroves<br>▪ Assessment of economic importance of sport fishing<br>▪ Permanent sample plots established for National Forest Inventory<br>▪ Environmental Research Institute established<br>▪ Wildlife conflict studies conducted<br>▪ Reforestation in Freshwater Creek Forest Reserve<br>▪ Agroforestry being promoted<br>▪ Strengthening of Long Term Forest Licenses<br>▪ Active Wildlife Office working on ending the wildlife trade in Belize<br>▪ Active Traditional Healers Association supported by NICH<br>▪ Promotion of bird watching by NGOs<br>▪ Mechanism for traditional harvest of NTFP integrated into a number of management plans<br>▪ A number of species-specific distributional surveys – amphibians, crocodiles, Central American river turtle, savanna plants | 7,10,12,14 |
| ***Community participation*** | ▪ Co-management agreement finalized for co-management of protected areas with NGOs / CBOs<br>▪ Requirement for socio-economic benefits from protected areas for key stakeholder communities<br>▪ Active participation of Managed Access fishers in surveillance and catch monitoring activities<br>▪ Stakeholder consultations required for the EIA process<br>▪ Capacity building activities for village leaders | 10 |

| | | |
|---|---|---|
| | ▪ Protected area communities involved in management planning and through advisory committees<br>▪ Active Traditional Healers Association, supported by NICH | |

| Outputs Linked to the National Protected Areas Policy and System Plan | | |
|---|---|---|
| **NBSAP Sections** | **Outputs relevant to specific NBSAP targets** | **Linked CBD Articles** |
| ***Public education and awareness*** | ▪ DoE has an effective public awareness and information management programme focused on "green, clean, resilient and strong"<br>▪ NPAS Office has a Communication Officer and is implementing awareness activities for the National Protected Areas System<br>▪ APAMO has an ongoing awareness programme<br>▪ Protected area co-management agencies include education, outreach and building capacity for sustainable livelihoods within their programmes<br>▪ There is a growing interest in agro-forestry (particularly cacao) and organic farming, with training opportunities available for farmers<br>▪ Belize has been well marketed for tourism | 13 |
| ***Institutional collaboration and coordination*** | ▪ The National Land Use Policy and Integrated Framework for Land Resource Development (2011) - specifically provides a framework for institutional collaboration and coordination<br>▪ The National Protected Areas Secretariat provides a forum for cross sectoral discussion on protected areas<br>▪ The Integrated Coastal Zone Management Plan (to be endorsed) provides a framework to guide planning in the coastal zone<br>▪ NEAC provides cross-sectoral review and discussion of Environmental Impact Assessments<br>▪ APAMO provides a collaboration mechanism for protected area co-management agencies<br>▪ Strengthening Belize's Traditional Healers Association is included in the cultural strengthening strategies of the draft Cultural Policy<br>▪ A number of GoB/NGO working groups have been established to strengthen collaboration, including:<br>  ▪ National Hicatee Conservation and Monitoring Network<br>  ▪ Manatee Working Group<br>  ▪ Belize Marine Mammal Stranding Network<br>  ▪ Spawning Aggregation Working Group<br>  ▪ National Coral Reef Monitoring Network<br>  ▪ Belize Sea Turtle Conservation Network<br>▪ There are several ongoing transboundary initiatives at both Government and NGO level – TRIGOH (Belize, Guatemala and Honduras) and Rio Hondo Border Commission with Mexico<br>▪ National Environmental Appraisal Committee (NEAC) acts as a multi-agency framework for discussing EIA proposals<br>▪ DoE is working with Guatemala / Mexico to address specific transboundary pollution issues through Conventions.<br>▪ Belize is part of the Small Island Developing States, as well as CARICOM and SICA, strengthening collaboration with these countries<br>▪ Belize has a very high international market profile | 17,18 |

| Outputs Linked to the National Protected Areas Policy and System Plan | | |
|---|---|---|
| **NBSAP Sections** | **Outputs relevant to specific NBSAP targets** | **Linked CBD Articles** |
| ***Information management*** | ▪ The Lands Information Centre (LIC) has the mandate for maintaining national GIS data<br>▪ The Biodiversity and Environmental Resource Data System (BERDS) stores biodiversity data on-line, and is being maintained under BTFS.<br>▪ The Environmental Research Institute hosts the:<br>▪ National Coral Reef Monitoring Bleaching Database<br>▪ Belize Spawning Aggregation Data<br>▪ BRAHMS Savanna Plant Database<br>▪ On-line library of publications and reports<br>▪ The Statistical Institute of Belize manages socio-economic information for the Government of Belize. Much of this information is available on-line<br>▪ Ongoing assessment of deforestation, land use, and fires is conducted via satellite imagery<br>▪ Dept. of Agriculture keeps records of agricultural data | 12,17,18 |
| ***Access to genetic resources*** | ▪ The Fisheries (Amendment) Regulations 1999, No. 13, Section 39 addresses aspects of marine bioprospecting, mainly the permitting and regulating process.<br>▪ Guidelines have been drafted for management of bioprospecting in the marine environment. Provision for bio-prospecting is included in the revised Fisheries Resource Bill (daft)<br>▪ New York Botanical Gardens (Belize Ethnobotany Project)conducted a long term project assessing medicinal plants from Belize for medicinal properties<br>▪ Belize Intellectual Property Rights Office established<br>▪ Protection of New Plant Varieties Act (16 of 2000) | 15 |
| ***Equity and benefit sharing*** | ▪ Rationalization process addresses shift in Wildlife Sanctuary Status to permit traditional use if implemented under a credible sustainable extraction plan<br>▪ Protected Areas management plans are increasingly incorporating mechanisms for local community benefits from protected areas<br>▪ Belize Intellectual Property Rights Office established | 8,10,15,16,20 |
| ***Population and biodiversity*** | ▪ National Poverty Elimination Strategy and Action Plan (2007, revised 2009)<br>▪ National Gender Policy (2013)<br>▪ Horizon 2030 (2010)<br>▪ Strengthening of the Physical Planning Unit | 10,13 |
| ***Biosafety*** | ▪ National Biosafety Policy was approved in 2009<br>▪ National Biosafety Committee (NBC) was formed in November 2002 under the leadership of the Ministry of Agriculture<br>▪ Focal Point of the Cartagena Protocol on Biosafety is under the Belize Agricultural Health Authority (BAHA), the competent authority in Belize for Agricultural Health and Food Safety. BAHA also host the Biosafety Clearing House (BCH) Focal Point for Belize. | 19 |

# PART III: PROGRESS TOWARDS THE 2020 AICHI BIODIVERSITY TARGETS AND CONTRIBUTIONS TO THE MILLENNIUM DEVELOPMENT GOALS

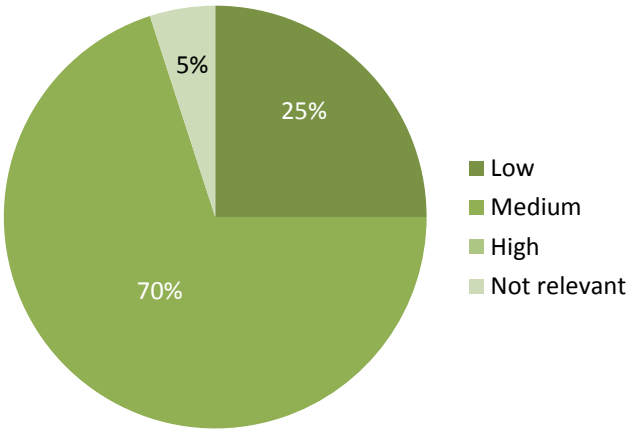
## 10. BELIZE'S PROGRESS TOWARDS THE IMPLEMENTATION OF THE STRATEGIC PLAN FOR BIODIVERSITY 2011-2020 AND ITS AICHI BIODIVERSITY TARGETS

Belize was assessed on its progress in contributing towards the goal of each global Aichi target through broad cross-sectoral stakeholder consultation. Progress was rated as follows:

| Summary of Ratings Per Aichi Target | Level of National Contribution | | | |
|---|---|---|---|---|
| | Low | Medium | High | Not Applicable |
| *Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society* |  |  | | |
| ***Strategic Goal B:** Reduce the direct pressures on biodiversity and promote sustainable use* |  |  | | |
| ***Strategic Goal C:** Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity* |  |  | | |
| ***Strategic Goal D:** Enhance the benefits to all from biodiversity and ecosystem services.* | |  | |  |
| ***Strategic Goal E:** Enhance implementation through participatory planning, knowledge management and capacity building* |  |  | | |
| **Number of Aichi Targets** | **5** | **14** | **0** | **1** |

Of the twenty Aichi Targets, Belize is considered to be providing a moderate contribution in fourteen target areas. Of these, one, Target 11, is considered to be close to providing a high contribution to global progress having met the majority of the target goals, particularly in the terrestrial environment:

***Target 11:*** *By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent 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 landscape and seascapes.*




**Level of Contribution to Aichi Targets**

One target is assessed as Not Relevant to the Belize context, as Belize is not currently a signatory to the Nagoya Protocol:

***Target 16:****By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.*

## *Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society*

**Target 1:** By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

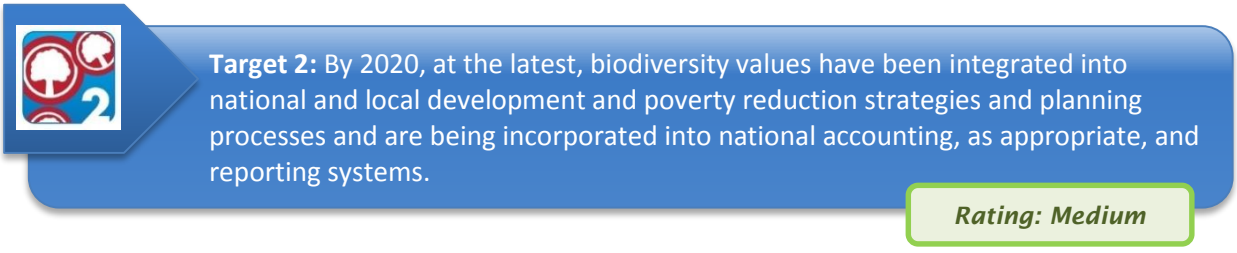
***Rating: Low***

- The Status of Protected Areas report (2010) identified that "*Public and political awareness of the importance of the National Protected Areas System's contribution to the national economy, in watershed protection, and water security, natural disaster mitigation, and climate change buffering, is considered inadequate, threatening the long-term security of Belize's social and financial investments in its protected areas.*"
- Public participation, education and access to socio-economic benefits are recognized within the National Protected Areas Policy and System Plan as important support mechanisms to engender greater awareness, appreciation and support for the protected areas. However, the State of Protected Areas report demonstrated a mean score of 2.14 (53.6%) averaged across the National Protected Areas System for Participation, Education and Socio-economic Benefit (Walker et al., 2010). This is one of the weaker areas of protected area management, and is reflected by the broad lack of public and political understanding of the contributions of the protected areas to the economy, quality of life, and security against natural disasters.
- This transcribes to an unwillingness to adequately defend the NPAS and the natural and cultural resources it protects, along with the environmental services provided, even though this is for the benefit of the nation.
- This weakness in support mechanisms therefore results in significant threats to the protected areas, demonstrating the urgent need to strengthen public awareness.
- During regional consultations (2014), awareness and understanding of biodiversity and environmental values across the general population in Belize was estimated at < 50%, and in some urban areas, is thought to be closer to 20%. Belize is small country, with Government actions often driven by the demands of the electorate. The limited awareness of the importance of maintaining a balance between environment and development by the electorate (and within Government itself) is a major barrier to the achievement of Belize's commitment to the CBD.
- Those communities with a higher level of awareness and involvement in natural resource management tend to be those adjacent to protected areas, with active engagement by NGO co-management agencies. These agencies are generally site-focused, and not as active in the primary population centres of Belize City and Belmopan, where over 25% of Belize's population resides.
- There are no national surveys of people's perceptions of the environment and environmental values. There are, however, a number of more targeted surveys of specific sectors or communities, linked to protected areas, generally conducted by NGO co-management agencies. Where socio-economic surveys are conducted, there is currently no standardization of socio-economic survey techniques among these agencies.
- There are very few national, sustained campaigns promoting the value of biodiversity and environmental services – awareness programmes are generally through NGO networks, and are very specific (e.g. on

legislation relevant to the Central American river turtle, or targeting stakeholders of a particular protected area).

- The National Protected Areas Secretariat (NPAS) office has recently launched an awareness campaign targeted at increasing awareness of the roles and values of Belize's protected areas in everyday life…however this is limited by being project based. There is very limited central funding for sustained initiatives to increase environmental awareness.

- The Environmental Research Institute is including environmental perception / awareness indicators within its Natural Resource Monitoring Framework, designed to standardise monitoring efforts across the country.
- In stakeholder consultations (2014), concern was expressed that the school curriculum at both primary and secondary level is not currently designed to fully engage students in valuing the environment and using natural resources sustainably. Education strategies in Horizon 2030 target this area, with a strategy of "*Educating to emphasize respect and appreciation for the natural environment*" by "*Integrating environmental education within the school system and providing children with access to Belize's natural wonders through field visits and hands-on experiences."* General consensus among teachers interviewed, however, suggests that it is becoming harder for them to integrate access to the outdoors in their activities.
- Engagement of the general public, and even of the NGOs, is considered to be weakened by inconsistent Government decisions that are contrary to national environmental policies and plans – particularly those associated with development and tourism in the highly sensitive marine environment.
- This leads to a reluctance to invest in protected areas, reflected by the focus of investment of the Sustainable Tourism Development project in archaeological sites rather than the National Protected Areas System, as the archaeological sites have a stronger governance regime and a better track record of project implementation and achieved outputs, with less risk of inadequate political support or negative political intervention.
- A significant challenge to increasing awareness is the high level of immigration, identified as one of the causes of poverty in Belize: "*The substantial influx of poor immigrants. Central American immigrants, who have no capital, are poorly educated, and lack skills, partly contribute to the increase in unemployment, under-employment, and poverty, especially in Cayo and Toledo*."
- These immigrants have limited knowledge of environmental laws, or location and regulations of protected areas, and as a result are cited by protected area managers as an issue in terms of adequate enforcement.




***Mainstreaming at Government Level***

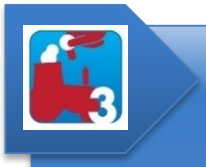
- National development planning is geared towards achieving the Millennium Development Goals and articulated through the National Poverty Eradication Strategy and Action Plan, 2009-2013 (NPESAP), and Medium-Term Development Strategy (MTDS: Building Resilience against Social, Economic and Physical

Vulnerabilities; 2010-2013). It is guided by Horizon 2030, a long-term national development plan, endorsed by Government in 2013.

- The Horizon 2030 Strategy provides a revised sustainable development context for the country, with a clear strategic focus on social and economic development. Environment is seen as the "bricks and mortar" on which development is founded.
  - The Horizon 2030 framework and the key environmental sustainability initiatives linked to it are used to guide international investment - these include:
    - National Protected Areas Policy and System Plan (Endorsed 2006)
    - National Integrated Water Resources Management Policy (Endorsed 2009)
    - National Land Use Policy and Integrated Planning Framework (Endorsed 2011)
    - National Sustainable Tourism Master Plan of 2030 (Endorsed 2012) National Policy on Responsible Tourism (2010)
    - Revision of the outdated Fisheries Act as the Fisheries Resource Bill (Draft - awaiting endorsement)
    - Integrated Coastal Zone Management Plan (Draft - awaiting endorsement)
    - Revision of the Forest Policy (Draft)
    - Belize's National Environmental Action Plan (Draft)
  - These policies and plans, however, are limited by fragmented implementation and inadequate investment in financial and human resources.
  - The National Poverty Elimination Strategy (2009 – 2013) addresses the need for environmental and biodiversity protection to meet MDG7 goals and for climate change adaptation
  - The National Land Use Policy and Integrated Framework for Land Resource Development (endorsed in 2011) provides the framework for management of Belize's land resources in an equitable, sustainable, fully representative and accountable manner. Despite its national acceptance in 2011, and its strengths, the framework and policy is not yet being implemented, and is currently being revised to reflect the separation of the Forest Department from the Ministry of Natural Resources to a new Ministry – the Ministry of Forest, Fisheries and Sustainable Development.
  - The Central Bank of Belize, in its review of development in Belize since independence (2012), stated that "*the management of Belize's natural resources including its natural habitats, water ways, and archaeological sites is a key feature of sustainability and a societal responsibility with government charged as the steward."* It notes that by developing a national outlook that takes into account the needs of future generations, questions are raised concerning the exploitation of today's natural resources such as oil, the forests, and the reef to help raise the living standard of current generations vs. policies that support conservation aimed at positioning Belize's future generations for an improved standard of living.
  - This has fed into to a position of conflict between the two stands, with conservation being seen as a barrier to development. Limited understanding at cabinet level of the critical importance of the interconnectivity between the environmental services that support Belize's economy and the health and wealth of its people, combined with political and personal interest agendas, have marginalised the environmental agenda, with little effort to truly integrate it into the national development agenda, even though the environment is present in policy statements.
  - Despite the statements on the importance of the environment in Horizon 2030, there is a critical need to strengthen the level of engagement of Government in actively making decisions that reflect the connection between the environment, and poverty alleviation, disaster risk management, climate change adaptation and the tourism industry. The second interim report for Horizon 2030 recognizes this, with the recommendation that the theme *"care for the natural environment" should be re-worked to give greater emphasis to climate change, the inextricable link between the economy and the environment and the primacy of protection/ conservation as a core principle of sustainable long term development."*

- The Government has approved a number of important environmental policies and plans, but many are not being implemented… these include the National Land Use Policy and Integrated Framework for Land Resource Development and the Integrated Coastal Management Plan. Challenges identified include limited resources (including human resources), limited political support / priority, and unclear designation of agencies responsible for implementation.

- Management of the natural resources is poorly represented in resource allocations, and has suffered significant cutbacks in central funding over the last five years…there is no integration of environmental values into national accounting, though the Integrated Water Resource Management Policy is the first such instrument to address Payment for Environmental Services.
- The institutions that are directly responsible for the management of Belize's environment and natural resources (Department of the Environment, Forest Department, Fisheries Department, Coastal Zone Management Authority and Institute) are under-funded, under-staffed and in many cases do not have the capacity to perform their basic functions.
- Raising awareness of the importance of the protected areas and the environmental services they provide is being worked on through NPAS, with the identification of strategic alignments of the environmental agenda and areas where these can assist in meeting national development targets, to engage other ministries. However NPAS needs the full support of the NGO partners to ensure the message is widespread – this support is currently impacted by NGO distrust of Government.



**Target 3:** By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

***Rating: Low***

***Negative Incentives***

- There is currently no national policy to ensure that incentives and subsidies are not harmful to biodiversity, and no positive incentives for conservation and sustainable use initiatives.
- One of the key disincentives for conservation is the productive vs. unimproved land tax – land has to be demonstrated to be developed in some way to be eligible for reduced land tax. The criteria for development do not include leaving the land natural for conservation and/or future forestry management. For large tracts of land under private ownership, the tax burden has resulted in lands being subdivided, and forested land cleared but subsequently left unused, to avoid payment of the undeveloped land tax.
- Belize still has national lands outside of the protected areas, which are available to Belizean nationals through a lease then purchase system. To apply for purchase, the prospective owner has to be able to demonstrate that he / she is actively developing the land. Again, this development is exclusive of forestry management or conservation, and leads to increased land clearance.
- Whilst recognized as a priority under the NPAPSP, there are currently no legal mechanisms for integrating private protected areas within the National Protected Areas System.

- There are currently no legal mechanisms in place (such as easements or covenants) or incentives for long term commitment of land to conservation - an obstacle that restricts the ability of private landowners to raise funding for effective conservation management.
- With much of the potential identified biological corridor areas under private ownership, this lack of incentive is detrimental to corridor formation or other biodiversity initiatives identified in the NPAPSP. Corridor functionality will only be feasible if incentives can be made available for private sector – or the "non-productive land tax" issue is, at least, resolved. This is an issue currently being addressed in both the Central and North East corridors.

- With agriculture playing a key role in Belize's development, the Government of Belize actively promotes large scale agricultural developments, with support for the largest agro-industries in Belize – citrus, bananas, sugar cane, shrimp farms and cattle – through incentives, in the form of fuel subsidies, reduced duties on pesticides, and zero rated materials. These incentives are identified as one of the drivers for increased agricultural clearance and unregulated pesticide use.
- The reduced import duties on pesticides are flagged as a reason for reduced incentive for farmers to moderate use of pesticides –an issue that is currently being considered by the Pesticide Control Board. However, realistically, the chances for changing this are slim due to the strong lobbying powers of the agriculture sector.
- The fishing sector does not benefit from any form of national subsidy or tax incentive programmes. The two largest fishing cooperatives are focused on short term profits, and have created small scale incentives to encourage their members to continue fishing despite declining catches. These include direct subsidies for fishing supplies and low-interest loans artificially changing the market risks, rewards, and costs of fishing, and encouraging more people to take up fishing as a livelihood. At a national level, however, these incentives are considered insignificant.

***Positive***

- The Department of the Environment (DoE) requires that all large-scale (>500acres) agricultural and aquaculture initiatives develop an Environmental Impact Assessment before start-up, and provide an Environmental Compliance Plan to mitigate potential impacts on the environment.
- As part of its remit to manage environmental impacts, DoE now requires that all shrimp farms install sediment ponds, in response to environmental impacts on water quality from shrimp farming effluent. This has been achieved, and has made a significant difference to the economics of shrimp farming, reducing water exchange by 75%.The settlement ponds remove the majority of the nitrogen and phosphorus, making a significant difference to the water quality of effluent.
- Whilst there are national agricultural policies promoting environmental sustainability, these are not linked to national incentives. However, there are private sector initiatives in the agricultural sector linked to global market demand towards reducing the environmental footprint of Belize's largest agricultural industries, and increasing their environmental sustainability.
- PACT, the Protected Areas Conservation Trust (PACT), an independent statutory body located under the Ministry of Forestry, Fisheries and Sustainable Development, currently has the mandate to receive a portion of the Conservation Tax paid by visitors on their departure from Belize, as well as to source external funding, and to make disbursements to protected area managers, through project grant-based mechanisms. PACT is the focal point for the MAR Fund in Belize, as well as for Climate Change Adaptation funding.

- The recent acceptance of Belize's REDD+ submission to the FCPF opens up further incentives and opportunities for implementation of REDD strategies linked with curbing deforestation.
- REDD+ is seen as a vehicle for achieving the goals and objectives of sustainable land use management and sustainable forest management, two tools towards sustainable development.

**Target 4:** By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

***Rating: Medium***

- The Department of the Environment is actively integrating sustainability into its everyday activities, and is in the process of developing the 2014-2024 cross sectoral National Environmental Action Plan.
- The agricultural sector is characterized by three main sub-sectors (FAO, 2011):
  - small-scale farmers, producing food primarily for local consumption
  - a relatively well organized sugar, banana, citrus, and marine products sector
  - large-scale commercial sector, represented primarily by the Mennonites
- The National Land Use Policy and Integrated Framework for Land Resource Development (Meerman et al. , 2011) provides the framework for management of Belize's land resources in an equitable, sustainable, fully representative and accountable manner. The Policy recognizes as part of its guiding principles that:
  - the "*management and protection of the integrity of natural resources and the natural environment in general is essential for the long-term, sustainable utilization of land*"
  - the "*development of land should be undertaken on the basis of sustainability*"
  - *"there are certain lands where the best use is conservation due to a variety of factors ranging from watershed protection, to landscape values, to ecosystem importance."*
  - *Conservation of biodiversity and natural resources as well as the associated retention of a variety of environmental services requires is harmed by fragmentation and thus requires large blocks of land.*
  - *Climate change adaptation and mitigation issues must be considered and mainstreamed into land use planning.*
- The policy has been endorsed but has not yet been implemented.
- The shrimp farming industry has been a leader in the move to certification under the Aquaculture Stewardship Council – again through market-driven necessity. Belize will be first country where 75% of shrimp farms are certified, and the first in the world to achieve certification. With the more regulated use of shrimp feed required by certification, shrimp farms are finding that they are not only reducing the level of nutrient in their effluent, but also achieving a much better feed conversion rate, reducing expenditures. Whilst certification won't necessarily affect their current market, the farms are finalizing their certification requirements in preparation for the next 5 years, when the EU will tighten its importation to permit only certified shrimp. The US$1.6 million required to achieve this has been located through investment from IDB, WWF, the EU / Complete Caribbean, with the support of the Government of Belize.
- The banana industry has a rolling contract with Fyffes that requires them to meet certification standards. To maintain their current contracts and to compete on the international market, farmers have to commit to, and meet, social and environmental standards, including close monitoring of issues such as pesticide use and management of runoff into adjacent rivers. This is at a cost to the farmers, with little or no direct assistance from Government towards meeting these costs (BBGA, pers. com.). It should be noted however, that despite this, considerable quantities of nematicides and fungicides are applied by the banana industry, and there is also concern about the organo-phosphate applied to the bags protecting each bunch of bananas.

- The citrus industry, too, is moving towards certification through the International Standards Organization ISO 14001 (Environmental Standards), linked to the requirements of its European market (CGA, pers. com.).
- The sugar cane industry, too, is certified under Fairtrade initiative, and there are efforts to replace the most toxic agro-chemicals with less damaging ones.
- Many leaders in the agricultural sector consider the certification requirements to be too extreme for Belize, and would like an opportunity to negotiate to customise some areas for realistic implementation and targets for the Belize context. However, market demand is dictating that they proceed regardless if they want to remain competitive at a time when globalization is removing preferential markets.
- Whilst the Agricultural Development Management and Operational Strategy (ADMOS; 2003) rated the establishment and development of an organic farming industry in Belize as a high opportunity area, during consultations, only limited interest in the promotion of organic farming was voiced by representatives of the Ministry of Agriculture (2014), with no ongoing activities.
- The development of the organic farming movement in Belize has been led by BOPA, the Belize Organic Producers Association, which has worked with the Ministry of Agriculture over the years to develop certification standards and train extension officers in certification (Tzul, 2009). These were presented in 2010 as the Participatory Guarantee System (PGS) Certification scheme for local production with the support of the Inter-American Institute for Cooperation on Agriculture (IICA) and the Ministry of Agriculture and Fisheries (MAF). Whilst BAHA, the Agricultural Health Authority, has the mandate to regulate the certification of organic farms in Belize, it currently has no certification system in place to do so (BAHA representative, 2014).
- The National Policy on Responsible Tourism addresses the need for tourism to respect Belize's natural resources:

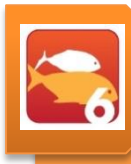
  *The Government of Belize shall support and engage in responsible tourism as its preferred approach to the management of Belize as a tourism destination in order that the integrity of Belize's natural resources and biodiversity be sustained, that there be equitable distribution of the economic benefits derived from tourism, that the local culture and communities involved in tourism activities be respected, and that visitors to Belize act in an appropriate manner that respects the natural resources and cultural heritage of the country. This shall be achieved by managing tourism as a shared responsibility requiring the support of and partnership among the public sector, private sector and those involved in and benefitting from the management of the country's protected areas and natural resources.*
- The Belize Tourism Board and tourism industry have been discussing the way forward in green certification, and more environmentally conscious tourism operations have become certified under independent certification programmes.

## *Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use*

**Target 5:** 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.

***Rating: Medium***

- Belize remains the only country in Central America with 61.1% forest cover (Cherrington, 2014). However, if the current trends continue, it is predicted that forest cover will fall to only 50% in approximately 29 years (Cherrington et al., 2012).Approximately 40% of this forest is within the National Protected Areas System. However the current rate of deforestation (0.97% in 2013) is increasing, and predicted to continue along this trend into the future. Most deforestation is occurring outside protected areas, except in transboundary areas.
- In the Belize context, ensuring 50% of the land remains under forest cover in the long term is considered a viable national target during consultations (though 60% is considered preferable), in the acceptance that with an expanding population and the need for development, there will be continued deforestation, and at an increasing rate.
- The minimum would be maintenance of forests within the protected areas, modified to ensure effective ecosystem representation within the National Protected Areas System, with maintenance of ecosystem functionality and biological corridors.
- There is still the opportunity to establish biological corridors, as supported by the Land Use Policy and the NPAPSP.
- The NPAPSP Rationalization process (2013) identifies which areas need to be protected and why, and is being used by Forest and Fisheries Dept. and NGOs to guide decisions. A priority is establishment of biological corridors whilst forest cover still exists.
- The current political climate promotes land clearance for agriculture – through reduced land taxes, and subsidised fuel and pesticides. Most large scale clearance for agriculture is currently associated with the Mennonite commercial farms, the sugar cane farming industry, and clearance for cattle farming. The surge in sugar cane prices and the newly opened market for cattle are leading to increased forest clearance, with extensive farming practices, leading to degraded soils.
- Over the past five years, a number of the remaining large tracts of intact forest under private ownership - the Balam Jungle property in north east Belize and the Gallon Jug and Yalbac properties in the west - have been sub-divided, and portions sold, resulting in extensive clearance for agriculture – a direct result of the land tax issue for non-productive lands, a Government strategy to pressure large landholders to subdivide, increasing land availability for small landholders.
- The rate of land clearance for Mennonite farming has been increasing exponentially, with land being made available through various means – purchase of sub-divided large tracts within areas such as Balam Jungle, partnerships with local community farmers on leased land, and purchase of farmland outright.



**Target 6:** 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

***Rating: Medium***

***Marine Sector***

- Belize's fishery is focused on the shallow waters between the coast and the barrier reef, and on the three offshore atolls. It is both socially and economically important to Belize, with more than 2,750 fishermen directly dependent on capture fisheries, over 12,500 Belizeans are direct beneficiaries (fishermen families and dependents) of the fishery, and a further 1,000 involved indirectly in processing and export (Fisheries Dept., 2014). The primary products in the marine sector are Caribbean spiny lobster, Queen Conch and finfish (primarily snapper and grouper), with sea cucumber as a relatively new extractive industry, and a limited level of extraction of fish for the aquarium trade.
- Fishing is non-industrial, with fishermen based from coastal communities fishing independently, using open boats, sail sloops, and canoes, and fishing by free-diving, use of lobster traps and shades, or by hook and line. The majority of the product is sold to two fishing cooperatives that export to the United States and Europe.
- There is a strong dependence on fishing in a number of coastal communities, with limited options for diversification away from the fishing industry.
- Belize is becoming a regional leader in marine resource management, with a series of complementary management strategies in place to address the above issues:
    - ecosystem-based management through the establishment of a network of eight marine reserves in key locations, with general use, conservation and strict replenishment zones
    - a further five marine protected areas have been established as full no-take reserves, under the Forest Department, strengthening replenishment zones in the marine sector
    - establishment of the active GoB/NGO National Coral Monitoring Working Network
    - protection of critical spawning aggregation sites and support of a national Government / NGO Spawning Aggregation Working Group
    - strict legislation and regulations
        - requirement for fishermen to have valid fishing licenses
        - enforced seasonal closures and size limits (lobster, conch, Nassau grouper), quotas (conch), and gear restrictions, with realistic fines
        - species specific protection (e.g. Nassau grouper, nurse shark)
        - protection of grazers (parrotfish and surgeonfish), with requirement for skin patch to be left on finfish fillet for ease of identification
        - full protection for sea turtles and key sport fishing species (permit, tarpon and bonefish)
        - nationwide ban on trawling
    - partnerships between the Belize Fisheries Department and NGOs to strengthen management, particularly in the areas of scientific monitoring and education and outreach
    - up to date management plans for each marine protected area, and system-level Conservation Action Plans to strengthen system level management within the larger seascape, communication and collaboration between marine protected area managers

- promotion of diversification into deep slope fishing and community based initiatives such as seaweed farming
- This management regime has allowed Belize to largely avoid the catastrophic collapse of fish stocks experienced by adjacent countries in the region. However, it is recognised that Belize has a mature fishery.
- The fishery is threatened by the open access regime, overfishing, illegal incursions from neighbouring countries, issuing of illegal fishing licenses to non-residents, declining reef health, increasing land-based impacts, the arrival of the invasive lionfish, and insufficient funds for effective surveillance and enforcement.
- Under its Sustainable Fisheries Initiative, the Belize Fisheries Department, protected area managers (both Government and co-management NGOs), fishermen and environmental organizations are partnering towards the implementation of rights-based Managed Access as part of a national fisheries management policy for Belize. This is intended to address overfishing, unregulated and illegal fishing, leading to restoration and recovery of the fishing industry, and protection of the health of Belize's marine ecosystem.

> ***Managed Access is "***…one of the best things to happen to the Belize fishing industry. It has allowed fishermen to take ownership of resources within a specified area. It provides a framework that allows them to be involved in the decision making process, helps them understand the process and to participate actively.
>
> ***Fishery management stakeholder, 2012***

- Rights-based Managed Access is being piloted in two of the marine protected areas Port Honduras and Glover's Reef Marine Reserves, with a national expansion that will include all territorial waters through the establishment of nine fishing zones or fisheries management areas, over the next five years.
- The fisheries sector has been accustomed to an open access fishery, and transitioning to a new regime has been complex and politically challenging for the Fisheries Department, and difficult for both fishers and managers. However, there is growing support for Managed Access as the results from the pilot sites demonstrate that it is working, with fishermen reporting increased catches, greatly improved compliance with regulations, and effective participation in surveillance and catch monitoring.
- Is it working? 100% of fishermen surveyed in 2012, at both sites, after the first year of the pilot phase, felt that they personally have benefitted from Managed Access, and are seeing increased yields. 100% of Managed Access fishermen thought that Managed Access was succeeding in increasing stakeholder benefits, and were of the opinion that the Managed Access concept has the potential to increase security of livelihoods for traditional fishermen with a long term use of the area (Catzim et al., 2013).
- This success is partially attributed to the highly participatory nature of the initiative, with fishermen being involved in decisions from the start, through the development of Community Managed Access Committees for the two pilot sites, significantly increasing the understanding and engagement of the PHMR fishers (Catzim et al., 2013).
- In the medium and long term, the Community Managed Access Committees are seen as a mechanism through which fishers will play an increasingly key role in the management of the fisheries, working with managers to recommend measures pertaining to the management of the marine reserves and playing an increasing role in monitoring and evaluation of Managed Access.
- There has long been recognition that there needs to be a cap on the number of fishermen, and whilst both Managed Access and non-Managed Access fishers generally accept this, they feel there should be greater focus on developing alternatives to assist fishermen as part of the Managed Access programme, as many don't have the level of education / capacity to find the information and support for themselves.

- This is being addressed through the Economic Alternatives and Fisheries Diversification Plan (Salas et al., 2014), and designed to build greater resilience into the local economies of the fishing communities.
- The balance currently being established between fishing and sustainable extraction is being challenged by an international call for review of the CITES status for the Queen conch by countries where populations have collapsed. With seasonal closures and the current national quota system in place, fishermen are already finding their fishing season curtailed – loss of the conch export market would place greater pressure for over-extraction of other species to make ends meet.
- Fisheries Management Plans are currently being developed for lobster, conch and sharks.

***Freshwater Sector***

- There is no organised freshwater fishery in Belize.
- Whilst no nation-wide survey has been conducted of freshwater fish stocks in the last five years, indications from regional consultations across Belize are that freshwater fish stocks are declining, and in some cases have reached critical levels.
- Causes of decline include unsustainable fishing practices (particularly nets across rivers, and, in some cases, use of poison in rivers), limited surveillance and enforcement, and competition from invasive species (primarily *Tilapia*, though the armoured catfish has recently been recorded in the Rio Hondo, on the border with Mexico).

**Target 7:** By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

***Rating: Medium***

- The shrimp farming industry has been a leader in the move to certification under the Aquaculture Stewardship Council, through market-driven necessity. Belize will be first country where 75% of shrimp farms are certified, and the first in the world to achieve certification. However, the sector still needs strengthening through the development of comprehensive aquaculture legislation, identified as a critical requirement to support the certification scheme.
- The US$1.6 million required to achieve this has been located through investment from IDB, WWF, the EU / Complete Caribbean, with the support of the Government of Belize.
- The banana industry has a rolling contract with Fyffes that requires them to meet certification standards. To maintain their current contracts and to compete on the international market, farmers have to commit to, and meet, social and environmental standards, including close monitoring of issues such as pesticide use and management of runoff into adjacent rivers. This is at a cost to the farmers, with little or no direct assistance from Government towards meeting these costs (BBGA, pers. com.).
- The citrus industry, too, is moving towards certification through the International Standards Organization ISO 14001 (Environmental Standards), linked to the requirements of its European market (CGA, pers. com.).
- The sugar cane industry has been certified under Fairtrade certification and needs to maintain its environmental compliance to keep its market.
- Many leaders in the agricultural sector consider the certification requirements to be too extreme for Belize, and would like an opportunity to negotiate to customise some areas for realistic implementation and targets

for the Belize context. However, market demand is dictating that they proceed regardless if they want to remain competitive at a time when globalization is removing preferential markets.

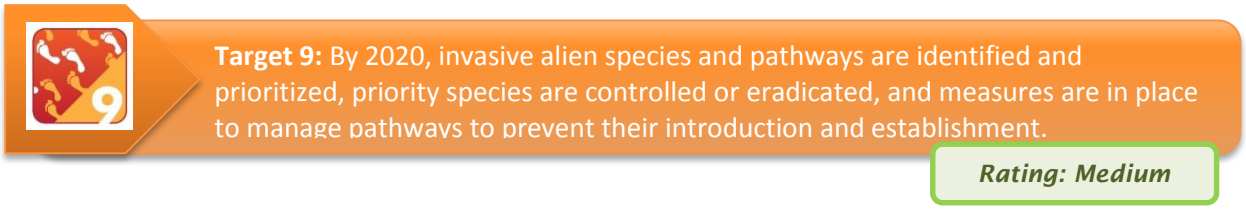
- In the forestry sector, Belize is moving towards Long Term Forest Licenses (LTFL) - 20 to 40 year licenses that promote Sustainable Forest Management towards long term sustainability.
- The Forest Act and LTFL licences include regulations to protect steep slopes and riparian belts from impacts, as well as addressing the need to protect the watershed and biodiversity. Although a number of Short Term Forest Licenses are still being issued, they are gradually being phased out.

**Target 8:** By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

***Rating: Low***

- Whilst there is some air and soil pollution in Belize, concerns are focused primarily on contamination of water, and particularly on its impacts on the coral reef. Sedimentation and agrochemical contamination from mainland watersheds have been highlighted as the greatest impacts on the Belize reef after climate change, with contamination reaching the atolls.
- The primary sources of land-based pollution impacting the reef are from agriculture. In the north, there are concerns about agrochemical runoff from the sugar cane, rice and cattle areas, as well as urban runoff and poor solid waste and sewage management. In Central Belize, agrochemicals are generally associated with the citrus and banana industries, and enter the rivers as a result of clearance of riverine vegetation and poor management practices.
- In the south, five major watersheds drain some of the principal banana growing areas. Following storm events, the increased sediment load of these rivers is also accompanied by an increased pesticide load, as rain washes agrochemicals from the watersheds into the rivers, and from there into the sea. This is overshadowed by the watersheds emptying into the Gulf of Honduras from Guatemala and Honduras (particularly the Ulua, Motagua, Patuca and Aguan) where land use change has removed much of the natural vegetation from the formerly forested slopes (Burke et. al. 2006). Studies indicated that Honduran river plumes, particularly that of the Ulu´a River, reached the southern part of the Belize Reef 61% of the time.
- The move towards certification of the larger agricultural industries (Citrus Growers Association, Banana Growers Association, Belize Shrimp Growers Association, and Sugar Cane Growers) will address a number of the identified pollution issues. Certification includes protection of riverine vegetation, reducing / minimising agrochemical/ feed use where feasible, reducing the level of pollutants entering the environment.
- Whilst these are the largest agricultural sectors, smaller industries are also looking into use of biodegradable chemicals.
- The Pesticides Control in Belize is the statutory body responsible for the implementation of the provisions of the Pesticides Control Act, and its enabling regulations. The Pesticide Control Board (PCB) runs trainings for farmers, licensing them for pesticide use. It also requires that any person buying pesticides should be asked for their applicator's license; however, both the training and the request to see the license are frequently circumvented.

- The PCB is gearing up to enforce tighter controls in the areas of registration and post-registration surveillance, including new requirements for importers and handlers involved in the storage and distribution of pesticides in Belize.
- The health issues linked to poor practices for chemical application aren't well known - sugar cane farmers aren't yet linking chemicals to high levels of neurological damage in the sugar cane communities, even though this has been shown in neighbouring countries. There is limited awareness of the concentrations to be used, and whilst Belize only permits the importation of pesticides registered by the PCB, restricted chemicals are brought in illegally from Mexico, with little safety awareness.
- Government focus is on increasing production rather than reducing pesticide use, and addresses these issues through enforcing regulations reducing the contamination of water by the removal of riparian vegetation, washing of pesticide application containers in rivers etc.
- Challenges lie in the agricultural policies that reduce the tax on pesticides, reducing the incentive to overuse rather than regulate use. There are also challenges in human and financial resource allocations for effective monitoring and surveillance.
- Large agricultural initiatives are required to submit an Environmental Impact Assessment, which ensures that environmental safeguards are in place to minimise environmental impacts.
- Solid waste issues are being addressed as a priority under Horizon 2030, with the establishment of the Solid Waste Management Authority and improved solid waste management. This service reaches approximately 50% of Belize's population.
- Old landfills have been replaced by transfer stations and the new sanitary landfill, designed to protect ground and surface water from contamination, minimize the accumulation of toxic landfill gases and allow for green use of the landfill after it has reached the end of its useful life.
- Most towns and smaller communities have designated dump sites, but these are often selected for convenience rather than on a technical basis, with inherent issues of chemicals leaching into the aquifer or nearby streams or rivers. There is generally no sorting of waste.
- Sewage contamination is a major issue - Belize Water Services currently operates and maintains sewerage systems in three municipalities namely Belmopan, Belize City and San Pedro Town. None of the municipalities served by these sewerage systems enjoy 100% coverage, and the systems are in need of modernisation.
- The Belize City and San Pedro sites are highly vulnerable to storm surge, with a high probability that during major storm events, sewage will overflow into the sea, affecting water and reef health a current project is focused on extending this coverage through the establishment of an integrated water and sanitation system for the Placencia Peninsula.
- Almost 90% of Belizeans do not have access to sewage services (IDB, 2014). Smaller towns and villages have no dedicated sewage treatment, with houses having independent septic systems, or simple pit latrines.
- Transboundary sewage is also an issue, with Chetumal's over-extended sewage system pumping raw sewage into the Corozal Bay Wildlife Sanctuary.




- There is adequate (but by no means complete) information in Belize on invasive species, and for those species causing significant impacts to the economy, pathways have been identified and where feasible, management regimes have been put in place.
- There aren't the human resources to address every invasive species, and a number have become well established. Where they are serious cause of concern to human health or agricultural production, however, measures have been put into place to control the impacts.
- In the terrestrial environment, the greatest concern is for vectors of human illness, such as the African yellow fever mosquito (*Aedes aegypti*) (also a vector for dengue), and invasive pests of the primary agricultural industries. The Ministry of Health is responsible for control of mosquito-carried diseases, and conducts spraying in towns and villages when risks are highest.
- BAHA is mandated to regulate the import of fruit, vegetables and vegetable material to Belize, to ensure that disease does not enter the country. BAHA also has the authority to prevent the transport of plant material and / or animals within Belize to prevent spread of infection. Challenges to control include the porous northern and southern borders, and the constant flow of Mexican and Guatemalan fruit, vegetables and cattle, crossing the border, making regulation difficult.
- The Citrus Research and Education Institute (CREI) of the Citrus Growers Association established a monitoring programme in 2004, to conduct pro-active bi-annual surveys for exotic diseases known to be present in the region but not yet present in Belize. The citrus greening disease was identified in Belize in 2009, and is being addressed through emergency funding from OIRSA (the International Regional Organization for Agricultural Health). Diseased trees are destroyed, and new stock is grown in screened nurseries approved by BAHA, as legislated under SI No. 122 of 2009, and operated under the BCCP (Belize Citrus Certification Programme) nursery regulations and guidelines.
- The pink hibiscus mealybug (*Maconellicoccus hirsutus*), from South East Asia, can affect many important horticultural and agricultural crops, and has been an issue in Belize in the past. It was detected in 1999, and an emergency plan was implemented, bringing it under control in a few months. Continued monitoring has been ongoing since then, and in 2003, a regional laboratory was established in Belize for production of the parasitoid *Anagyrus kamali,* for control of PHMB in the region.
- The Medfly Eradication Programme was initiated in Belize in 1977, and has been able to control this invasive species, preventing its establishment as a crop pest. Belize was officially recognized by the USDA as a medfly free country on August 28th, 2001.
- Two non-native herptiles are found in Belize. The Asiatic house gecko arrived overland in the late 1980's, and has replaced the smaller dwarf gecko in urban areas and rural communities, the dwarf gecko now being marginalised to more natural forested environments. Asian Tokay geckos (*Gecko gecko*), originating from South East Asia, and common in the US pet trade, were first recorded on South Water Caye in 1994. A survey of the herptile populations of the caye in 2002 indicated that the local gecko population was declining, and it is suspected that the introduction of this species may be the cause of local extinction of tuberculate leaf-toed gecko (*Phyllodactylus tuberculosus*) on that caye (Meerman et al., 2002). There have not been any attempts made to eradicate either of these two species. For the Asiatic house gecko, the potential for eradication is low, with this species now wide spread throughout the country, and in neighbouring countries.

- For the marine and freshwater invasive species, control has not been possible, with the high connectivity of the aquatic environment.
- Invasive lionfish (*Pterois volitans*) have had the most impact, first being recorded in Belize in 2008, and spreading rapidly throughout Belizean waters. This species is native to the West Pacific Ocean, and is a voracious feeder, eating both juvenile fish and crustaceans - a single lionfish on a small patch reef can reduce fish recruit biomass by 80% in five weeks (Albins et al., 2008). Whilst active fishing of this species is encouraged through tournaments and prizes, and an export market has been developed for fillet, it is now acknowledged that this species is in Belize waters to stay. Fishermen are therefore encouraged to fish for this species as an alternative, diversification from the regular finfish species, and as a means to have some control over numbers.
- The Belize Fisheries Department and NGOs are using organised lionfish fishing tournaments to help regulate this species.
- Black tiger prawns (*Penaeus monodon*) originate as a result of an accidental release from a South Carolina research facility in 1988 (TISI), and first appeared in Belize in 2013. There is the potential threat that native crustaceans – shrimp, lobster, and crabs - may be susceptible to diseases carried by this species. Strategies for control are similar to those for lionfish…targeted fishing and market creation. One shrimp farm in Belize is investigating the potential to breed this species.
- Shrimp farms utilise Whiteleg, or Pacific white Shrimp (*Litopenaeus vannamei*), and successive storm events have led to this species now being common in coastal waters in southern Belize, and utilized by local communities.
- In the freshwater environment, *Tilapia* has largely replaced the native cichlids as the dominant species in rivers and freshwater bodied. This species originated from Tilapia farms both in Belize and in neighbouring Guatemala and Mexico, with fish stocks washing into the rivers during storm events, as a result of flooding. With the high connectivity of the river systems, removal of *Tilapia* is not considered realistic.
- Armoured catfish were first reported in the Rio Bravo in 2012 and in the Rio Hondo in 2013. This species, from the exotic aquarium trade, is of concern as it roots through the substrate and may disrupt the food sources of native fishes and hamper their reproduction by destroying their eggs. It also destabilizes river beds and banks, removing riverine vegetation and increasing sedimentation, placing further strain on freshwater fish species already impacted by *Tilapia*. Efforts to remove this species from the waterways have not so far been successful
- Invasive plants include the pantropical water hyacinth, which can be found in extensive rafts in northern Belize rivers – particularly the New River. It appears though that floodwaters and flow surges maintain a balance – dislodging the water hyacinths and flushing them out to sea, where they rapidly perish in saline water.
- The Australian *Casuarina* pine is present along much of Belize's coastline, and can be locally common on sandy savannah soils. African oil palm is gradually invading the coastline of southern Belize – presumably from seeds flushed downriver from Honduran and Guatemalan oil palm plantations. *Melaleuca* is another invasive tree that has spread through savannah areas in central Belize. Cogon-grass is reported to be invading the savannahs throughout Belize, as well as traditional slash and burn farms.


**Target 10:** By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

***Rating: Medium***

- Belize's carbon footprint is (relatively) low…it is accepted that there is little the country can do to reduce its contribution to emissions. For those ecosystems particularly vulnerable to climate change, strategies are therefore focused on building resilience and adaptation. This status is rated as Medium based on Belize's efforts to reduce pressures on these ecosystems.
- Belize has a world-renowned barrier reef - the largest in the western hemisphere, and recognized for its global importance by the declaration of seven of Belize's protected areas as a serial World Heritage Site.
- Reefs in Belize have historically been perceived to be at slightly lower risk than others in the region, due in part to the small human population and relatively low levels of coastal development. In recent years, however, coral health has generally been on a par with, or slightly below, the rest of the Caribbean, with impacts from a combination of coral bleaching, disturbance events (primarily hurricanes) and chronic stressors, leading to declining coral cover and increases in macroalgae (McField, et al., 2008 (ed. Wilkinson et al., 2008)).
- The extensive loss of key reef-building species (*Acropora cervicornis, Agaricia tenuifolia, Millepora complanata, Diploria spp. and Montastrea spp*.) and shift in species composition with subsequent replacement by *Agaricia tenuifolia* (CCRE, 2002), a faster growing species, but with lower value for provision of reef structure and functionality as a structural barrier to storm surges.
- This, combined with increasing effects of global warming is of particular concern (Kramer & Kramer 2001), with an ecological shift towards algal dominance at many sites across Belize, and in the Caribbean generally. Global climate change (with increasing sea temperatures and ocean acidification) has been identified as the biggest contributing factor in reef health decline (Aronson et al., 2006). This overlies and adds to other stressors, including coral diseases, overfishing of herbivorous fish, the population crash of the herbivorous long-spined sea urchin *Diadema antillarum* and other environmental stressors, including land-based sedimentation and pollution (Liddell et al, 1986; Aronson et al, 1998).
- Wave actions from tropical storm events has added to the pressures faced by the reefs, and major bleaching events have been recorded with increasing frequency, thought to be accentuated by increased acidification resulting from higher $CO_2$ levels (Anthony et al., 2008). 29% of Belize's reefs are assessed as being in Critical health, 44% as Poor, 22% as Fair, and only 5% considered in Good health (Healthy Reefs, 2012). This is, however, an improvement from the 2010 ratings.
- The primary need is to address the human pressures on the reef - for the effective, sustainable management of the fishery and the reduction of land based threats. Fisheries management is under the Belize Fisheries Department, which has an effective network of marine protected areas with zones and regulations in place. Bottom trawling has been banned, as has the use of nets on the reef, regulating the use of nets generally, and the fishing of grazers critical to reef health. Managed Access is being introduced as a management tool to reduce overall fishing pressure within the marine protected areas.
- Whilst there are policies and regulations in place, these are not always practiced, and short term financial gain often outweighs long term sustainability, leading to mangrove clearance, clearance of riverine vegetation, reduction of agricultural and aquaculture runoff.


- Whilst Belize is working to reduce its pressures on the reef, it has to be recognized that the primary pollution impacts are from neighbouring countries, with far larger agricultural and urban sectors and is therefore outside the ability of Belize to make direct interventions. (WRI, 2007). Regional initiatives and agreements are focused on reducing these anthropogenic impacts where possible.
- The tourism industry regulates tourism impacts through the training and licensing of guides, and regulations for guide / visitor ratios. Whilst carrying capacities haven't been established for many protected areas, visitor management is generally considered part of the surveillance and enforcement duties of rangers.
- Other vulnerable ecosystems include littoral forests, mangroves and herbaceous beach communities – all under heavy pressure from development as the coastal beaches and cayes of Belize increase in their popularity as tourism, investment and retirement destination. The sandy beaches are critical for nesting sea turtles and American crocodiles, and the littoral forest for the island leaf-toed gecko, a species with extremely disjointed distributions, as well as for numerous migratory bird species.
- As climate change impacts increase, these beach communities will be affected by rising sea levels and increased tropical storm impacts. Mangrove and herbaceous beach communities play critical roles in stabilizing island structure, reducing coastal erosion, beach loss and sedimentation as well as providing nursery functionality for many marine species. Mangroves are protected under legislation, but limited human resources limits monitoring of development activities unless they are within or near marine protected areas. The Mangrove Protection Legislation has been under review for more than five years, awaiting endorsement.
- Elfin forest, a quasi-cloud forest of the Maya Mountains Massif is also considered particularly vulnerable to climate change, with predictions of cloud cover rising as air temperature rises, with associated changes in the cloud forest environment that will impact the critically endangered and endangered amphibian species and specialised bird and plant species that inhabit the ecosystem.
- The unique sphagnum bog of Sarstoon Temash National Park has recently been impacted by fire as a result of activities associated with oil exploration – oil exploration and extraction, particularly in the wetland and marine environments is of concern to many Belizeans, particularly as the nation has few resources to deal with serious oil spills.

## *Strategic Goal C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity*


**Target 11:** By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent 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 landscape and seascapes.

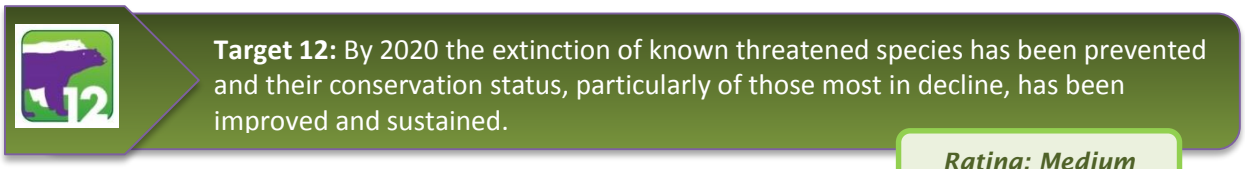
***Rating: Medium / High***

- Belize currently has 35.8% of its terrestrial area protected (Cherrington, 2014), meeting the CBD target.
- In order to meet the targets within the CBD, the Belize Fisheries Department is focusing on incorporating 10% of all marine and coastal habitats within Belize's territorial waters as functional and legally protected, non-extractive replenishment zones.
- Currently, whilst 19.8% of territorial waters are under marine protective management, only 6.7% of this is legally established replenishment zone (with full protection against fishing activities), and only 3.12% is considered as functional –managed as replenishment zone (TNC, 2014).
- Of the 68 natural ecosystems identified under the revised ecosystem mapping (Meerman, 2011), only 7 ecosystems do not meet the 10% target recommended as the IUCN minimum, and are therefore considered under-represented within the National Protected Areas System. When using 30% as the minimum threshold for representation (Selva Maya), a further 21 ecosystems would be considered under-represented.
- The most prominent gaps are in the marine environment, under the various categories of Caribbean Open Sea.
  - Caribbean Open Sea – Abyssal lacks any representation within the national ecosystem coverage
  - One other deep water ecosystem (Caribbean Open Sea – Bathyal) has very poor coverage, at 0.3% for the MPA system as a whole. This decreases to 0.2% when only including legislated Replenishment Zones (non-extractive zones).
- The recent declaration of the Turneffe Atoll Marine Reserve has increased representation of the Coastal Shelf and Mesopelagic waters to over 10% within MPAs, though only 7.8% and 2.9% respectively lie within Replenishment Zones.

| **Marine Ecosystems** | **% of ME in MPA** | **%of ME in NTZ** |
|---|---|---|
| Caribbean Open Sea - Abyssal | 0.0 | - |
| Caribbean Open Sea - Bathyal | 0.3 | 0.2 |
| Caribbean Open Sea - Mesopelagic | 12.8 | 2.9 |
| Coastal Shelf | 33.0 | 7.8 |
| Coral Reef | 54.3 | 14.3 |
| Deep Patch Reef and Seagrass | 99.9 | 26.4 |
| Deep Water Mud | 22.0 | 2.9 |
| Littoral Forest | 8.5 | 2.7 |
| Mangrove | 16.8 | 3.2 |
| Seagrass | 23.7 | 1.9 |
| Sparse Algae and Sea Grass | 80.5 | 6.6 |

*This estimation covers MPAs and protected areas up to 2km inland from the coast*
***ME:*** *Marine Ecosystem*
***NTZ:*** *No Take Zone*

- Whilst not an ecosystem in their own right, seamounts such as those between Turneffe and Lighthouse Atolls are also important systems that are currently not represented within the NPAS.
- Also highlighted as under-represented within the system are mangrove forests, with only 9.3% of dwarf mangrove scrub within the NPAS.
- Coastal forests (littoral forests) and beach vegetation (Tropical coastal vegetation on very recent sediments, moderately drained), considered one of the most vulnerable ecosystems, lying in areas targeted for tourism development.
- Rivers, often being used to define protected area borders, but not included within the protected areas themselves. This impacts effective protection of species such as the critically endangered Central American river turtle.
- Two seasonally inundated ecosystems of the coastal plain - Eleocharis marsh and Tropical evergreen seasonal broad-leaved lowland swamp forest, tall variant have less than 10% coverage
- Recommendations have been made to support protected area realignments to improve coverage of under-represented ecosystems within the NPAS (Walker et al., 2012).
- Mangroves have shown a 10% loss over the last 10 years (Heathy Reefs). This relatively slow rate of loss is predicted to continue and accelerate (Cherrington, 2014).
- Mangroves are not considered to be adequately protected within the National Protected Areas System, and there is only limited enforcement of existing mangrove legislations. This ecosystem is, however, flagged by DoE for further assessment in EIA reviews. The Integrated Coastal Zone Management Plan also identifies key areas of mangroves that have high protection values and therefore in zones of low development activity.
- The NPAS also fulfils other critical roles, such as watershed protection and other environmental services. Additionally, increasing risk of impacts from hurricanes and post-hurricane anthropogenic fire requiring the retention of larger areas of coverage of greater geographical spread, with replication, necessary to fulfil minimum dynamic area and threat mitigation requirements - insurance against potentially non-reversible impacts. The identified highest priority biodiversity areas of global concern in Belize (Global Key Biodiversity Area 1) are adequately covered by the NPAS, occurring within the protected areas of the Maya Mountains Massif.
- Protected area priorities for species protection have also been identified (Walker et al., 2012)
- With limited financial and human resource, it is important for Belize to be able to prioritize where investments are focused within the National Protected Areas System. A prioritization exercise was therefore conducted in 2013 based on a series of critical criteria– ecosystem services, biodiversity values, socio-economic values and climate change resilience. Each protected area was assessed based on these criteria, to provide a baseline prioritization to guide the decision making and financial investment processes (Walker et al., 2013).



**Target 12:** 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.

***Rating: Medium***

- Belize has a total of 105 globally threatened species (11 critically endangered, 31 endangered and 63 Vulnerable) and a further 55 near threatened.

- A draft list of nationally threatened species was developed as part of the National Protected Areas System Plan, but still needs validation, as part of the update to the National Biodiversity Strategy and Action Plan.
- While the Government of Belize focuses on forest, fishery and protected areas management, species conservation efforts are led primarily by the NGO community, generally with GoB support. Many of Belize's globally threatened species are being addressed through NGO initiatives – including the mandating of four NGO rehabilitation facilities (for parrots, primates, manatees and crocodiles), and specific species conservation programmes in both the terrestrial and marine environments.
- The global and national threatened species lists, along with availability of data from protected area managers, formed the basis for selection of seventeen species of concern indicators for the terrestrial environment in the State of Protected Areas reporting (Walker et al., 2010),
- The overall viability of species of concern in the terrestrial protected areas system of Belize is considered to rate at the lower end of GOOD, this being that "populations are reduced, but should recover with limited human intervention" (Walker et al., 2010).
- For the Central American river turtle, the yellow-headed parrot, the Petén sub-species of the scarlet macaw, Belize is considered the last remaining stronghold in the region. For other species, such as the Antillean manatee, and Yucatan black howler monkey, Belize has the most viable populations in the region.
- The Critically Endangered **Central American river turtle** (*Dermatemys mawii*), locally known as the "hicatee", is considered nationally as one of the most critical terrestrial species, with a rapidly declining population. A nationwide survey of hicatee populations in 2010 demonstrated that *Dermatemys* is heavily depleted in most of Belize, with hunting pressure removing it from many of the watersheds. In a few remote areas, however, especially in those areas with some level of protection, healthy populations still remain (Rainwater et al., 2010). The current level of extraction is considered unsustainable (Rainwater et al., 2010).It is considered a cultural delicacy, and whilst there are regulations in place for its protection, including year-round possession limits, a brief closed (non-hunting) season, and a complete prohibition on selling and purchasing *Dermatemys*, these still allow for legal hunting when in season.
- The Forest Department, Fisheries Department and a number of NGOs form the National Hicatee Conservation and Monitoring Network, and have conducted a national awareness programme, with increased targeted awareness and enforcement at cultural events. A number of protected area co-management NGOs are involved in the network, and incorporate monitoring into their field activities and awareness into their education and outreach programmes.
- Endangered **yellow-headed parrots** (*Amazona oratrix ssp. belizensis*) have also been flagged as a critical species, as increasing frequency of fires, competition with citrus farmers, and poaching of nestlings for the illegal pet trade have reduced the national population significantly with estimates of fewer than 1,500 individuals remaining in the wild (BBR, 2014). Their large size and ability to learn words makes this species particularly attractive for the illegal pet trade.
- A significant push to enforce legislation addressing the issue of the illegal pet trade in parrots was started in 2012, and strengthened in 2014, with a permit system being introduced for birds in long term captivity, and a no tolerance stance for new birds entering the trade through poaching.
- Where yellow-headed parrots occur within protected areas, there are initiatives in place to increase nesting sites artificially, manage fires, and increase enforcement against poaching of the nestlings.
- The Belize Bird Rescue Centre, one of four Government mandated rehabilitation centres, is working with the Forest Department and TIDE to rehabilitate as many pet parrots as possible, for return to the wild at Payne's Creek National Park.

- This is also true for the isolated sub-population of **scarlet macaw** (*Ara macao*) in Belize, estimated at fewer than 200 (FCD, 2013), this bird is highly threatened by transboundary poaching of nestlings. A team of individuals, working with the co-management agency, Friends for Conservation and Development, provide active protection of the primary macaw nesting site during the nesting season each year, and in 2014, to increase nesting success through constant presence at the nesting sites, deterring poachers.


- The **white-lipped peccary** (*Tayassu pecari*) has been flagged as in acute decline as hunting, forest fragmentation and the increasing human footprint have impacted the once large populations. Large herds of 200 or more have now declined to herds of 30 to 50. This species is almost wiped out from the large Chiquibul Forest, with a population decline of 90% or more, primarily by transboundary poaching from Guatemala, linked to the large scale transboundary incursions in the area. Similar pressures exist in the southern Maya Mountains Massif, with illegal, transboundary xateros subsisting on game meat as they harvest xaté. Whilst there are no specific monitoring plans or conservation action plans in place for peccaries, most effectively managed protected areas maintain a record of sightings and group size.
- Forest fragmentation and the increasing human footprint is also a threat for other forest species – in particular, the Endangered **Geoffroy's spider monkey** (*Ateles geoffroyi*), with populations becoming increasingly isolated in forest pockets – the Peccary Hills, Gallon Jug and eastern slopes of the Maya Mountains Massif. Populations were affected in 2011 by extensive fires in the central Belize area, following Hurricane Richard (2010), and are currently recovering. This trend is predicted to increase.
- Belize is also the stronghold for the endangered **Yucatan black howler monkey** (*Aloutta pigra*), a Yucatan endemic. Both these species face similar threats from the illegal pet trade.
- The Forest Department works closely with the Belize's Primate Rehabilitation Centre, which focuses on rehabilitation of these two species, and reintroduction back into the wild, where feasible. 15% of intakes are injured monkeys / displaced monkeys from the wild, 85% are ex-pets confiscated by the Forest Department in its no-tolerance campaign against the wildlife trade in Belize.
- Of particular concern is the viability of the **key nesting bird colonies**, with species such as brown pelicans, magnificent frigatebirds, great egrets, reddish egrets, white ibis, and roseate spoonbills. Seven Bird Sanctuaries were established in 1977 under the Lands Act for the protection of key bird nesting and roosting sites.
- However, only one of these cayes, located within South Water Caye Marine Reserve, is fully integrated into the National Protected Areas System, and few have any significant management presence. Protection of these sites is doubly difficult as at times the colonies shift cayes, and some key colonies, particularly for wood storks were not included within the original listing.
- **Jaguars** are an active target for conservation initiatives through the regional Panthera initiative, linked to the establishment of biological corridors.
- A number of tree species and non-timber forest products are managed under the Forest Department through the Forest Act and associated policies. However, limited human and financial resources, combined with hurricane and tropical storm damage to forests, and subsequent unregulated salvage logging have led to over-harvesting of several species, including rosewood, cedar and mahogany, though these are unlikely to become extinct in Belize.
- Belize is famous for its barrier reef, stretching parallel to the shore, with its rich marine life – corals, invertebrates and fish – bringing critical tourism dollars, and supporting an important traditional, low-technology fishing industry. It also has three offshore Atolls that benefit from having very low human impacts. The health of the reef, however, has been declining since the 1970's / 1980's, with a phase shift from greater coral to greater macroalgal cover.

- Species such as the structurally important **elkhorn corals** (*Acropora palmata*) have declined rapidly over the past thirty years
- Climate predictions for Belize suggest that the prognosis for reef health is not good – it lies on the threshold of coral temperature tolerance - a 1°C sea surface temperature rise will take many of the corals out of their tolerance range.
- **Reef health** within the Mesoamerican region has been monitored by the Healthy Reefs initiative, using a Simplified Healthy Reef Index to compare sites across Mexico, Belize, Guatemala and Honduras, using % coral and macroalgal covers, and herbivorous and commercial fish biomass. Between 2006 and 2012, 14 sites increased and 19 decreased in health, with 6 showing no change. In general, the mean % coral cover increased from 12% in 2008 to 19% in 2012, considered fair, though over a similar time frame, the mean % macroalgae cover also increased from 9% to 16%.
- Belize reef conservation strategies include the successful "Fragments of Hope" initiative – the growing on of resilient coral fragments in nurseries and planting out on impacted reef areas.
- Belize has already seen the local extinction of two species of Critically Endangered sawfish, with no validated reports in many (>10) years. These species inhabit shallow bays, lagoons and estuaries and were a primary target when gill nets first arrived in Belize. Populations declined rapidly, and by 1985, the last few individuals were caught. However, unverified reports from northern Belize suggest that a remnant population of **smalltooth sawfish** (*Pristis pectinata*) may still be present in some of the northern the coastal lagoons.
- **Commercial fish** have shown an ongoing decrease in mean biomass rating as Poor, particularly when compared to the regional average. Large specimens of the endangered hogfish, for example, one of the most prized commercial species, have almost disappeared from the reef. The larger parrotfish populations, the primary grazers on the reef, decreased from 1788 g.100m$^2$ in 2008 to 1407 g.100m$^2$ in 2010.Regulations were passed and implemented in 2009 to protect reef grazers - parrotfish and surgeon fish.
- The Critically Endangered **Goliath grouper** (*Epinephelus itajara*) has shown significant decline over the last ten years in Belize, with the average fish length at landing decreasing, and many of those fish now reaching market being below reproductive age. Unlike the Endangered **Nassau grouper** (*Epinephelus striatus*), the goliath grouper is not protected under the Fisheries regulations. Many groupers spawn in aggregations in specific sites along the ref, which are monitored and protected. Three sites reported over 1,000 Nassau grouper for 2012, with the highest counts being from Northeast Point, Glovers Reef Atoll, averaging 1,725 individuals (SPAG Working Group, 2013).
- Shark populations in Belize are overexploited and undermanaged, with only the **whale shark** (*Ryncodon typus*) and nurse shark (*Ginglymostoma cirratum*) under any form of legal protection. The Endangered **scalloped** and **great hammerheads** (*Sphyna lewini* and *S. mokarran*), and Vulnerable **oceanic whitetip** and **dusky sharks** (*Charcharinus longimanus* and *C. obscurus*) are among those species targeted by shark fishermen, primarily as transboundary incursions to provide fins for the shark fin trade. At one point, over 2,000lbs of shark meat was being exported illegally to Guatemala per week (R. Graham, pers. com.), a level that is in no way sustainable.
- Belize is considered a stronghold for the **Antillean manatee** (*Trichechus manatus manatus),* an Endangered sub species of the Vulnerable West Indian manatee. Manatees in Belize are facing increasing threats from tourism development in the coastal area, particularly linked to cruise ship tourism. With the projected development of two cruise ship disembarkation points on near-shore cayes, both in key manatee areas, it is predicted that the population will face increased pressure, particularly from boat strikes, the primary cause of death in Belize. With a population estimated at between 800 and 1,000, the current mortality rate is significant cause for concern. High levels of heavy metals detected during necropsies also point to issues of water contamination.


- A species recovery plan for manatees was written in 1998, and guided the implementation of key strategies – the formation of the Manatee Working Group and the Belize Marine Mammal Stranding Network, declaration of three protected areas in key manatee areas, and the establishment of a Manatee Rehabilitation Centre. The Manatee Programme is active in Belize, but despite increased awareness and protective measures, mortality in the last two years has increased exponentially, as boat traffic increases in key manatee areas.
- Belize has four sea turtle species – the Critically Endangered **hawksbill** (*Eretmochelys imbricata*) and **leatherback** (*Dermochelys coriacea*) **turtles,** and Endangered **green** (*Chelonia mydas*) and **loggerhead** (*Caretta caretta*) **turtles**. Sea turtle populations are fully protected, but remain highly threatened by loss or degradation of nesting habitat, particularly through coastal development, and from impacts from neighbouring countries. A Turtle Monitoring Network engages both Government and Non-Government agencies in monitoring of nesting beaches and in-water population surveys, as well as citizen scientists under the ECOMAR Turtle Watch programme.
- **American crocodile** (*Crocodylus acutus*) populations are declining, with impacts on their nesting beaches from coastal development and increasing human conflicts on the cayes. This is being addressed by the Forest Department and the American Crocodile Education Sanctuary (ACES).
- Government funding for threatened species is limited, and focused primarily on maintenance of commercial fish stocks and marine turtles, and support of the Wildlife Office, consisting of one Forest Officer.


**Target 13:** By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

***Rating: Low***

- There are international initiatives focused on maintaining genetic stock of wild cacao, and the Toledo Cacao Growers Association are working on maintaining local varieties of cacao, for use in rehabilitation of old fields through grafting of high quality plants
- Generally, however, Belize has not identified its indigenous seed stock at national level, nor have policies and laws been put in place that protect these stocks - this is not considered a high priority target by the Agriculture Department in Belize
- Whilst some culturally important varieties of corn and beans exist, there is limited focus on local varieties of cultivated plants at the national level.
- In local indigenous communities there are attempts to maintain these varieties using forested buffer zones and collections / storage of seedstock, but there is no scientific backing for these efforts, and they are not coordinated.

***Strategic Goal D:*** *Enhance the benefits to all from biodiversity and ecosystem services.*

**Target 14:** 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.

***Rating: Medium***

- The current NPAS effectively provides ecosystem services for Belize, including:
  - water catchment,
  - wetland / flood sink function
  - river bank / coastal protection
  - steep slope protection
  - marine replenishment areas
  - filtration by mangrove and seagrass
- The NPAS Rationalization process assessed protected areas across Belize for their ecosystem services, and recommended protected area realignments where these would improve priority ecosystem coverage (Walker et al., 2012)
- Many of the upper watersheds in Belize fall within the National Protected Areas System, safeguarding the water supplies to much of the country.
- The primary concern for water security is the loss of catchment functionality in the northern lowlands particularly with the increasing rate of clearance of some of the remaining large tracts of forest for agriculture in the Balam Jungle and Yalbac / Gallon Jug areas. With the large scale loss of forest cover in these areas, the limestone bedrock and shallow aquifer may not be sufficiently protected to prevent desiccation and water shortages.
- Recent legislation – the Integrated Water Resources Act – provides additional mechanisms for safeguarding water catchment areas.
- Wetlands such as Crooked Tree are fulfilling their functions as flood sinks, but the increase in unseasonal excessive rainfall is over-stretching the systems, with increased flooding events, despite the protection of ecosystem functionality in these areas. This is exacerbated by poorly planned causeway construction, restricting water flow.
- Environmental policies provide some protection for the 66' riparian and coastal vegetation, to address the issues of erosion and protection from storm events and filtration of agrochemicals from adjacent agricultural areas.
- Large scale agriculture / aquaculture industries are moving towards certification, with requirements for increased protection of riparian vegetation and mangroves.
- Expansion of marine replenishment zones (non-extractive) is essential to ensuring Belize's marine protected areas system is effective in building a sustainable fishery – this is being addressed by the Belize National Replenishment Zone Project, through a Government/ NGO steering committee.
- The ecosystem services provided by the coral reefs and mangroves, in particular, cannot be over-estimated. The protection they provide to coastal communities throughout Belize from tropical storms and their support of the traditional fishing industries have been important in the development of Belize. Climate change places these ecosystem services at risk. 54% of coral reefs and 16.8% of mangroves fall within Marine Protected Areas (TNC, 2014).


- Mangroves, too, provide significant protection from storm events and coastal and caye erosion, as well as important nursery areas for many commercially important species – the predicted sea level rise will inundate existing mangroves, with the potential to cause loss of this important habitat from the cayes and lower lying coastal areas on the mainland. Mangrove is, however, very resilient, and will migrate inland as the coast is flooded and coastal aquifers become more saline.
- Coastal mangroves have protection under legislation, but available human and financial resources are insufficient for effective enforcement, and the legislation requires revision for integrating effective penalties.


**Target 15:** By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

***Rating: Medium***

- Belize is very aware of the urgency of ensuring it has mechanisms in place to increase its resilience to climate change, and is mainstreaming climate change across all Ministries.
- The NPAS Rationalization process assessed protected areas for their contribution towards Belize's climate change resilience.
- In the terrestrial environment, the changing temperature and rainfall regimes anticipated lead to predictions of drier forests – of a shift from "tropical wet" to "tropical moist", and "tropical moist" to "tropical dry." These broad changes across the terrestrial landscape will be further shaped by the increased intensity of storms, and the associated storm impacts, and by the rising sea level.
- In the coastal zone, the increased sea level may result in huge ecosystem shifts, particularly with the salination of low lying aquifers of the coastal zone, with associated shifts to more salt-tolerant species. Should the barrier reef not be able to maintain growth rates equal to sea level rise, and Belize loses this protection against the force of the open sea waves, there will be greatly increased coastal erosion, with the loss of both minor and major cayes, and several of the coastal lagoons merging with the sea. This will also have huge impacts on coastal communities.
- A number of broad adaptation measures have been identified to help maintain the species diversity:
  - Maintaining large blocks of forest cover, with priority given to the primary forest nodes, to buffer against climate change impacts and continue providing water security
  - Maintaining lateral connectivity to facilitate ecosystem migration southwards, with priority given to the three primary corridors
  - Maintaining altitudinal connectivity to facilitate ecosystem migration up altitudinal gradients
  - Maintaining forest cover where feasible in the lowlands of the southern coastal plain to provide conditions conducive for orographic rainfall
  - Maintaining the integrity of coastal mangrove systems, to protect coastlines from erosion
  - Managing post-hurricane fire risk with effective planning and fire management
- The health of the marine environment is critical to the social and economic health of Belize – however the state of the reef has declined significantly over the last twenty years. Local threats to the marine environment are over-shadowed by the impacts of climate change, already affecting the marine ecosystems of Belize.

- The condition of the coral reef, the ecosystem on which much of Belize's marine resource utilization is based, has been declining at an alarming rate and corals are already at the upper limit of their temperature tolerance.
- Climate change implications also have the potential to include:
  - the increased risk to coastline and caye infrastructure due to inundation potential long term loss of coastal protection functionality if reef growth can't keep up with sea level rise
  - decreased functionality of wave shadow protection from atolls has the potential to increase mechanical damage to the barrier reef, reducing its ability to act as a protective barrier to the mainland during storm events
  - increased lagoon - open sea water exchange resulting in reduced water temperatures
- The predicted socio-economic impacts of climate change include:
  - The loss of tourism revenues (diving and snorkelling) as a result of the reduced aesthetic appeal of the reef and the loss of charismatic reef species (e.g. parrotfish, corals, colourful fish and sharks), through degradation of marine ecosystems
  - The potential collapse of the fishing industry that currently supports 2,750 fishers and their families. Increased storm activity, with increased beach erosion and loss of coastal / caye land, resulting in dredging activity for landfill for coastal and offshore tourism developments
  - Declining tourism and fishing industries will affect local economies, resulting in reduced revenues, with the associated reduction of viable employment opportunities with an associated increase in fishing pressures, with increased illegal activities and conflict with MPAs. With no national strategies in place to address this predictable increased unemployment, some community economies will be more vulnerable than others – but all will be affected
- While desertification may not be nationally significant, the issues of land degradation and drought are relevant to Belize's management of its natural resource base. Belize's accede to the United Nations' Convention to Combat Desertification in 1998. In Belize, the main forms of land degradation treated in the Convention result from a number of causes including (but possibly not limited to):
  - deforestation and other land cover conversions
  - farming on marginal lands including acidic soils
  - farming on steep slopes
  - fire
  - growth and expansion of human settlements
  - invasive species
  - overgrazing of livestock
  - logging
  - surface mining
- More than a third of all agricultural land in Belize is on acidic soils particularly sensitive to land degradation. A tenth is on steep slopes, and 4% of all agricultural land is located in areas at extreme risk of erosion in storm events (Meerman et al., 2005). Almost half of the countries soils overlie limestone, with issues of desiccation in dry season.
- The National Land Use Policy takes into account the risk of land degradation, integrating soil quality and land degradation mapping into the Land Use Planning Mapping System (Meerman et al., 2011). The cross sectoral Policy and Plan, whilst being endorsed, is currently being revised, and implementation has not yet started.
- The recent acceptance of Belize's REDD+ submission to the FCPF opens up further incentives and opportunities for implementation of REDD strategies, to be managed under the Belize National Climate Change Committee. REDD+ is seen as a vehicle for achieving the goals and objectives of sustainable land use management and sustainable forest management, two tools towards sustainable development.


- 37% of the current forests of Belize are classified as primary – the most biodiverse and carbon-dense category of forest (UNEP, 2013). Deforestation accounted for the largest emission sources in Belize in the reference years (1994, 1997 and 2000), with Green House Gas (GHG) emissions increasing from 5,117 in 1994 to 7,253 (in 1997) to 9,088 Kt CO2e (in 2000) - a trend that is expected to continue (UNEP, 2013).
- Belize is able to play a mitigation function, and is estimated to be in a position to contribute over 1 million tons in CO2 emissions reductions per year if deforestation is avoided completely (UNEP, 2013).
- Belize established the Environmental Protection Regulations (Clean Development Mechanism) in 2011 under the Department of the Environment.
- Belize is investigating the use of biofuels – in particular, Jatropha for biodiesel, and has started energy production fuelled by sugar cane waste (bagasse) – the Belcogen co-generation plant.
- Belize has started to utilise its hydropower potential, and is investigating the potential of solar photovoltaic power and wind generation, as part of its Clean Development Mechanism.
- Enabling Activities for the Preparation of Belize's Third National Communication to the UNFCCC, include updating inventories of greenhouse gases for 2003 and 2006


**Target 16:** By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

***Not Relevant***

**Belize is not a signatory to the Nagoya Protocol on Access to Genetic Resource**

The Forest Department is currently assessing whether Belize should or should not sign on to the Nagoya Protocol. It has an interest in the Protocol, particularly in its position as a provider of genetic resources, but does not currently have a domestic access and benefit-sharing or bio-discovery policy framework in place. There is legislation (e.g. the Wildlife Protection Act) that provides some control in some situations.

## *Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building*

**Target 17:** By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

***Rating: Medium***

- The NBSAP, developed in 1998, has never been endorsed, but has provided an informal framework for the guidance of biodiversity conservation in Belize, and been used by the Government, NGO's and CBO's in the justification and prioritisation of biodiversity conservation activities. Over the last five years, there has been increasing recognition of the importance of the environment in Belize's national development, in its adaptation mechanisms for climate change, and the need for cross sectoral integration of the environment into mainstream policies and planning.
- Belize recognizes the need for an updated, strengthened National Biodiversity Strategy and Action Plan, and has located funding under the National Biodiversity Enabling Activities, as part of the "National Biodiversity Planning to Support the implementation of the CDB 2011 - 2020 Strategic Plan in Belize" project. The revision of the NBSAP provides an opportunity to:
  - strengthen the Plan through the incorporation of the new Aichi objectives, actions and targets, modified to the national context
  - integrate a framework for effective monitoring and evaluation of implementation
  - reinforce the importance of ecosystem services to national development
  - address the issues of climate change impacts on ecosystems and biodiversity, and the need to build resilience
- Belize will have an opportunity to use the process itself to improve mainstreaming of biodiversity across government and society, to strengthen Belize's commitment to maintaining its natural resources, ecosystem services and species diversity, and as a tool to ensure Belize moves forward with strategies that will assist in reducing poverty and increasing resilience and adaptation to climate change.

**Target 18:** 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.

***Rating: Medium***

- Traditional fishing on the coastal shelf is fully integrated and supported by Managed Access and Fisheries legislation. Managed Access provides a mechanism for direct and effective participation in management through community advisory committees.


- There is unwritten recognition of traditional community use of freshwater / marine resource inside a number of Wildlife Sanctuaries (non-extractive designation).This will be formalised through the future revision of the Protected Areas System Act, with the division of Wildlife Sanctuaries into two – Wildlife Sanctuary 1 (non-extractive: e.g. Cockscomb Basin Wildlife Sanctuary) and Wildlife Sanctuary 2 (sustainable traditional extraction: e.g. Crooked Tree and Corozal Bay Wildlife Sanctuaries). Sustainable use will only be permitted with an approved sustainable resource use management plan.
- Management planning requires that traditional knowledge through stakeholder consultation and participation be incorporated into the management planning process, and that managers identify ways of incorporating community customs and traditions into protected area management.
- The first management strategy to fully integrate traditional sustainable resource use was developed for Columbia River Forest Reserve, with multiple stakeholder consultation – however, this still needs to be implemented.
- In the Maya Golden Landscape in southern Belize, Integrated Landscape Management has been rolled out across a matrix of community, national and private lands and 12 protected areas, bringing stakeholders together to share and implement plans for development built on sustainability of these plans and the natural resources on which they are based.
- One major area of conflict is between traditional use and oil exploration – currently, the legislation framework for oil exploration supersedes that for protected areas, even when a protected area is managed directly by local communities, and can impact the ecosystem services provided (e.g. Sarstoon-Temash National Park).


**Target 19:** By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

***Rating: Medium***

- There is increasing information available on the ecosystems and biodiversity of Belize, its values, the ecosystem services provided and trends, primarily restricted to protected areas. This is through:
  - The requirement to integrate baseline information into protected area management plans
  - Biodiversity and threat monitoring within protected areas
  - The different working groups:
    - National Hicatee Conservation and Monitoring Network
    - Manatee Working Group
    - Belize Marine Mammal Stranding Network
    - Spawning Aggregation Working Group
    - National Coral Reef Monitoring Network
    - Belize Sea Turtle Conservation Network
- Biodiversity monitoring is not consistent across the country, and for the protected areas system, is dependent on the capacity of the co-management agencies.

- In the marine environment, there have been significant advances in standardising data collection, under both the Fisheries Department monitoring programmes, and the Healthy Reef Initiative.
- The Forest Department is in the first stages of establishing a national Forest Inventory, with permanent sample plots located throughout Belize.

- A National Biodiversity Monitoring Programme is currently being developed through ERI-UB, focusing on developing national biodiversity monitoring goals and targets. Information is being used to inform biodiversity management at both site level and at national level, with extraction regulation amendments based on scientific data (e.g. for parrotfish, Nassau grouper, rosewood). Whilst the Belize Government has established an on-line Central Clearing House Mechanism, it has not been able to maintain this facility, restricting information availability. However other initiatives, both Government and NGO, are making information more available:
  - The Environmental Research Institute stores and makes available electronic documents.
  - The Lands Information Centre has the mandate for maintaining national GIS data
  - The online Biodiversity and Environmental Resource Data System, maintained under BTFS, stores the biodiversity information for the country.
  - The Statistical Institute of Belize manages socio-economic information for the Government of Belize. Much of this information is available on-line
  - Ongoing assessment of deforestation, land use, and fires is conducted via satellite imagery under the NPAS and Forest Department
  - Dept. of Agriculture keeps records of agricultural areas and use

**Target 20:** By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan 2011- 2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resources needs assessments to be developed and reported by Parties.

***Rating: Low***

- Belize does not have a revised Strategy for Resource Mobilization - the current strategy listed in CBD documents is linked to the 1998 National Biodiversity Strategy and Action Plan (CBD, 2013).
- Despite the limitations of not having a comprehensive strategy to guide mobilization of financial resources, Belize currently has international funding to implement identified critical activities, in preparation for the revision and updating of the National Biodiversity Strategy and Action Plan, and for strengthening the environmental framework.
- Belize is supported by a number of donor agencies, including:
  - Food and Agriculture Organization, for implementation of their Country Programme Framework for Belize 2011 – 2015
  - World Bank / Global Environment Facility (GEF) Management and Protection of Key Biodiversity Areas in Belize – strengthening environmental legislation, addressing threats to the KBAs, and improving biodiversity management

- IDB support for improved solid waste management, waste water and sanitation for the Placencia Peninsula, land management programmes, improving agricultural health systems, the support of green power through Belcogen, supporting cacao growers, disaster risk management
- UNDP support for improved water resource management, the development of the National Integrated Water Resource Management Act (2011)
- UNDP support for strengthening of disaster preparedness and emergency response capacity in Belize
- UNDP portfolio of climate change initiatives, developed within the GCCA framework, and implemented under the National Climate Change Office within the Ministry of Forestry, Fisheries and Sustainable Development
- Funded Project: Enhancing Belize's Resilience to Adapt to the Effects of Climate Change
- Funded Project:Enabling Activities for the Preparation of Belize's Third National Communication to the UNFCCC, including updating inventories of greenhouse gases and development of a comprehensive climate change adaptation strategy

## 11: THE CONTRIBUTION OF ACTIONS TO IMPLEMENT THE CONVENTION TOWARDS THE ACHIEVEMENT OF THE RELEVANT 2015 TARGETS OF THE MILLENNIUM DEVELOPMENT GOALS IN BELIZE

Belize has recently submitted its report on progress towards the Millennium Development Goals (GoB / UNDP, 2013). MDG7: Ensure Environmental Sustainability focuses on the integration of sustainable development into Belize's policies and programmes. It "*recognises that growth must be both inclusive and environmentally sound to reduce poverty and build shared prosperity for people, today and for future generations*" (UNDP, 2013). Progress towards MDG7 is measured against four targets, using ten indicators.

| **MDG7 Target A: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental services** | | | | |
|---|---|---|---|---|
| ***MDG Indicators*** | ***Baseline (GoB/UNDP, 2013)*** | ***Status (GoB/UNDP, 2013)*** | ***Current Status*** | ***Comments*** |
| 7.1 Proportion of land area covered by forest<br><br>***Direct alignment between MDG and CBD Aichi Targets 5 and 11*** | 65.8%<br>*(2000)* | 62.8%<br>*(2010)* | 61.1%<br>*(CATHALAC 2013)* | **On Target:** Belize has one of the lowest deforestation rates in the region, but this is increasing – approaching 1% for 2013 (Cherrington, 2014).<br>⅔ of the remaining forest lies within the National Protected Areas System, but forested areas outside the NPAS are being cleared for agriculture. |
| 7.2 $CO_2$emissions per capita and per $1 GDP (PPP)<br><br>***Aichi Target 15 contributes towards achieving the national target*** | NA | 13,482.7769g (2000)<br>2.7 PPP | No data | **On Target:** Belize is a low emission nation, and incorporating CDM mechanisms into its national development to reduce $CO_2$ emissions. Maintenance of its forest cover, both inside and outside the National Protected Areas System, is also contributing to achieving this goal. |
| 7.3 Consumption of Ozone Depleting Substances (ODSs), Chlorofluorocarbons (CFCs), Hydro Chlorofluorocarbons (HCFCs) and Methyl bromide | NA | Complete phase-out of CFCs. HCFCs-54.78 Metric tons; Methyl bromide-0.08 | Complete phase-out of CFCs. HCFCs-54.78 Metric tons; Methyl bromide-0.08 (UNDP, 2013) | **On Target:** Belize has successfully phased out CFC's, The government of is pursuing the 2020 consumption reduction targets for HCFC's set by Decision XIX/6 of the Meeting of the Parties of the Montreal Protocol. |

| MDG7 Target A: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental services | | | | |
|---|---|---|---|---|
| ***MDG Indicators*** | ***MDG Indicators*** | ***MDG Indicators*** | ***MDG Indicators*** | ***MDG Indicators*** |
| 7.4 Proportion of fish stock with safe biological limits<br><br>***Aichi Targets 4 and 7 contribute towards this MDG7 target*** | NA | NA | **Not Reported for Belize:** Belize is pro-active in management of its fish stocks, and takes an ecosystem approach. As part of the national strategies towards achieving a sustainable fishery, Belize leads the region in percentage of marine no-take zones, and is piloting Managed Access. It has set gear restrictions and seasonal closures to protect key commercial species, protected spawning aggregation sites, and stopped fishing of grazers critical to coral reef health. It has also placed a moratorium on the clearance of mangroves and banned bottom trawling for shrimp. The Fisheries Act of 1948 is currently revised and updated as the Fisheries Resource Management Bill, and awaiting endorsement.<br>However, in 2012, the spiny lobster fishery, constricted by 16.6% of its 2011 values, despite a 6.85 increase in the number of licensed fishermen (an increase in fishing effort) (Fisheries Department / UNDP, 2013). | |
| 7.5 Proportion of total water resources used<br><br>***Aichi Target 14 contributes towards this MDG target*** | | | **Not Reported for Belize:** Belize has the highest volume of freshwater availability per capita for Latin America…however availability of water is considered to be decreasing based on a comparison of 1987 and 2009 figures. Current figures estimate internal renewable surface water resources at 15.258 $km^3$/year and internal renewable groundwater resources at 7.51 $km^3$/year (IGRAC, 2012).In 2000, total water withdrawal was estimated at 101.0 $km^3$, of which 68.4 million $m^3$(68%) for agricultural purposes, 21.2 million $m^3$(21%) for industrial purposes and 11.4 million $m^3$(11%) for municipal purposes (FAO/AQUASTAT, 2014).Belize has developed a National Integrated Water Resource Management Policy, endorsed by Government, to provide for management of water resources. This is the first initiative in Belize to put a cost on an environmental service for integration into the national economy. No comprehensive water-quality monitoring program exists in Belize. | |

| Target B: Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss. | | | | |
|---|---|---|---|---|
| ***Indicators*** | ***Baseline (UNDP, 2013)*** | ***Status (UNDP, 2013)*** | ***Current Status*** | ***Comments*** |
| 7.6 Proportion of terrestrial and marine areas protected<br><br>***Aichi Target 11 contributes towards this MDG target*** | NA | 76 Protected Areas Total (44 Terrestrial 24 Marine, 8 Private) (2010) | 98 protected areas total; 72of these established for ecosystem and species protection. | **On Target:** Belize currently has 36.6% of its terrestrial area protected, and 19.8% of marine areas under protection. The Belize Fisheries Department is focusing on incorporating 10% of all marine and coastal habitats in Belize's territorial waters within legally protected, non-extractive replenishment zones, increasing this from the current 6.7% of the marine reserves that are legislated replenishment zones (with full protection against fishing activities). In the terrestrial environment, freshwater bodies and rivers are as being under-represented within the NPAS. Of the 68 natural ecosystems identified under the revised ecosystem mapping (Meerman, 2011), only 7 ecosystems do not meet the 10% target recommended by IUCN, and are considered under-represented within the National Protected Areas System. When using 30% as the minimum threshold for representation (Selva Maya target), a further 21 ecosystems would be considered under-represented. Recommendations for reaching the 10% targets are included in the NPAPSP Rationalization report (Walker et al., 2013) |

| Target B: Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss. | | | | |
|---|---|---|---|---|
| ***Indicators*** | ***Baseline (UNDP, 2013)*** | ***Status (UNDP, 2013)*** | ***Current Status*** | ***Comments*** |
| 7.7 Proportion of species threatened with extinction<br><br>***Aichi Target 11 and 12 contributes towards this MDG target*** | NA | Belize hosts 137 species of plants and animals listed in the IUCN Red List (2009) | Belize has a total of 105 globally threatened species 11 critically endangered, 31 endangered and 63 Vulnerable. A further 55 are near threatened. | **On target**: Species conservation efforts are largely led by the NGO community, except in the case of commercially important species. Two of the Critically Endangered species listed for Belize are on the edge of national extinction – both sawfish. There has been no credible report of either species for more than 10 years, though reports are still occasionally received from artisanal fishermen in the northern communities. Other than these, all critically endangered species are not expected to become locally extinct in the next 5 years, and initiatives are in place to address identified threats. One new critically endangered species has been added to the national list (not covered by the IUCN list) as a result of a range extension. |
| **Target C: Halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation** | | | | |
| ***Indicators*** | ***Baseline (UNDP, 2013)*** | ***Status (UNDP, 2013)*** | ***Current Status*** | ***Comments*** |
| 7.8 Proportion of population using an improved drinking water source | 43.8% (1995) | 93.4% (Census 2010) | 97.7 (MICS 2011) | **On Target:** Near 100% |
| 7.9 Proportion of population using an improved sanitation facility | 41.0% (1995) | 73.5% (SIB/LFS 2009) | 96.9% (MICS 2011) | **Slightly Behind Target:** "Improved" pit latrines are the most common forms of sanitation infrastructure in rural areas, but there are significant issues when flooding occurs, and with lateral percolation through limestone bedrock, leading to contamination of wells. National sanitation is being addressed through the MDG Acceleration |

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|---|---|---|---|---|
| | | | | Framework: Water and Sanitation (2011). Initiatives are ongoing to improve sanitation in urban areas, with ongoing initiatives in Placencia, Belize City and San Pedro |
| **Target C: Halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation** | | | | |
| ***Indicators*** | ***Baseline (UNDP, 2013)*** | ***Status (UNDP, 2013)*** | ***Current Status*** | ***Comments*** |
| 7.10 Proportion of urban population living in slums | | | **Not reported for Belize.** | |

## 12. LESSONS LEARNT FROM THE IMPLEMENTATION OF THE CONVENTION IN BELIZE

A number of high priority activities have been highlighted during the preparation of this report:

- Belize urgently needs to revise its National Biodiversity Strategy and Action Plan, ensuring the process is accompanied by national awareness and engagement
- The endorsed National Land Use Planning Framework needs to be implemented as a matter of urgency
- The Integrated Coastal Zone Management Plan still needs to be endorsed and implemented
- National plans need to be implemented and not ignored when decisions are made about issues that have the potential to cause widespread environmental and social issues or conflicts
- The Statutory Instruments for many of the protected areas need to be revised in collaboration with the Lands Information Centre, to ensure that information is as accurate as possible for implementation of the Lands Use Planning activities.
- Belize needs to improve its baseline knowledge and management of species inventories, and strengthen its Clearing House Mechanism, through the Environmental Resource Institute (University of Belize)

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## ANNEX 1: NATIONAL LIST OF CRITICAL SPECIES (DRAFT)

### National Protected Areas Policy and System Plan, Appendix 2.4 (Meerman et al., 2005)

| **Justification:** | |
|---|---|
| 1. The Fisheries Department expressed that it is aware of present trends in the global populations of all Groupers. Measures have been taken to protect spawning sites of these fish in Belize and the Department is attempting to introduce measures that will allow it to sustainably manage this resource. For this reason the grouper all have been placed in the CD = Conservation Dependant category.<br>2. Endemic species<br>3. Small Range – Regional Endemic<br>4. Hunted – Fished | 5. Economic importance<br>6. Colony breeder (restricted number of breeding colonies/locations)<br>7. Needs large range<br>8. Specialized ecological requirements<br>9. Charismatic species drawing national and international attention<br>10. Prosecuted as perceived pest<br>11. Genetically different from South American counterpart |

| Order | Species | English Name | IUCN class | Status in Belize | Justification |
|---|---|---|---|---|---|
| Amphibians | *Agalychnis moreletii* | | CR | DD | 3 |
| Amphibians | *Bolitoglossa dofleini* | | NT | DD | 3 |
| Amphibians | *Bufo campbelli* | | NT | LC | 3 |
| Amphibians | *Smilisca cyanosticta* | | NT | DD | 3 |
| Amphibians | *Eleutherodactylus chac* | | NT | DD | 3 |
| Amphibians | *Eleutherodactylus laticeps* | | NT | DD | 3 |
| Amphibians | *Eleutherodactylus leprus* | | VU | DD | 3 |
| Amphibians | *Eleutherodactylus psephosypharus* | | VU | DD | 3 |
| Amphibians | *Eleutherodactylus sabrinus* | | EN | DD | 3 |
| Amphibians | *Eleutherodactylus sandersoni* | | EN | DD | 3 |
| Amphibians | *Hyla bromeliacia* | | EN | DD | 3 |
| Amphibians | *Rana juliani* | | NT | NT | 2 |
| Birds | *Agamia agami* | Agami Heron | | VU | 6,8 |
| Birds | *Ajaia ajaja* | Roseate Spoonbill | | VU | 6 |
| Birds | *Amazona oratrix* | Yellow-Headed Amazon | | EN | 4,8,9,10 |
| Birds | *Amazona xantholora* | Yellow-Lored Parrot | | VU | 10 |
| Birds | *Anous stolidus* | Brown Noddy | | VU | 6 |
| Birds | *Ara macao cyanoptera* | Scarlet Macaw | | EN | 4,8,9,11 |
| Birds | *Ardea herodias* | Great Blue Heron | | VU | 4,10 |
| Birds | *Asio stygius* | Stygian Owl | | VU | 10 |
| Birds | *Bubo virginianus* | Great Horned Owl | | VU | 10 |

| Order | **Species** | **English Name** | **IUCN class** | **Status in Belize** | **Justification** |
|---|---|---|---|---|---|
| Birds | *Cairina moschata* | Muscovy Duck | | VU | 4 |
| Birds | *Columba leucocephala* | White-Crowned Pigeon | NT | VU | 4,7 |
| Birds | *Contopus cooperi* | Olive-Sided Flycatcher | NT | DD | |
| Birds | *Crax rubra* | Great Curassow | NT | VU | 4,9 |
| Birds | *Dendrocygna autumnalis* | Black-Bellied Whistling Duck | | VU | 4,10 |
| Birds | *Dendrocygna bicolor* | Fulvous Whistling Duck | | VU | 4,10 |
| Birds | *Dendroica cerulea* | Cerulean Warbler | | VU | VU |
| Birds | *Egretta rufescens* | Reddish Egret | | VU | 6,10 |
| Birds | *Egretta thula* | Snowy Egret | | VU | 6,10 |
| Birds | *Egretta tricolor* | Tricolored Heron | | VU | 6,10 |
| Birds | *Electron carinatum* | Keel-Billed Motmot | | VU | 3,8,9 |
| Birds | *Eudocimus albus* | White Ibis | | VU | 6 |
| Birds | *Falco deiroleucus* | Orange-Breasted Falcon | | VU | 8,9 |
| Birds | *Fregata magnificens* | Magnificent Frigatebird | | VU | 6 |
| Birds | *Harpia harpyja* | Harpy Eagle | NT | CR | 4,7,9,10 |
| Birds | *Harpyhaliaetus solitarius* | Solitary Eagle | NT | CR | 4,7,10 |
| Birds | *Jabiru mycteria* | Jabiru | | VU | 4,7,9,10, 11 |
| Birds | *Laterallus jamaicensis* | Black Rail | NT | DD | |
| Birds | *Melanoptila glabrirostris* | Black Catbird | NT | NT | 8,9 |
| Birds | *Meleagris ocellata* | Ocellated Turkey | NT | VU | 3,4,9 |
| Birds | *Morphnus guianensis* | Crested Eagle | NT | CR | 4,7,10 |
| Birds | *Mycteria americana* | Wood Stork | | VU | 4,6,10 |
| Birds | *Nyctanassa violacea* | Yellow-Crowned Night-Heron | | VU | 6 |
| Birds | *Nycticorax nycticorax* | Black-Crowned Night-Heron | | VU | 6 |
| Birds | *Pelecanus occidentalis* | Brown Pelican | | VU | 6,10 |
| Birds | *Penelope purpurascens* | Crested Guan | | VU | 4 |
| Birds | *Phalacrocorax auritus* | Double-Crested Cormorant | | VU | 4,6,10 |
| Birds | *Phalacrocorax brasilianus* | Neotropic Cormorant | | VU | 4,6,10 |
| Birds | *Pionopsitta haematotis* | Brown-Hooded Parrot | | DD | |
| Birds | *Sarcoramphus papa* | King Vulture | | VU | 7,8,9 |
| Birds | *Sterna anaethetus* | Bridled Tern | | VU | 6 |
| Birds | *Sterna antillarum* | Least Tern | | VU | 6 |
| Birds | *Sterna dougallii* | Roseate Tern | | VU | 6 |
| Birds | *Sterna fuscata* | Sooty Tern | | VU | 6 |
| Birds | *Sterna sandvicensis* | Sandwich Tern | | VU | 6 |
| Birds | *Sula leucogaster* | Brown Booby | | VU | 6 |
| Birds | *Sula sula* | Red-Footed Booby | | VU | 6 |

| Order | Species | English Name | IUCN class | Status in Belize | Justification |
|---|---|---|---|---|---|
| Corals | *Anthozoa – all species* | Gorgonians, Telestaceans, Soft Corals, Black Corals, Stony Corals | VU | VU | 9 |
| Corals | *Hydrozoa – all species* | Fire Corals, Lace Corals | VU | VU | 9 |
| Fishes | *Balistes vetula* | Queen Triggerfish | VU | VU | 4,5 |
| Fishes | *Dermatolepis inermis* | Marbled Grouper | VU | MD | 1,4,5,6 |
| Fishes | *Epinephelus itajara* | Goliath Grouper | CR | MD | 1,4,5,6,9 |
| Fishes | *Epinephelus morio* | Red Grouper | NT | MD | 1,4,5,6 |
| Fishes | *Epinephelus nigritus* | Warsaw Grouper | CR | MD | 1,4,5,6 |
| Fishes | *Epinephelus niveatus* | Snowy Grouper | VU | MD | 1,4,5,6 |
| Fishes | *Epinephelus striatus* | Nassau Grouper | EN | MD | 1,4,5,6,9 |
| Fishes | *Hippocampus erectus* | Lined Seahorse | VU | DD | |
| Fishes | *Hippocampus reidi* | Longsnout Seahorse | DD | DD | |
| Fishes | *Lachnolaimus maximus* | Hogfish | VU | VU | 4,5 |
| Fishes | *Lutjanus analis* | Mutton Snapper | VU | VU | 4,5,6 |
| Fishes | *Lutjanus cyanopterus* | Cubera Snapper | VU | VU | 4,5,6 |
| Fishes | *Mycteroperca venenosa* | Yellowfin Grouper | NT | MD | 1,4,5,6 |
| Fishes | *Pagrus pagrus* | Red Porgy | EN | DD | 4,5 |
| Fishes | *Sanopus astrifer* | Whitespotted Toadfish | VU | DD | |
| Fishes | *Sanopus greenfieldorum* | Whitelined Toadfish | VU | DD | |
| Fishes | *Sanopus reticulatus* | Reticulated Toadfish | VU | DD | |
| Fishes | *Sanopus splendidus* | Splendid Toadfish | VU | DD | |
| Fishes | *Scarus guacamaia* | Rainbow Parrotfish | VU | VU | 4,5 |
| Fishes-Sharks | *Carcharhinus leucas* | Bull Shark | NT | NT | 4,5,9,10 |
| Fishes-Sharks | *Carcharhinus limbatus* | Blacktip Shark | NT | NT | 4,5,9,10 |
| Fishes-Sharks | *Carcharhinus longimanus* | Oceanic Whitetip Shark | NT | NT | 4,5,9,10 |
| Fishes-Sharks | *Carcharhinus plumbeus* | Sandbar Shark | NT | NT | 4,5,9,10 |
| Fishes-Sharks | *Galeocerdo cuvier* | Tiger Shark | NT | NT | 4,5,9,10 |
| Fishes-Sharks | *Isurus oxyrinchus* | Shortfin Mako | NT | NT | 4,5,9,10 |
| Fishes-Sharks | *Mustelus canis* | Dusky Smoothhound | NT | DD | |
| Fishes-Sharks | *Negaprion brevirostris* | Lemon Shark | NT | NT | 4,5,9,10 |
| Fishes-Sharks | *Prionace glauca* | Blue Shark | NT | NT | 4,5,9,10 |
| Fishes-Sharks | *Pristis pectinata* | Smalltooth Sawfish | NT | CR | 4,5 |
| Fishes-Sharks | *Pristis perotteti* | Largetooth Sawfish | CR | CR | 4,5 |
| Fishes-Sharks | *Rhincodon typus* | Whale Shark | VU | VU | 7,8,9 |
| Fishes-Sharks | *Sphyrna lewini* | Scalloped Hammerhead | NT | NT | 4,5,9,10 |
| Fishes-Sharks | *Sphyrna mokarran* | Great Hammerhead | DD | DD | 4,5,9,10 |
| Fishes-Sharks | *Sphyrna zygaena* | Smooth Hammerhead | NT | NT | 4,5,9,10 |
| Mammals | *Alouatta pigra* | Mexican Black Howler Monkey | EN | VU | 3,9 |

| Order | Species | English Name | IUCN class | Status in Belize | Justification |
|---|---|---|---|---|---|
| Mammals | *Ateles geoffroyi* | Central American Spider Monkey | VU | VU | 9 |
| Mammals | *Balaenoptera physalus* | Fin Whale | EN | DD | 9 |
| Mammals | *Balantiopteryx io* | Thomas's Sac-winged Bat, | EN | VU | 8 |
| Mammals | *Bauerus dubiaquercus* | Van Gelder's Bat, | VU | VU | 8 |
| Mammals | *Cabassous centralis* | Northern Naked-Tailed Armadillo | DD | DD | 8 |
| Mammals | *Centronycteris centralis* | Shaggy Bat | VU | VU | 8 |
| Mammals | *Dicotyles pecari* | White-Lipped Peccary | VU | VU | 4,7,10 |
| Mammals | *Globicephala macrorhynchus* | Short-finned Pilot Whale | VU | DD | 9 |
| Mammals | *Herpailurus yaguarondi* | Yaguarundi | VU | LC | 10 |
| Mammals | *Leopardus pardalis* | Ocelot | VU | VU | 4,9,10 |
| Mammals | *Leopardus wiedii* | Margay | VU | VU | 9,10 |
| Mammals | *Lontra longicaudis* | Neotropical River Otter | DD | VU | 10 |
| Mammals | *Mazama pandora* | Yucatan Brown Brocket Deer | DD | DD | 3,4 |
| Mammals | *Molossops greenhalli* | Greenhall's mastiff Bat | VU | VU | 8 |
| Mammals | *Mormoops megalphylla* | Ghost-faced Bat | NT | NT | 8 |
| Mammals | *Myotis elegans* | Elegant Myotis | VU | VU | 8 |
| Mammals | *Panthera onca* | Jaguar | NT | NT | 4,7,9,10 |
| Mammals | *Physeter macrocephalus* | Sperm Whale | VU | DD | 9 |
| Mammals | *Pteronotus gymnonotus* | Greater Naked-back Bat | NT | NT | 8 |
| Mammals | *Puma concolor* | Puma | NT | NT | 4,7,9,10 |
| Mammals | *Stenella frontalis* | Atlantic Spotted Dolphin | VU | VU | 9 |
| Mammals | *Stenella longirostris* | Spinner Dolphin | VU | DD | 9 |
| Mammals | *Steno bredanensis* | Rough-Toothed Dolphin | VU | DD | 9 |
| Mammals | *Tapirus bairdii* | Central American Tapir | EN | VU | 4,9,10 |
| Mammals | *Thyroptera tricolor* | Spix's Disk-winged Bat, | VU | VU | 8 |
| Mammals | *Trichechus manatus* | West Indian Manatee | VU | VU | 4,9 |
| Mammals | *Turiopsis truncatus* | Bottlenose Dolphin | VU | VU | 9 |
| Plants | *Ceratozamia robusta* | | VU | VU | 3 |
| Plants | *Pithecellobium johansenii* | | EN | DD | |
| Plants | *Quiina schippii* | | EN | DD | |
| Plants | *Schippia concolor* | Mountain Pimento | VU | LC | 2 |
| Plants | *Swietenia macrophylla* | Large-Leaved Mahogany | VU | VU | 5,9 |
| Plants | *Zamia prasina* | | CR | DD | 2,8 |
| Plants | *Zamia* sp. Nov. | Un-described Zamia | | VU | 2,8 |
| Plants | *Zamia variegata* | Variegated Zamia | EN | VU | 3,9 |
| Reptiles | *Caretta caretta* | Loggerhead | EN | EN | 4,5,6,9 |

| Order | Species | English Name | IUCN class | Status in Belize | Justification |
|---|---|---|---|---|---|
| Reptiles | *Chelonia mydas* | Green Turtle | EN | EN | 4,5,6,9 |
| Reptiles | *Crocodylus acutus* | American Crocodile | | NT | 4,9,10 |
| Reptiles | *Crocodylus moreletii* | Morelet's Crocodile | | CD | 3,4,5,9,10 |
| Reptiles | *Dermatemys mawii* | Central American River Turtle | EN | EN | 3,4,5,9 |
| Reptiles | *Dermochelys coriacea* | Leatherback | CR | CR | 4,9 |
| Reptiles | *Eretmochelys imbricata* | Hawksbill Turtle | CR | CR | 4,5,6,9 |
| Reptiles | *Phyllodactylus insularis* | Island Gecko | | NT | 2 |
| Reptiles | *Staurotypus triporcatus* | Mexican Musk Turtle | NT | NT | 4 |
| Reptiles | *Trachemys scripta* | Common Slider | NT | LC | 4 |

**ANNEX 2: CLIMATE CHANGE IMPLICATIONS FOR BELIZE**

Global modelling has predicted that Belize will be one of the country's most at risk to the adverse impacts of climate change (UNFCCC). It is expected to face more frequent heat waves and droughts, rainfalls with increased intensity, and rising sea levels. These impacts will be at their greatest in the north east of Belize where annual rainfall has already decreased significantly over the last 30 years (local consultations), and is predicted to continue decreasing, with lengthened dry seasons and reduced predictability of rainfall. Average accumulated precipitation during July, August and September is predicted to drop from 180mm (the 2008 baseline) to 120mm in 2020 – a reduction of 60mm - over 33% (Anderson et al., 2008). The average July temperature along in north east of Belize is predicted to rise from 28°C in 2008 to 29°C in 2020…to 33°C in 2080 (Anderson et al., 2008), with associated risks to health, agriculture and fish stocks.

The country's location in the highest risk of tropical storm impacts, combined with the increased intensity of storms, increasing sea level (a potential rise of 0.18 to 0.56 meters by 2090), and the generally low elevation (less than 2m above sea level), is predicted to result in a drop in the availability of fresh water for household use and irrigation, with increased saltwater inundation, and eventual salination of the shallow aquifer.

| Predicted Climate Change Impacts | | |
|---|---|---|
| **Impact** | **Current Status – 50 years** | **100 yrs** |
| **Sea level rise** | ▪ Increased global average sea level rise rate of 1.8mm per year from 1961 – 2003 (IPCC, 2007).<br>▪ Current average increase in sea level rise in the Mesoamerican region is estimated at 3.1mm per year (IPCC, 2007). | ▪ Predicted increase of between 0.6m and 1.0m over next 100 years, though could be higher (up to 3.3m), dependent on the rate of melt of ice sheets (Simpson et al., 2009) |
| **Sea surface temperature rise** | ▪ Water temperature has increased by 0.74˚C between 1906 and 2005<br>▪ Current levels of increase are estimated at 0.4˚C per decade (Simpson et al., 2009) | ▪ Predicted regional increase of temperature by up to 5˚C by 2080, with the greatest warming being experienced in the north-west Caribbean (incl. Belize) (WWF, 2009). |
| **Increased intensity of storms** | ▪ Increased intensity of storms from 1999 onwards, with annual fluctuations. Stronger storms >Cat 4 / 5 | |

| Predicted Climate Change Impacts | | |
|---|---|---|
| **Impact** | **Current Status – 50 years** | **100 yrs** |
| **Ocean acidification** | ▪ Atmospheric $CO_2$ concentration has increased from 280 parts per million (ppm) in 1880 to 385 ppm in 2008 (Simpson et al., 2009).<br>▪ 48% of all atmospheric $CO_2$ resulting from burning of fossil fuels has been taken up by the ocean (Hartley, 2010)<br>*25 – 50 years*<br>▪ Predicted atmospheric $CO_2$ levels of 450 by 2040 (Simpson et al., 2009)<br>▪ Predicted 30% decrease in pH<br>▪ Predicted decrease in calcification rate by 20 - 50% by 2050 | ▪ Some experts predict a 35% reduction in coral growth by 2100 (Simpson et al., 2009) |
| **Decreased Precipitation** | ▪ Mean monthly rainfall over Belize has decreased at an average rate of 3.1mm per decade since 1960 (NCSP/UNDP)<br>*25 – 50 years*<br>▪ Predicted ecological shifts up the altitudinal gradient of the Maya Mountains Massif may remove the quasi-cloud forest, and the catchment functionality important for maintaining rivers in dry season in the south of Belize, and providing nutrients to the reef environment.<br>▪ Increased concentration and seasonality of agrochemical delivery / pollution | ▪ Predicted decrease in precipitation of 9% by 2099 (IPCC, 2007), with significant fluctuations, attributed to El Niño<br>▪ Some models predict a decrease of as much as 22% (IPCC 2007) |
| Air Temperature | ▪ Mean annual temperature has increased in Belize by 0.45°C since 1960, an average rate of 0.10°C per decade.<br>▪ Average number of 'hot' days per year in Belize (days exceeding 10% higher than current average temperature) has increased by 18.3% between 1960 and 2003 (NCSP/UNDP). | ▪ Predicted mean annual temperature increase is 3.5° by 2099 (UNDP, 2009). |

Belize is very aware of the urgency of ensuring it has mechanisms in place to increase its resilience to climate change, and is mainstreaming climate change across all Ministries. The NPAS Rationalization process assessed protected areas for their resilience to climate change and their contribution towards Belize's climate change strategies.

The terrestrial environment is characterised by forests, savannas, wetlands and coastal ecosystems that will be affected by climate change. The changing temperature and rainfall regimes anticipated lead to

predictions of drier forests – of a shift of "tropical wet" to "tropical moist", and "tropical moist" to "tropical dry." These broad changes across the terrestrial landscape will be further shaped by the increased intensity of storms, and the associated storm impacts, and by the rising sea level.

| Northern forests | |
|---|---|
| **Potential Climate Change Impacts** | ▪ Increasing temperatures will take some forest ecosystems and species outside their tolerance zone, with ecosystem shifts, and a general shift towards Yucatan species.<br>▪ Migration of species – a drying of forest conditions, with an increase in Yucatan composition.<br>▪ The humid end of the species spectrum will be lost.<br>▪ Decreased reliability of rainfall will have a direct impact on some fauna as well – amphibians will be first vertebrate taxon to show these impacts<br>▪ Increased hurricane intensity will impact forest stature and structure and will remove some species less tolerant of landscape scale storm impacts, with decreased biodiversity.<br>▪ Decreased productivity, with loss of older fruiting trees and knock on effects.<br>▪ Increased vulnerability to local extinctions exacerbated by reduced connectivity and increased ecosystem fragmentation.<br>▪ Increased vulnerability to fire.<br>▪ In low lying coastal areas, saline intrusion into groundwater will reduce species diversity and cause changes in species composition – in these limestone areas, tree species rely having their roots deep in the aquifer, and will not be able to adapt to increasingly saline conditions.<br>▪ Increasing seasonality of rainfall / inundation of swamp forest – change in species composition. |
| **Resilience Features** | ▪ Forests have species arrays that cover a broad range of tolerances from the dry Yucatan to the more humid Petén forests. Existing forest ecosystems occur in an area where there has previously been significant shifts in sea level rise, and has adapted in the past.<br>▪ The large extent of forest in the Selva Maya node is many times over the minimum dynamic area, increasing resilience to climate change<br>▪ Distance of Selva Maya node from coast buffers to some extent from the most severe impacts of hurricanes / tropical storm events.<br>▪ The North East and Maya Mountains nodes also have some buffering from climate change through size, current intact condition and connectivity |
| **To increase resilience** | ▪ Maintain forest connectivity to facilitate ecosystem migration southwards, particularly from Shipstern / Fireburn node, with its Yucatan elements<br>▪ Prevent further erosion of core forest nodes<br>▪ Reduce external anthropogenic impacts –e.g. fire, illegal hunting and illegal logging, which could tip the balance for some species – hurricane damage is greater where canopy is interrupted by logging roads. Recommend integrate spatial planning for minimizing impact of logging roads into long term management planning for areas such as Rio Bravo<br>▪ Increased prioritization of fire management / prevention, especially at the interface of forest and savanna |

| | |
|---|---|
| | ▪ Formal integration of large private lands (e.g. Yalbac, Gallon Jug, Peccary Hills) where feasible, into national system to retain forest nodes |

| **Southern Coastal Forests – Pine and Broad-leaved** | |
|---|---|
| **Potential Climate Change Impacts** | ▪ Increasing seasonality of rainfall / inundation has the potential to result in change in species composition.<br>▪ In low lying coastal areas, saline intrusion into groundwater will reduce species diversity and cause change in species composition towards a more mangrove dominated, haline ecosystem<br>▪ Increased hurricane intensity will impact forest stature and structure and will remove some species less tolerant of landscape scale impacts, with decreased biodiversity.<br>▪ Decreased productivity, with loss of older seed-stock and fruiting trees, directly affecting frugivores, and indirectly impacting ecosystem functionality<br>▪ Increased vulnerability to fire.<br>▪ Increased vulnerability to local extinctions exacerbated by reduced connectivity and increased fragmentation.<br>▪ Migration of species and ecosystems – a drying of forest with increased Yucatan composition.<br>▪ The humid end of the species and ecosystem spectrum will be lost. |
| **Resilience Features** | ▪ Forests occur in areas that are exposed to significant seasonal shifts in water regime – infers a degree of resilience.<br>▪ These ecosystems occur in areas where there has already been significant shifts in sea level rise, and has adapted in the past.<br>▪ Many areas have been exposed to frequent anthropogenic fires – remaining biodiversity has some resilience<br>▪ Large area under protection under MMMC |
| **To increase resilience** | ▪ Maintain forest connectivity to facilitate ecosystem migration from the north southwards, and from the Maya Mountains Massif to the coastal plain<br>▪ Fire management / prevention, particularly in savannah / forest interface areas<br>▪ Prevent further erosion of core forest nodes<br>▪ Reduce external anthropogenic impacts – fire, hunting, illegal logging, which could tip the balance for some species – hurricane damage is greater where canopy is interrupted by logging roads |

In the coastal zone, the increased sea level may result in huge ecosystem shifts, particularly with the salination of low lying aquifers of the coastal zone, with the associated shifts to more salt-tolerant species. Should the barrier reef not be able to maintain growth rates equal to sea level rise, and Belize loses this protection against the force of the open sea waves, there will be greatly increased coastal

erosion, with the loss of both minor and major cayes, and several of the coastal lagoons merging with the sea.

| Coastal Lagoons | |
|---|---|
| **Potential Climate Change Impacts** | ▪ Potential for significant change - coastal lagoons have the potential to become coastal bays, with erosion of coastal ridge, increased tidal flow and flushing of sediments.<br>▪ May lose estuarine characteristics and species, but with a shift to increased seagrass and associated biodiversity and nursery functionality<br>▪ Greater flushing, resulting in less turbid conditions, combined with increased depth may increase seagrass cover and ecosystem productivity.<br>▪ Increased depth, so temperature cycling not as great, with greater buffering of dissolved oxygen shifts<br>▪ Erosion of low lying coastal areas with loss of protective coastal ridge and increased tidal / wave action<br>▪ Migration of inundated mangrove inland, and relocation of fringing mangroves to new coastline.<br>▪ Increased severity of exposure for coastal forests.<br>▪ Greater vulnerability to hurricane impacts.<br>▪ Reduced annual freshwater input resulting in reduced estuarine conditions, with greater seasonality of freshwater input and rapid salinity changes during storm events of increasing intensity |
| **Resilience Features** | ▪ Mangroves have capacity to migrate up elevation gradient as sea level rises – will slow loss of land area – slow the erosion rate.<br>▪ Coastal vegetation has a natural resilience to storms, with a high capacity to regenerate from severe tropical storm events. |
| **To increase resilience** | ▪ Maintain fringing mangroves and natural coastal vegetation to slow rate of loss of coastal ridges and erosion of lagoon shorelines<br>▪ Zone coastal development to prevent exacerbation of climate change impacts in identified sensitive areas and prevent development in areas that will exacerbate the impacts of sea level rise and coastal erosion – coastal ridges.<br>▪ Accept that dramatic changes will take place in the Belize coastline, and mitigation measures are unlikely to be effective in the long term…relevant to investment |

| Upland Forests of the Maya Mountains Massif | |
|---|---|
| **Potential Climate Change Impacts** | ▪ Migration of species and ecosystems along altitudinal and precipitation gradients.<br>▪ Reduction of orographic rainfall will affect viability of montane and sub-montane ecosystems, causing ecosystem shifts, drying of forests at all elevations, reducing river flow and water security for lowland communities<br>▪ Decreased reliability of rainfall will impact fauna as well – amphibians will be first vertebrate taxon to show these impacts<br>▪ Increasing temperatures will take some forest ecosystems and species outside their tolerance zone, with ecosystem shifts, and a general shift up altitudinal gradients.<br>▪ Increased vulnerability to fire |
| **Resilience Features** | ▪ Altitudinal gradients ensure that the forests have species arrays that cover a broad range of tolerances from dry to more humid forests.<br>▪ The large extent of forest, many times over the minimum dynamic area for species and ecosystems, increases resilience<br>▪ Geographically separated replication of ecosystems increases resilience to hurricane impacts<br>▪ Rugged terrain normally decreases storm strength very rapidly, with mountainous ridges protecting forests on the leeward slopes<br>▪ Very few of the anthropogenic impacts known to increase storm impacts – e.g. few wide roads, clearings, etc. |
| **To increase resilience** | ▪ Increase enforcement against transboundary incursions, forest clearance<br>▪ Re-establish forest cover over illegally cleared lands<br>▪ Prevent further erosion of protected areas at periphery<br>▪ Focus on agro-forestry initiatives in Southern Coastal Plain to maintain forest cover where feasible, to maintain orographic rainfall functionality where feasible<br>▪ Fire management / prevention<br>▪ Reduce anthropogenic impacts – fire, illegal hunting and logging, which could tip the balance for some species – hurricane damage is greater where canopy is interrupted by logging roads |

| Forest Ecosystems on Karst Hills | |
|---|---|
| **Potential Climate Change Impacts** | ▪ Increasing temperatures will take some forest ecosystems and species outside their tolerance zone, with ecosystem shifts, and a general shift towards Yucatan species.<br>▪ Increased vulnerability to fire<br>▪ Migration of species – a drying of forest with increase of Yucatan composition.<br>▪ The humid end of the species and ecosystem spectrum will be lost<br>▪ Decreased reliability of rainfall will impact fauna as well – amphibians will be first vertebrate taxon to show these impacts<br>▪ Increased hurricane intensity will impact forest stature and structure and will remove some species less tolerant of landscape scale impacts, with decreased biodiversity.<br>▪ Decreased productivity, with loss of older fruiting trees affecting frugivores and associated ecosystem functionality.<br>▪ Increased vulnerability to local extinctions exacerbated by reduced connectivity and increased ecosystem fragmentation. |
| **Resilience Features** | ▪ Forests have species and ecosystem array that covers a broad range of tolerances from dry to the more humid Petén forests. System occurs in areas where there have already been significant climatic shifts in the past, and has adapted.<br>▪ Geographically separated replication of ecosystems increases resilience to hurricane impacts<br>▪ Rugged terrain normally decreases storm strength very rapidly, with mountainous ridges protecting forests on the leeward slopes<br>▪ Karst ecosystems are drought tolerant |
| **To increase resilience** | ▪ Maintain forest connectivity to facilitate ecosystem migration southwards and up elevational gradients<br>▪ Prevent further erosion of core forest nodes<br>▪ Reduce external anthropogenic impacts – fire, illegal hunting and logging, which could tip the balance for some species – hurricane damage is greater where canopy is interrupted by logging roads<br>▪ Fire management / prevention |

A number of broad adaptation measures have been identified to help maintain the species diversity of the tropical ecosystems:

- Maintaining large blocks of forest cover, with priority given to the primary forest nodes, to buffer against climate change impacts and continue providing water security
- Maintaining lateral connectivity to facilitate ecosystem migration southwards, with priority given to the three primary corridors
- Maintaining altitudinal connectivity to facilitate ecosystem migration up altitudinal gradients

- Maintaining forest cover in the lowlands of the southern coastal plain to provide conditions conducive for orographic rainfall
- Maintaining the integrity of coastal mangrove systems, to protect coastlines from erosion
- Managing fire risk with effective planning and fire management

The health of the marine environment is critical to the social and economic health of Belize – however the state of the reef has declined significantly over the last twenty years. Local threats to the marine environment are over-shadowed by the impacts of climate change, already affecting the marine ecosystems of Belize.

- The condition of coral reef, the ecosystem on which much of Belize's marine resource utilization is based, has been declining at an alarming rate and corals are already at the upper limit of their temperature tolerance.
- Climate change implications also have the potential to include:
- The increased risk to coastline and caye infrastructure due to inundation
- Potential long term loss of coastal protection functionality if reef growth can't keep up with sea level rise.
- Decreased functionality of wave shadow protection from atolls has the potential to increase mechanical damage to the barrier reef, reducing its ability to act as a protective barrier to the mainland during storm events.
- Increased lagoon - open sea water exchange resulting in reduced water temperatures.

The predicted socio-economic impacts of climate change include:

- the loss of tourism revenues (diving and snorkelling) as a result of the reduced aesthetic appeal of the reef and the loss of charismatic reef species (e.g. parrotfish, corals, colourful fish and sharks), through degradation of marine ecosystems.

- The potential collapse of the fishing industry that currently supports 2,750 fishers and their families.

- Increased storm activity, with increased beach erosion and loss of coastal / caye land, resulting in dredging activity for landfill for coastal and offshore tourism developments.

- Reduced productivity of the shallow-water marine environment would lead to a potential shift of sport fishing focus to deep sea species.

Declining tourism and fishing industries will affect local economies, resulting in reduced revenues, with the associated reduction of viable employment opportunities with an associated increase in fishing pressures, with increased illegal activities and conflict with MPAs. With no national strategies in place to address this predictable increased unemployment, some community economies will be more vulnerable than others – but all will be affected.

**Increased Sea Surface Temperature**

- The shallow reef lagoon, with its limited circulation, is already seeing impacts of rising sea temperatures with three major coral bleaching episodes since 1995, resulting in increased coral vulnerability to disease, and coral mortality.
- Reduced live coral cover - at Laughing Bird Caye National Park, live coral cover has dropped from an estimated 60% twenty years ago to an average of 16.6% in 2007-2008, and 7% in 2010
- There is reduced hard coral density and diversity, resulting in reduced reef structure – with a shift from the elkhorns to the more opportunistic lettuce corals as dominant species
- Predicted changes in fish distributions, with fish moving offshore into cooler waters
- Predicted reduced protective value from the barrier reef following increased coral mortality and erosion, resulting in increased wave action, and greater storm damage, with destruction of littoral forests, mangroves and turtle nesting beaches
- Reproduction / growth in seagrassis temperature-driven, so may be affected.
- Possible impacts from increased algal blooms, reducing light penetration.

**Sea Level Rise**

- Loss of deeper water corals, with shift in distribution
- Changes in ocean and lagoon currents, with associated changes in dispersal and recruitment routes and sources for corals, fish and other marine biodiversity
- Inundation and loss of littoral forest, mangroves and nesting beaches on cayes
- Shift in range of seagrass and possible habitat loss
- Potential for reduction of functionality of atolls in providing a barrier to direct wave action on the central barrier reef, increasing wave impacts

**Air Temperature Rise**

- May alter phenological patterns of mangroves - timing of flowering and fruiting.
- At temperatures above 25°C, some mangrove species show a declining leaf formation rate.
- Temperatures above 35°C have led to thermal stress affecting mangrove root structures and establishment of mangrove seedlings.
- In mangroves, leaf temperatures of 38-40°C result in almost no photosynthesis (IUCN, 2006)

**Ocean Acidification**

- Decreasing rate of coral growth, with insufficient calcium for skeleton development in reef building corals
- Reduced survival of larval marine species, including conch, lobster and commercial fish species, on which the Belize fishing industry is based
- Reduction in coral reef health and resilience
- Reduction in functionality of barrier reef as a protection against storm surges

**Increased Frequency of Storms**

- Increased mechanical damage to corals
- Increased sedimentation, with reduced ability of colonies to re-establish after storm events
- Massive sediment movements uprooting or burying seagrass.
- Increased frequency of storms may increase turbidity, reducing light availability for deeper water seagrasses beyond their limits.
- Decreased salinity from increased storm events may adversely affect seagrass
- Increased frequency of high water events could affect mangrove health and composition due to inundation and changes in salinity

| Climate Change Impacts | Impacts on Ecosystem | | |
|---|---|---|---|
| | **Coral Reef** | **Seagrass** | **Mangrove** |
| **Sea level rise** | Coral reefs may be able to keep up with sea level rise, barring other impacts (anthropogenic impacts, bleaching, acidification, disease and erosion) - dependent on rate of sea level rise. Change in dispersal / recruitment routes / sources. There may be a loss of deeper corals, a shift in distribution, as light availability decreases. Increased sedimentation and reduced light availability due to shoreline erosion.<br><br>After initial temperature rise, possible reduction in water temperature in inner lagoon resulting from increased water exchange with deeper waters as current barriers become inundated. | Increases in water depths above present meadows will reduce light availability and changes in currents may cause erosion and increased turbidity of water column. Shifts in distribution of seagrass beds. Over the medium term, seagrass should be able to survive in increased water depth | Inundation of lenticels in the aerial roots can cause the oxygen concentrations in the mangrove to decrease, resulting in death. Damage to coral reefs may adversely impact mangrove systems that depend on the reefs to provide shelter from wave action. If inland, migration cannot occur, then mangroves may disappear. Increase in saltwater intrusions may also affect distribution of mangroves. Potential for changes in dispersal patterns for mangrove propagules |
| **Sea surface temperature rise** | Increased coral bleaching, potential mortality and erosion, and eventual loss of ecosystem functionality. May affect symbiont type in corals. Increased prevalence of coral disease. Possible impacts from new invasive species and algal blooms. A shift towards more tolerant / opportunistic species, with reduced diversity. May alter localized current patterns – and associated larval dispersion patterns. Less tolerant species may settle only in cooler waters, but increased sea level rise may eventually balance increased water temperature. | Temperature stress on seagrasses will result in distribution shifts, changes in patterns of sexual reproduction, altered seagrass growth rates, metabolism, and changes in their carbon balance. When temperatures reach the upper thermal limit for individual species, the reduced productivity will cause plants to die (above 35˚C for *T. testudinum*). Higher temperatures may increase epiphytic algal growth, increasing shading and reducing available sunlight. | Loss of reef may reduce protection from erosion and storm events, increasing risk to mangroves. |

| Climate Change Impacts | Ecosystem | | |
|---|---|---|---|
| | **Coral Reef** | **Seagrass** | **Mangrove** |
| **Increased frequency and intensity of storms** | Increased mechanical damage of corals, increased sedimentation. Reduced ability of colonies to re-establish after storm events.<br><br>Removal of macro algae, resulting in more available substrate for recruitment.<br><br>Fragmentation – dispersal and colonization of corals due to mechanical damage from storm impact. | Massive sediment movements that can uproot or bury seagrass. It may also become harder for seagrasses to become re-established. Would be exacerbated by anthropogenic impacts – primarily dredging and landfill | Large storm impacts result in mass mortality inundation and changes in sediment dynamics. Possible increase in nutrients / growth. Projected increases in frequency of high water events, salinity and inundation could affect mangrove health and composition. Inundation is also projected to decrease the ability of mangroves to photosynthesize. |
| **Ocean acidification (corals, lobster / conch)** | Decreases in coral calcification rates, growth rates and structural strength. Weakening of reef matrix. If there are areas of high localised calcification, acidification will have a drastic impact., dependent on the ratio of accretion / dissolution changes | Possible direct positive effect on photosynthesis and growth, as in some situations, seagrass is carbon limited. Higher $CO_2$ levels may also increase the production and biomass of epiphytic algae on seagrass leaves, adversely impacting seagrasses by causing shading. Acidification of seawater could counter the high pH formed by photosynthesis in dense seagrass stands, increasing seagrass photosynthesis and productivity. | Positive increase in growth. However, damage to coral reefs may adversely impact mangrove systems that depend on the reefs to provide shelter from wave action. May affect invertebrates and other organisms of mangrove root communities. |
| **Decreased Precipitation** | There is a hypothesis that the increased algal bloom in southern Belize may be attributed to reduced precipitation... decreased visibility might be positive, as it may shade the corals | Seagrass has relatively high adaptation to shifts in salinity – particularly increasing salinity. | Reduction of freshwater lens, effect on carbon uptake, photosynthesis. Decreased precipitation results in a decrease in mangrove productivity, growth, and seedling survival, and may change species composition favouring more salt tolerant species. Projected loss of the inner cayes to unvegetated hypersaline flats |

| Climate Change Impacts | Ecosystem | | |
|---|---|---|---|
| | Coral Reef | Seagrass | Mangrove |
| **Air Temperature** | Indirect – by increasing water surface temperatures | Indirect – by increasing water surface temperatures | May alter phenological patterns - timing of flowering and fruiting. At temperatures above 25°C, some species show a declining leaf formation rate. Above 35°C have led to thermal stress affecting. Mangrove root structures and establishment of mangrove seedlings. At leaf temperatures of 38-40°C, almost no photosynthesis occurs (IUCN, 2006). Possible localized changes in distribution. |

**Rationalization Exercise of the Belize National Protected Areas System, 2013**

## ANNEX 3: BELIZE NATIONAL CLIMATE CHANGE ADAPTATION POLICY – KEY ACTIONS PER GOVERNMENT AGENCY

| Government Agency | Key Actions |
|---|---|
| Agriculture Department | ▪ Prepare adaptation options for those crops, which are threatened. These may include the introduction of varieties, which are more tolerant to the new climatic regime, diversification, and the introduction of new agronomic practices.<br>▪ Promote the use of new cultivars and practices in the agricultural community |
| Coastal Zone Management Authority and Institute | ▪ Prepare adaptation plans for the coastal zone to address the impacts of climate change. |
| Education | ▪ Promote the inclusion of climate change in the school curricula at all levels<br>▪ Prepare educational material on climate change for use at all levels |
| Energy | ▪ Convene an Interdisciplinary Energy Committee comprised of energy producers, distributors and the major users to formulate a national energy plan and provide the Government with advice on energy.<br>▪ Seek opportunities for Belize to participate to the fullest extent possible in energy projects which meet the needs of the country and which can be accommodated within the opportunities being developed through the climate change negotiation process. |
| Environment | ▪ Prepare adaptation options to meet the threats of climate change. |
| Fisheries | ▪ Undertake climate change vulnerability studies of the fish species resident in Belizean waters.<br>▪ Sensitize the fishing community to opportunities that may arise as new species become more abundant in Belizean waters.<br>▪ Monitor and protect the nation's reefs and mangroves to preserve these important fisheries habitats. |
| Forestry | ▪ Explore and promote the opportunities being developed for forestry projects, which will enable the country to participate fully in the emerging carbon markets.<br>▪ Monitor and protect the nation's forests and watersheds, including our mangroves. |
| Information | ▪ Develop a public awareness campaign on climate change.<br>▪ Encourage the media to publicize the issues associated with climate change. |
| Tourism | ▪ Prepare adaptation options for those sectors threatened by climate change<br>▪ Promote projects within the tourism industry, which could benefit from the opportunities being developed by the flexibility mechanisms of the climate change negotiation process. These include renewable energy production, energy efficiency and waste disposal projects. |
| Transportation | ▪ Undertake climate change vulnerability studies of the nation's roads, bridges and waterways.<br>▪ Prepare adaptation options to meet these threats |
| Water Resources | ▪ Convene an interdisciplinary Water Commission to coordinate, monitor and regulate the use of the nation's water resources.<br>▪ Undertake climate change vulnerability studies of the nation's water resources.<br>▪ Advise the relevant sectors of threats on their supplies of water as a result of climate change and recommend that they prepare adaptation options. |

**ANNEX 4: ACRONYMS**

| | |
|---|---|
| **APAMO** | Association of Protected Area Management Organizations |
| **BAS** | Belize Audubon Society |
| **BBR** | Belize Bird Rescue |
| **BCCC** | Belize Climate Change Committee |
| **BEST** | Belize Enterprise for Sustainable Technology |
| **BFD** | Belize Fisheries Department |
| **BSGA** | Belize Shrimp Growers Association |
| **BTFS** | Belize Tropical Forest Studies |
| **BTB** | Belize Tourism Board |
| **CBO** | Community Based Organization |
| **CCRE** | Caribbean Coral Reef Ecosystems Programme (Smithsonian) |
| **CGA** | Citrus Growers Association |
| **CZMAI** | Coastal Zone Management Authority and Institute |
| **DoE** | Department of the Environment |
| **ERI-UB** | Environmental Research Institute – University of Belize |
| **GDP** | Gross Domestic Product |
| **FAO** | Food and Agriculture Organization |
| **FCD** | Friends for Conservation and Development |
| **FD** | Forest Department |
| **IIED** | International Institute for Environment and Development |
| **IoA** | Institute of Archaeology |
| **IUCN** | International Union for Conservation of Nature |
| **KBA** | Key Biodiversity Area |
| **MFFSD** | Ministry of Forestry, Fisheries and Sustainable Development |
| **MPA** | Marine Protected Area |
| **NBMF** | National Biodiversity Monitoring Framework |
| **NGO** | Non-Governmental Organization |
| **NICH** | National Institute of Culture and History |
| **NPAPSP** | National Protected Areas Policy and System Plan |
| **NPAS** | National Protected Areas System |
| **PA** | Protected Area |
| **PACT** | Protected Areas Conservation Trust |
| **PFB** | Programme for Belize |
| **PPA** | Private Protected Area |
| **SACD** | Sarteneja Alliance for Conservation and Development |
| **SATIIM** | Sarstoon Temash Institute for Indigenous Management |
| **SI** | Statutory Instrument |
| **SIB** | Statistical Institute Belize |
| **SIRHI** | Simplified Integrated Reef Health Index |
| **TIDE** | Toledo Institute for Development and the Environment |

| | |
|---|---|
| **TNC** | The Nature Conservancy |
| **TRIGOH** | Tri-national Gulf of Honduras |
| **UNFCCC** | United Nations Framework Convention on Climate Change |
| **WRI** | World Resource Institute |