



Risking the Atoll

Analysis of Environmental and Economic Effects of Improperly Regulated Development at Turneffe Atoll



Contents

ACRONYMS	
EXECUTIVE SUMMARY	01
INTRODUCTION	03
THE RESERVE	04
Turneffe Atoll Marine Reserve	05
THE RULES	07
Development and Management Guidelines for the Atoll	08
Regulations Directly Relevant to Development at Turneffe	12
National Development Plans	16
THE DAMAGE	21
Development Activities within Turneffe Atoll	22
Conflicts with Development and Management Guidelines for the Atoll	27
Conflicts with Existing Environmental Laws and Regulations	31
Conflicts with Existing Master Planning and Other Development Plans	34
Affected Stakeholders of Turneffe Atoll	36
THE IMPLICATIONS	38
Economic Feasibility of the Belize Dive Haven Project	39
Economic Implications for the Future Economic Value of Turneffe	42
CONCLUSION	43

LIST OF TABLES

Table 1: Legal Framework For TAMR	12
Table 2: Management Zones Of TAMR	14
Table 3: Development Conflicts With TAMR Development Guidelines	28
Table 4: Development Conflicts With NSTMP	34
Table 5: Development Conflicts With National Plans	35

LIST OF FIGURES

Figure 1: Turneffe Atoll	06
Figure 2: Open Discharge Of Brine At Belize Dive Haven	23
Figure 3: Crocodile Reserve Threatened By Mangrove Clearings	25
Figure 4: Belize Dive Haven - A 97-Room Resort At Turneffe	27
Figure 5: Dredging Of Back Reef Flats At Ropewalk Caye	32



Acronyms

BDHRM	Belize Dive Haven Resort and Marina
BTB	Belize Tourism Board
CBA	Central Building Authority
CZMAI	Coastal Zone Management Authority and Institute
DOE	Department of Environment
ECP	Environmental Compliance Plan
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act
GOB	Government of Belize
GSDS	Growth and Sustainable Development Strategy
ICZMP	Integrated Coastal Zone Management Plan
INCAE	Instituto Centroamericano de Administración de Empresas
MTCA	Ministry of Tourism and Civil Aviation
NPV	Net Present Value
NSTMP	National Sustainable Tourism Master Plan
OS	Oceanic Society
SWOT	Strength, Weakness, Opportunities, Threats
TAMR	Turneffe Atoll Marine Reserve
UB	University of Belize
WHS	World Heritage Site





Executive Summary

This case study has been commissioned to evaluate and quantify the effects of improperly regulated development at Turneffe Atoll. It is intended to benefit decision makers, developers, environmental advocates and other interested parties by demonstrating the consequences of improperly designed and permitted projects in remote and sensitive areas.

Turneffe Atoll was designated a marine reserve in 2012. The Atoll is located approximately 30 miles east of Belize City and is the largest and most biologically diverse atoll in the Caribbean. Turneffe is a self-contained coastal marine ecosystem approximately 30 miles long and 10 miles wide. It is made up of a complex pattern of coral reefs, back-reef flats, cayes, channels and lagoons. The atoll supports several threatened and endangered species.

Tourism and commercial fishing are the main economic activities at Turneffe Atoll with several tourism developments, including three high-end eco-tourism resorts, a mega-hotel, and two

SOME DEVELOPMENT ON THE ATOLL HAS CIRCUMVENTED NATIONAL MASTER PLANS AND ENVIRONMENTAL REGULATIONS

educational/research facilities focused on the marine environment. There are also approximately thirty semi-permanent fishing camps, scattered across the atoll. The Belize National Coast Guard maintains a manned station on Calabash Caye, while the Belize Port Authority has lighthouses on Mauger Caye and Caye Bokel. The Atoll contains approximately 38 cayes comprised mostly of mangrove-covered swamp. For decades, Turneffe has been a major contributor to Belize's commercial harvest of lobster, conch and finfish. Additionally, the atoll is known worldwide as a sport fishing

and scuba diving destination, and it is also an important center for marine research. Over the past decade, development pressures have increased enormously. Since 2005, the transfer of property from national ownership to private ownership has skyrocketed with several large stands of mangroves cleared and critically important marine areas dredged and destroyed. Reversing this ominous trend will be difficult, if not impossible, without a dedicated approach to sustainable management of the atoll.

The main development impacts on Turneffe Atoll have been related to tourism, which has involved large-scale sand dredging and mangrove deforestation. Although most development at the Turneffe Atoll has been done in a reasonably sustainable manner, there have been a few notable exceptions that have had significant negative impacts. If continued, these destructive activities will cause severe, long-lasting environmental and economic damage to Turneffe and Belize.

Environmental laws, as well as important national master plans, have direct bearing on development activities at Turneffe Atoll. However, in several cases these have been circumvented. A case in point is the Belize Dive Haven Resort and Marina (hereinafter referred to as Belize Dive Haven), a mega-scale tourism development originally located on a 47-acre parcel of land on Ropewalk Caye, and now expanded to 240 acres. This development consists of a main hotel building with 90 hotel rooms, 7 penthouse suites, a service support facility, two very large pools and an access canal measuring 1,800 feet long by 150 feet wide. The canal is 6 feet deep and runs from the inner lagoon to near the ocean side of the property.





The scale of the development at Belize Dive Haven appears to be in direct conflict with the principal management purpose of the TAMR - to “balance development with the conservation of the natural resources in this unique and fragile environment”. An Environmental Impact Assessment (EIA) was not carried out for this development, even though the project fits the definition of a Schedule I project under the Environment Protection Act. Under Section 20 of the Environment Protection Act, any project that may significantly affect the environment requires an EIA. An Environmental Compliance Plan (ECP) was prepared for the project after construction had been underway for several years. Other developments on the Atoll have followed a similar course, although to a lesser degree.

The impacts of unmanaged development extend beyond the natural environment to the stakeholders who depend on a healthy environment for their livelihoods. Most Turneffe stakeholders depend directly upon the ecosystem services provided by the Atoll. These include traditional fishermen, eco-tourism operators and their staffs, scientific researchers, and government departments. Turneffe Atoll makes a substantial contribution to the economy of Belize which is also directly related to its environmental assets and recreational value. When considering only direct expenditures related to Turneffe’s tourism activities, fisheries benefits, and storm protection value, the annual economic contribution of the atoll is slightly more than US\$62.3 million per year.

Although the economic contribution from Turneffe’s commercial fishery appears to have diminished somewhat, it still plays an important economic role for several coastal communities by creating income and employment for hundreds of fishers. Additionally, Turneffe plays a significant role in protecting the Belize mainland, and particularly Belize City, from the impact of storms. The overall annual economic contribution of Turneffe Atoll to Belize when factoring in income and employment exceeds US\$75.8 million per year.

Degradation of Turneffe’s back-reef flats, mangroves, corals, sea grass and water quality puts in jeopardy these significant economic benefits derived from a healthy and functioning ecosystem. There is still ample opportunity to correct the course of unsustainable development activities within the Turneffe Atoll Marine Reserve. The current pace of development remains manageable if better compliance with sustainable standards can be achieved. Greater awareness among stakeholders, decision makers and the general public of the critical importance, and the economic value, of Turneffe Atoll’s environmental assets is needed, as is more vigilance on the part of Turneffe stakeholders and the managers of the protected area.

¹The Belize Dive Haven project was started in 2005, well before TAMR was established in 2012. Even so, the scope of this project in a sensitive marine environment should definitely have required an EIA, even prior to the marine protected area designation.





Introduction

Although most development at the Turneffe Atoll has been done in a reasonably sustainable manner, a few developments have had significantly negative impacts to the atoll. If continued, these practices would cause severe, long-lasting environmental and economic damage to Turneffe and Belize. The purpose of this case study is to evaluate the negative effects of improperly regulated development at Turneffe Atoll. This study is intended to benefit decision makers, developers and other interested parties by demonstrating the consequences of improperly designed and permitted projects in sensitive areas and to encouraging sustainable developmental practices.

This report presents a summary of the Turneffe Atoll Marine Reserve (TAMR) including a brief history of its formation as well as its current status. The TAMR Management Plan and relevant regulations within the Statutory Instrument establishing TAMR are then reviewed to clarify allowable developmental practices within the TAMR. The incongruence and conflict between

“ THIS STUDY IS INTENDED TO BENEFIT DECISION MAKERS, DEVELOPERS AND OTHER INTERESTED PARTIES BY DEMONSTRATING THE CONSEQUENCES OF IMPROPERLY DESIGNED AND PERMITTED PROJECTS IN SENSITIVE AREAS AND TO ENCOURAGE SUSTAINABLE DEVELOPMENTAL PRACTICES. ”

certain developments and these established guidelines and regulations is then examined and discussed. Overarching national development plans are reviewed and analyzed along this same vein.

Specific developmental activities are then discussed in detail to demonstrate specific areas where infractions have occurred. The Belize Dive Haven Resort and Marina is undoubtedly the largest development on the atoll and the economic feasibility of this project is evaluated. The

report presents the impacts and implications of this project; however, specific violations can only be verified by the Department of Environment which enforces the Environmental Compliance Plans for all developments.

Turneffe Atoll and the Turneffe Atoll Marine Reserve are valuable resources for Belize. The benefits from these resources, however, are directly threatened by environmental degradation related to unsustainable development. The estimated economic value of the Atoll is discussed to demonstrate the tremendous value placed at risk by unsustainable developmental practices. Various stakeholders depend upon a healthy Turneffe ecosystem and they stand to lose heavily if these marine resources are degraded. There is an urgent need for all stakeholders, including developers, to become familiar with the broad-based development guidelines established for Turneffe Atoll by and for regulatory agencies. Further, there is a need for permitting and regulatory agencies to stand behind these guidelines.





THE RESERVE





Turneffe Atoll Marine Reserve

The Turneffe Atoll was designated a marine reserve in 2012. The reserve, which is located approximately 30 miles east of Belize City, is the largest and most biologically diverse atoll in the Caribbean. Turneffe is a self-contained coastal marine ecosystem approximately 30 miles long and 10 miles wide. It is made up of a complex pattern of coral reefs, back-reef flats, cayes, channels and lagoons. The atoll supports several threatened and endangered species, including the American Saltwater Crocodile (*Crocodylus acutus*), the Antillean Manatee (*Trichechus manatus*), Hawksbill Turtles (*Eretmochelys imbricata*), the Goliath Grouper (*Epinephelus itajara*), and Nassau Groupers (*Epinephelus stiiatus*).

Two regionally important spawning aggregation sites are located on the north-east and south walls of the Atoll, and are managed under Fisheries regulations (Statutory Instrument 161 of 2003). A third site, Mauger Caye, regulates fishing of Nassau Grouper during spawning season, under Statutory Instrument 49 of 2009. A Public Reserve was also declared by the Forest Department to protect part of Cockroach Beach and the associated lagoon, in recognition of its importance as the primary American Saltwater Crocodile nesting site in the country.

There are no settlements on the atoll; however, there are several developments, including three high-end ecotourism resorts (Turneffe Flats, Turneffe Island Resort, and Blackbird Caye Resort), a mega-hotel Belize Dive Haven, and two educational/research facilities focused on the marine environment - namely the University of Belize's Environmental Research Institute at Calabash Caye and The Oceanic Society located at Blackbird Caye. There are also an estimated thirty semi-permanent fishing camps, scattered around the atoll. The Belize National Coast Guard maintains a station on Calabash Caye, while the Belize Port Authority has lighthouses on Mauger Caye and Caye Bokel. There are approximately 38 substantive cayes with higher land, and many low-lying, mangrove-covered islands at Turneffe Atoll.

For decades, Turneffe has been a major contributor to Belize's commercial harvest of lobster, conch and finfish. Additionally, the atoll is known worldwide as a sport fishing and scuba diving destination, and it is also an important center for marine research. Over the past decade, development pressures have increased significantly. Since 2005 the transfer of property from national ownership to private ownership has skyrocketed with large stands of mangroves cleared and critically important marine areas dredged and destroyed. Reversing this ominous trend will be difficult, if not impossible, without major efforts to sustainably manage the atoll coordinated between stakeholders, TAMR and decision makers.



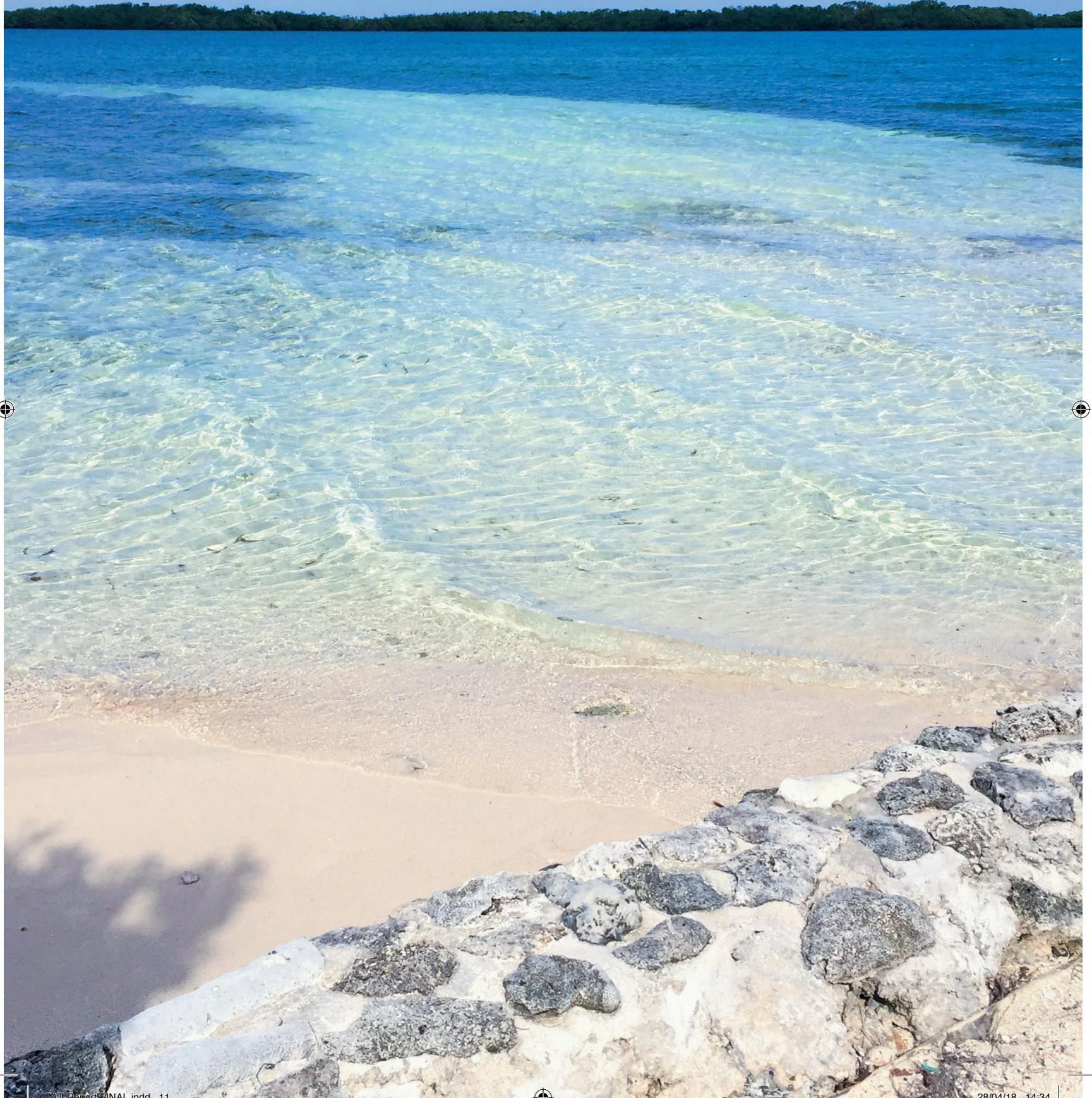


Figure 1: Turneffe Atoll





THE RULES





Development and Management Guidelines for the Atoll

In developing the Integrated Coastal Zone Management Plan, the Coastal Zone Management Authority and Institute (CZMAI) developed regional coastal zone management guidelines to provide support for planned development and resource management along the coastline and offshore areas of the entire country. These guidelines have been prepared for nine (9) coastal planning regions which were demarcated based on commonalities, geographic definition and regional characteristics.

The Turneffe Atoll Coastal Zone Management Guidelines were developed in conjunction with the stakeholder groups of the Turneffe region and pertinent government agencies including Fisheries, Forestry, Mining and Geology and the Department of Environment. These management guidelines are meant to ensure that anthropogenic use of the coastal region occurs in consideration of the carrying capacity of the environment in addition to other ecological, cultural, social and economic development priorities of the region. The guidelines are expected to be implemented by all those agencies that have legal mandates and/or permitting powers that impact resource utilization in the coastal zone of Belize, in partnership with this region's stakeholder groups.

Among the several objectives of the coastal zone management guidelines² are:

- a) Protecting the fishing resources and fishing rights especially for the fisherfolk from the communities of Belize City, Sarteneja, Chunox and Copper Bank
- b) Promoting orderly and sustainable development, based on suitable land use planning, and with effective development guidelines that will meet the needs of current and future generations.
- c) Maintaining and protecting ongoing and future conservation, recreational and tourism areas and uses.
- d) Preventing inappropriate high-impact, unsustainable developments that are incompatible with community needs.
- e) Protecting and preserving significant national and international natural features and ecological biodiversity of special interest or uniqueness that define the character and scientific importance of the Turneffe Atoll.
- f) Preventing development practices that damage commercial fishing and sport fishing habitats, particularly the back-reef flats and sea grass beds.

TOURISM DEVELOPMENT

The long-term objective of the CZMAI Guidelines for sustainable tourism development within the barrier reef system, including Turneffe Atoll, is to limit growth allowing only necessary improvements and small enlargements for existing homes, resorts, lodges and other tourism facilities. Preservation of the reef system, marine habitats and ecosystem is to be the primary concern when assessing the need to make improvements to existing facilities. Specifically, the tourism guidelines state the following:

²Turneffe Atoll Management Guidelines, CZMAI, 2013. Pg. 22





- a) Promote low-impact, environmentally-sensitive, nature-based tourism with care to avoid practices that destroy Turneffe Atoll's sensitive and valuable habitats;
- b) Avoid high-impact, environmentally-destructive tourism development;
- c) All tourism facilities should meet the Belize Tourism Board's minimum standards, including disaster preparedness and evacuation plans; and meet the "Tourism and Recreation Best Practices Guidelines for Coastal Areas in Belize" produced by CZMAI.

In 2004, the CZMAI produced the "Cayes Development Guidelines" for the cayes within nine coastal planning regions including the Turneffe Atoll. These development guidelines were produced in consultation with stakeholders from each planning region, with full involvement of the Fisheries Department, Forestry Department, the Department of Environment and other pertinent agencies. For each area, land use classes were developed along with accompanying standards for the varying types of development recommended of each cay. Use classes were also assigned to each cay based on development suitability assessments. Use categories included residential, conservation, commercial, research and education and they recommended the various degrees of allowable development intensities in these areas. The original Cayes Development Guidelines for Turneffe identified ninety-four (94) "development sites" and specified the type of land use, lot size, building density, means of utility supply and other relevant performance standards for each site. The "Cayes Development Guidelines" stipulated, for instance, that the height of buildings permitted on the atoll would be twenty-eight (28) feet or two floors maximum. These "Cayes Development Guidelines" have now been formally incorporated into the Integrated Coastal Zone Management Plan as the Coastal Zone Management Guidelines.

DREDGING AND MINERAL EXTRACTION

The Turneffe Atoll Coastal Zone Management Guidelines address marine dredging and mineral extraction. The guidelines point out that the Turneffe Atoll has sufficient high land for resort and/or residential development and that conversion of swamp into "beaches" or "land" is not recommended for the development of the Atoll. Furthermore, the guidelines emphasize that the protection of Turneffe's environment, particularly the reef, back-reef flats and seagrass beds, is essential to the survival of its two major economic sectors – commercial fishing and tourism. According to the guidelines, dredging invariably destroys critical habitats for these enterprises – namely back-reef flats, sand flats and seagrass beds. Additionally, Turneffe Atoll's coral reefs are easily damaged by silt and runoff from dredging. The reef system at Turneffe has been under increasing stress in recent years due to coral bleaching from climatic changes as well as damage from hurricanes. The guidelines highlight the need to limit significant man-made stresses from activities such as dredging.

Specifically, the guidelines point out that dredging conflicts with all the objectives for Turneffe Atoll. The guidelines state that no dredging, sand mining, or land filling, except for a limited hand dredging around docks, should be allowed at Turneffe without: 1) a comprehensive Environmental Impact Assessment to include a vetting process involving relevant stakeholders, and 2) compliance with the guidelines.

The guidelines go even further to stipulate that "in consideration of the objectives of these guidelines which include sustainability of commercial fishing sector and support of low-impact, nature-based tourism, development should be confined to areas naturally supportive of such development. Additionally, land without feasible access should not be developed and only minimal manual dredging for boat access should be allowed³."

³Turneffe Atoll Management Guidelines, CZMAI, 2013. Pg. 78





CORALS, MANGROVES AND SEAGRASS

The guidelines rightly acknowledge that the firm-bottomed back-reef flats at Turneffe are recognized world-wide for their beauty and their healthy populations of bonefish (*Albula vulpes*) which provide the backbone for Turneffe's sport fishing sector. Turneffe's back-reef flats also serve the commercial fishing sector in that they are important conch nurseries and conch harvesting locations. Furthermore, the back-reef flats provide juvenile habitat for numerous fish species and play an integral role in limiting storm damage by providing critical protection to the eastern side of the atoll during hurricanes. The total coral cover at Turneffe Atoll is approximately 45 km².

The guidelines underscore that mangroves are important for a variety of ecological and economic purposes including their role as fisheries nurseries and as habitat for birds, reptiles and marine invertebrates. Additionally, mangroves offer protection from hurricanes, provide flood control, and improve water purification through natural filtration services. Turneffe Atoll contains the largest area of mangroves found on Belize's cayes and the variety and extent of mangrove habitats found there is extraordinary. The total mangrove cover in this region is approximately 65 km². Like mangroves, extensive, healthy seagrass beds throughout Turneffe are essential to the commercial fishery as well as sport fishing. Additionally, they are important in sustaining Turneffe Atoll's manatee population. The total seagrass cover at Turneffe Atoll is approximately 366 km².

To ensure protection of corals, mangroves and seagrass, the guidelines state that:

- a) Clearing of vegetation should be kept to a minimum and valuable littoral forest should be identified with GPS coordinates, clearly mapped and zoned for protection.
- b) Preservation of seagrass beds should be a priority in all management decisions at Turneffe Atoll.
- c) Due to the economic and ecological importance of Turneffe's fringe reef, patch reef and back-reef flats, management of Turneffe Atoll should ensure that the integrity and health of these areas is carefully protected.

UTILITIES

Given that tourism is one of the main activities on Turneffe Atoll, the guidelines identify the provision of utilities as having potential impact on the ecology of the area. To address this, the guidelines state that:

- a) Tourism and residential developments should be required to provide detailed plans about how they will provide adequate fresh water which will not degrade natural fresh water resources used by wildlife.
- b) Rainwater collection, recycling of gray water, and other water preservation methods, should be utilized as much as possible.
- c) Maximal use of solar and wind power is recommended, yet it is recognized that some fuel based power will be necessary.
- d) Power requirements should be minimized to the extent possible using power-saving measures and other efficiencies.

FOSSIL FUELS

The guidelines note that transportation and storage of fossil fuels present risks of serious contamination, and that adequate policies and procedures for these activities should be required and approved for all residential and tourism developments. The guidelines stipulate





that fuel related contaminants must be disposed of responsibly and all tourism and residential development proposals should include responsible plans for these processes.

SOLID WASTE AND POLLUTION

For pollution control, the guidelines highlight the fragile nature of the atolls and as such underground septic tanks and soak-aways are not recommended as a means of handling liquid wastes. Furthermore, the “Cayes Development Guidelines” recommend the use of above-ground septic tanks with drain fields in several of the development sites. In 2010, Central Building Authority (CBA) produced detailed specifications for the construction of soak-aways and septic tanks for residential and other low-impact buildings. The CZMAI recommends that developers must consult with the CBA on standards for the construction of above-ground septic tanks with drain fields.

The guidelines further stipulate that:

- a) For tourism and residential developments, solid waste from toilets should be treated by means of an earth tub or similar type technology with the resulting compost used in landscaping. Open septic tanks should not be permitted for tourism or residential facilities and closed septic tank/drain-field systems should be permitted only with pre-approval from the Department of the Environment and Central Building Authority.
- b) Gray water should be recycled and reused as much as possible.
- c) Food waste from tourism and residential properties should be composted and used on-site as fertilizer.
- d) All hazardous waste, including batteries, tires, propellant cans and petroleum-based products, should be properly stored to avoid contamination and transported to the mainland for final disposal.
- e) Metal containers should be used for incinerating burnable inorganic waste, although such incineration should be done in a manner that is not a nuisance to neighbors. Large-scale resorts (yet to be defined) should be required to utilize incinerators for these purposes.
- f) There are no basic health care facilities on the atoll, and as such the guidelines stipulate that all residents should be prepared to provide at least basic medical care and resorts are encouraged to aid the wider community when needed.

The guidelines described above all form part of the Turneffe Atoll Coastal Zone Management Guidelines which in turn form part of the Belize Integrated Coastal Zone Management Plan being developed by the CZMAI. The Plan has been approved by CZMAI’s Board of Directors and the House of Representatives, and is now official government policy. As such, there is an expectation of adherence to them by both public and private entities.



Regulations Directly Relevant to Development at Turneffe

GENERAL RULES AND REGULATIONS

There are various laws and regulations that have a direct bearing on development activities on the Turneffe Atoll. The following table lists the existing pieces of legislation that apply to the TAMR.

Table 1: Legal Framework for TAMR

Legislation/Statutory Instruments	Description	Relevant Provisions
Fisheries Act	Passed in 1948, revised in 1983, and is currently being overhauled (2011); It is administered under the Fisheries Department and is the principal governing legislation to regulate the fishing industry.	Directly concerned with maintaining sustainable fish stocks and protecting the marine and freshwater environments. Provides protection for marine turtles and nest sites. Requires that artisanal fishers and fishing vessels are licensed annually to fish for commercial purposes.
Sport Fishing regulations (SI 114 and 115 of 2009)	Whilst the regulations are legislated under the Fisheries Act, the issuing of Sport Fishing licenses falls under the Coastal Zone Management Authority and Institute.	Established to better manage the economically important sport fishing species in Belize, and more specifically address the management and conservation of the three major sport fish in Belize - bonefish, tarpon & permit.
Environmental Protection Act (1992)	Was developed under the Department of the Environment with the aim of ensuring that development initiatives within Belize are planned for minimum environmental impact.	Important in permitting, regulating and overseeing development on the Atoll.
Environmental Impact Assessment Regulations (SI 105 of 1995)	Requires an Environmental Impact Assessment (EIA) for any proposed development project, undertaking or activity within any protected area (terrestrial or marine), including the Turneffe Atoll Marine Reserve.	An approved EIA results in the production of an Environmental Compliance Plan (ECP), which is developed, approved and monitored by the Department of Environment (DOE). Requires the DOE to respond to human impacts on the reef, such as pollution, boat groundings and fuel spills. Provides a mechanism for assessment of damage from boat groundings, based on the area impacted.



Forest (Protection of Mangrove) Regulations (SI 52 of 1989, under revision, 2011)	Provides for the protection of mangroves, with restrictions on mangrove alteration and/or clearance.	Before granting a permit for mangrove alteration, Belize law requires the Forest Department to consider whether the project will adversely affect the conservation of the area's wildlife, water flow, erosion and values of marine productivity, and to find either 'that the proposed alteration will not significantly lower or change water quality' or that the degradation of water quality is in the "larger and long-term interest of the people of Belize". ⁴
Wildlife Protection Act (SI 12 of 1982, revised 2000)	Falls under the Forest Department	Provides protection for West Indian manatee, whales and dolphins, with the prohibition of hunting and commercial extraction.
Mines and Minerals Act (1989)	Falls under Department of Geology (Ministry of Finance and Natural Resources)	Regulates the exploration and extraction of all non-renewable resources, including oil. Controls activities such as dredging which have the potential to impact the Atoll.
Petroleum Act (1991)	Falls under Department of Petroleum (Ministry of Economic Development, Petroleum, Investment, Trade and Commerce)	Regulates the exploration and extraction of petroleum. Controls activities such as oil prospecting and drilling which, if conducted in the adjacent seascape, have the potential to impact the Atoll. Princess Petroleum Ltd. holds a concession area covering most of the northern half of Turneffe Atoll and the seabed to the east.
Belize Port Authority Act, 1976; revised, 2003	The Port Authority is mandated to ensure the safety of navigational channels, through the installation of navigational aids and installation and maintenance of demarcation buoys.	Port Authority maintains two lighthouses at Turneffe Atoll (Dog Flea Caye to the north and Caye Bokel to the south). It also has a role in the registration of boats and monitoring of vessels using navigational channels and the removal of boats from the reef, when groundings occur.

A series of legislated regulations under the Fisheries Department provide a mechanism for management of commercial marine resources, as do statutory instruments Statutory Instrument 161 of 2003 and Statutory Instrument 49 of 2009. Regulations specific to the Turneffe Atoll are incorporated into the Statutory Instrument that defines the Marine Reserve.

THE FISHERIES (TURNEFFE ATOLL MARINE RESERVE) ORDER, 2012

The following management zones have been established for the TAMR:

- a) Zone 1: Mauger Caye Conservation Zone;

⁴Chapter 213, Section 5.5, Belize's Forest Act





- b) Zone IIA: Dog Flea Conservation Zone;
- c) Zone IIB: Cockroach - Grassy Caye Special Management Area;
- d) Zone III: Vincent's Lagoon Special Management Area;
- e) Zone IV: Blackbird Caye Conservation Zone;
- f) Zone V: Long Bogue Conservation Zone;
- g) Zone VI: Caye Bokel Conservation Area;
- h) Zone VII: Preservation Zone; and
- i) Zone VIII: General Use Zone.

The following activities are regulated or not permitted within the management zones except with the authorization of the Fisheries Administrator:

Table 2: Management Zones of TAMR

Management Zones	Regulated or Prohibited Fishing Activities	Section of Regulation
Zone I: Maugre Caye Conservation Zone	Extractive fishing	Section 7
	Spears fishing	Section 10
Zone IIA: Dog Flea Conservation Zone	Extractive fishing	Section 7
	Spears fishing	Section 10
Zone IIB: Cockroach - Grassy Caye Special Management Area	Extractive fishing for conch	Section 8
	Spears fishing	Section 10
Zone III: Vincent's Lagoon Special Management Area	Only traditional users shall engage in extractive fishing	Section 9(1)
	Spears fishing	Section 10
Zone IV: Blackbird Caye Conservation Zone	Extractive fishing	Section 7
	Spears fishing	Section 10
Zone V: Long Bogue Conservation Zone	Extractive fishing	Section 7
	Spears fishing	Section 10
Zone VI: Caye Bokel Conservation Area	Extractive fishing	
	Spears fishing	Section 10
Zone VII: Preservation Zone	Spears fishing	Section 10
	Extractive fishing, sport fishing, snorkelling, diving or any other water activity	Section 11(1)
	Motorized boat (except in cases of emergency)	Section 11(2)
Zone VIII: General Use Zone	The use of beach traps, fish traps are permitted in the General Use Zone only with special permission.	Section 6(2)
	Seine Nets or Gill Nets permitted only for scientific research with special permission.	





The Turneffe Atoll Marine Reserve Regulations also include regulations for the following activities in the reserve: a) Use of long lines, seine nets or gill nets in the reserve; b) engaging in commercial fishing, sport fishing or recreational fishing within the reserve; c) casting or dragging an anchor; d) engaging in water-skiing or jet-skiing; and e) using beach traps or fish traps.

THE FISHERIES (TURNEFFE ATOLL MARINE RESERVE) REGULATIONS

The Turneffe Atoll Marine Reserve Statutory Instrument No. 111 of 2012, is the main legal instrument that regulates activities and provides further development guidelines within the TAMR. The following “prohibitions within the reserve” are stipulated in Statutory Instrument No. 111 of 2012.

Section 6(3):

A person shall not engage in any activity which may cause negative environmental impact on species, habitats or ecosystems without written approval from the Fisheries Administrator.

Section 25:

A person shall not --

- (a) remove from its place or disturb any species of flora or fauna, including rocks, dead corals, shells or sand unless authorized to do so in accordance with these Regulations;
- (b) have in his possession any flora or fauna, unless authorized to do so in accordance with these Regulations;
- (c) discharge or deposit any toxic material, garbage or litter in the reserve;
- (d) mark or tamper with any sign, buoy or notice which is installed within the reserve.

Section 27:

A person who contravenes these Regulations commits an offence and is liable on summary conviction to the penalty specified in section 15 of the Fisheries Act.





National Development Plans

In addition to specific environmental regulations and development guidelines, national master plans provide a higher-level vision for the management and use of Belize’s natural resources. Three relevant master plans are the Growth and Sustainable Development Strategy (GSDS), the National Sustainable Tourism Master Plan (NSTMP) and the National Biodiversity Strategy and Action Plan (NBSAP). These are discussed in more detail below.

GROWTH AND SUSTAINABLE DEVELOPMENT STRATEGY

The Growth and Sustainable Development Strategy (GSDS) 2016-2019 is Belize’s primary development planning document, providing detailed guidance on priorities and on specific actions to be taken, including actions that contribute to longer term development objectives beyond 2019. The GSDS encompasses issues covered by previous medium-term economic

development plans; and it also incorporates, for the first time, both poverty reduction and long-term sustainable development issues. It builds on previous documents including the Horizon 2030: National Development Framework for Belize 2010-2030.

“ THE GSDS ALSO RECOGNIZES THAT TOURISM IS COMPLETELY DEPENDENT FOR ITS SUSTAINABILITY ON CARE OF THE ENVIRONMENT AND THE INTEGRITY OF BELIZE’S ECOSYSTEMS ”

The GSDS notes that the development of the tourism industry will be guided by the National Sustainable Tourism Master Plan 2030 (NSTMP). A key action proposed by the GSDS is as follows:

“Action 33: Foster inclusive growth in the

development of the tourism industry.”

The GSDS states: “In pursuing tourism development, special care will be taken to ensure that the sector pursues an inclusive growth pathway. ... Efforts will be made to attract investors in hotel plants where the “all inclusive” hotel model will not be pursued, to spread the economic benefits of tourism more broadly to surrounding communities.” ”.

Under the section on protected areas, the GSDS lists the following special issues and implementation priorities to be addressed during the planning period:

- a) Strengthening enforcement to reduce haphazard and unplanned coastal development; and
- b) Highlighting the social and economic benefits of protected areas and integrating consideration of these benefits — as well as valuations (as available and appropriate) — into national development planning decisions.

Under the section on marine and aquatic resources, the GSDS proposes the following action:

⁵Growth and Sustainable Development Strategy (2016-2019), Ministry of Economic Development, GOB





“Action 11: Implement the Integrated Coastal Zone Management Plan (ICZMP), including the development of a marine spatial plan.”

The GSDS cites the Coastal Zone Management Authority and Institute (CZMAI) to lead a multi-stakeholder process to harmonize implementation of the recently approved ICZMP with other plans, including the Sustainable Tourism Master Plan and land-based planning documents, leading to the development of a Marine Spatial Plan for Belize.

NATIONAL SUSTAINABLE TOURISM MASTER PLAN

As part of the development of the National Sustainable Tourism Master Plan (NSTMP), an environmental assessment of each district was undertaken to identify measures for safeguarding of natural assets of Belize. Relevant gaps at the district level were identified. Although the Atolls were not specifically assessed, several coastal areas such as Belize City, Placencia and Punta Gorda, as well as the northern islands (Ambergris Caye and Caye Caulker), were included in the assessment and comments related to them are pertinent to the Atolls.

- a) The improper disposal of solid waste can have negative impacts to the surrounding Caribbean Sea and the recreational waters of [Turneffe Atoll]. Many substances in common domestic waste have the potential to negatively affect the environment because of their chemical properties.
- b) Dredging on the windward coast is supposedly severely restricted because of the potential impacts this activity could have on the reef system, but it continues to be a huge problem. The wave action caused by the increased depth of shoreline water due to illegal dredging can severely erode the nearby coastline especially during tropical storms and hurricanes.
- c) Beach erosion, although a natural phenomenon, has accelerated in recent times and is attributable to numerous causes —mainly those of man’s activities in various forms such as the clearance of mangroves, the reclamation of land from the sea, seawalls, the construction of piers, and the dredging of sand offshore, all of which affect the littoral drift and the consequent shift and deposition of sand.
- d) Despite the significant importance that mangroves have on the environment, they are rapidly being cleared to make way for new mega-developments. Sea walls are often put up in their absence, to prevent erosion, but with little effect.
- e) A UNESCO report raised special concern on several sites within the Belize Barrier Reef System World Heritage Site stating that some of these sites are “poorly protected and that there is no clear recognition and understanding of the management implications”. The Belize World Heritage Site (WHS) has been placed on the list of World Heritage in Danger.
- f) Coastal development is not presently guided by any zoning plan or master plan.
- g) Waste water discharge and the potential for pollution of the recreational waters is a major issue to be considered as part of the future development of the area.
- h) Beach erosion because of coastal structures and developments is always a major issue to consider.
- i) Another area of concern has been the mass visitation of cruise ship tourists to reefs, protected areas and other sites perhaps surpassing the carrying capacities of several of these sites. A study conducted by the Instituto Centroamericano de Administración de Empresas (INCAE) provides indications of environmental damage by cruise tourism,

⁶Ibid



especially to the marine areas visited.

- j) Offshore oil exploration is another area of concern focused on the devastating impacts an oil spill could have on Belize's very sensitive marine ecosystem, as well as its tourism and fishing industries.⁷

The NSTMP project also conducted a SWOT analysis as part of a Diagnostic of the Tourism Sector in Belize. The main conclusions obtained from this diagnostic are summarized as follows:

*Belize as a tourism destination has a wide range of strengths that should be promoted in terms of tourism development. Its tourism attractiveness has its foundation on biodiversity, an ecotourism ethic, and cultural sites. However, sustainable practices should be integrated into all tourism operations to avoid environmental damage of the natural and cultural sites of Belize. The country also faces many weaknesses highlighting lack of basic service provision and infrastructure, technical skills and quality of tourism facilities, a low promotion of the destination in potentially lucrative markets, lack of tourism product services and other socio-economic constraints that should be minimized.*⁸

The NSTMP identified the following constraints for sustainable tourism development as well as potential negative impacts that may be applicable to the Turneffe Atoll:

Constraints for sustainable tourism development (NSTMP):⁹

- Lack of asset management, mainly due to lack of awareness, knowledge and financial issues. Results in:
 - ❖ Over-visitation of sites;
 - ❖ Serious environmental and social negative impacts;
 - ❖ Decrease of destination image: from eco-tourism or cultural sites to mass tourism;
 - ❖ Risk of serious deterioration, due to lack of diversification of product offering (marine assets, nature assets);
 - ❖ Damage of marine habitat due to larger vessels, especially at anchor.
- Insufficient waste disposal, resulting in:
 - ❖ Mosquito infestation;
 - ❖ Malaria and dengue infection risk.
- Insufficient sewage systems, result in:
 - ❖ Water contamination;
 - ❖ Diseases due to water contamination;
 - ❖ Negative image of the country's development.
- Lack of land planning and regulation, resulting in:
 - ❖ Haphazard and inadequate urban development;
 - ❖ Incompatible development of commercial, industrial and residential activities;
 - ❖ Environmental concerns;
 - ❖ Degradation of the landscape;

⁷National Sustainable Tourism Master Plan for Belize 2030, BTB and MTCA (June 2011).

⁸Ibid

⁹Ibid





- ❖ Beach erosion and navigational safety hazards due to coasts clustered with piers and jetties;
- ❖ Uncomfortable feeling for residents and visitors.
- Lack of public awareness programmes, resulting in:
 - ❖ Degradation of beaches and the natural environment, due to poor promotion of ecotourism and sustainability issues;
 - ❖ Inappropriate usage of natural resources, such as the reef, national parks and rainforests.

As part of a strategy to enhance sustainability of tourism, the NSTMP lays out a destinations development strategy for a set of seven tourism destinations. These seven destinations include the following: 1) Northern Belize, 2) Northern Islands, 3) Central Coast Belize, 4) Western Belize, 5) South Eastern Coast Belize, 6) Southern Belize and, 7) Belize Reef. Turneffe Atoll falls within the Belize Reef tourism destination.

To achieve sustainability, the NSTMP lays out three strategies as follows:

- a) Design and develop a wide set of cluster programs to develop products structured as national clusters, being very cautious to avoid any negative environmental and social impact.
- b) Focused and controlled development, facilitating control of the positive and negative impacts as well as managing development properly. The NSTMP states that the strategic model for tourism in Belize should be focused on “a mid-level growth in terms of over-nights – low in rural or sensitive sites – and low in terms of density, except in certain areas allowing higher densities.”
- c) Due to the constrained economic resources Belize has for tourism development, it is required to set priorities for investment and define a clear phased program. This will also improve benefits from tourism allowing the projects to be completed, and their results achieved, before new investments are starting in other programs or sites.¹⁰

An analysis of the importance and implementation ease of Belize’s product portfolio characterizes the Belize Reef tourism destination as third priority for development – low priority in urgency and ease of implementation, and low priority in importance of implementation. In other words, Belize Reef’s development is not regarded to be urgent or important for the general development of the Belize tourism product.

According to the NSTMP, “this rating was especially a result of [the Belize Reef’s] low potential to generate overnights, the low level of projects planned, its lack of management capacity, its current development level within the destination and their poor connectivity to other tourism destinations. However, this does not mean that Belize Reef should be left out, as its investment and development is required to diversify and complete Belize’s tourism destination portfolio.”¹¹

The NSTMP’s National Destination Physical Plan defines the following as the destination development objective for the Belize Reef:

Conservation is key, and development completely subservient in quality and extent. The main objective is to limit growth, only allowing it for necessary improvements to existing homes, resorts, lodges and

¹⁰National Sustainable Tourism Master Plan for Belize 2030, BTB and MTCA (June 2011).

¹¹Ibid





other facilities. Preservation of the Barrier Reef and all other marine habitats should be the primary concern when assessing any alterations to these.¹²

The **Model of Development** for the Belize Reef is stated to be: “Only allow improvements and small enlargements for existing tourism facilities to complete maximum growth allocated of 37 new hotel rooms. The proposed strategy for conservation is to establish and promote a day visitation formula.”¹³

“ FROM 2025 UNTIL 2030, BELIZE REEF COULD DEVELOP 37 NEW ACCOMMODATION ROOMS IN LOW DENSITY FACILITIES. ”

The **Accommodation Growth Model** is as follows: “From 2012 to 2020, Belize Reef should not develop any additional hotel accommodation rooms. Existing facilities should be encouraged to restructure their offerings for day visitor activities. New development should not be promoted, as they would eventually become detrimental to the occupancy rates and the existing accommodation businesses. From 2025 until 2030, Belize Reef could develop 37 new accommodation rooms in low density facilities. New investments are recommended to be made in facilities devoted to

nautical, sun & beach and nature-based activities.”

To summarize, the Belize Reef was identified by the NSTMP to “remain as long as possible a natural and generally untouched destination, which will mostly develop water-based day visitor attractions and enhance its nautical tourism product. Only at a later stage, Belize Reef [should] start developing its low-density sun & beach tourism product”.¹⁴

NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN

The National Biodiversity Strategy and Action Plan 2016-2020 (NBSAP) is another key planning document that is relevant to the TAMR. The NBSAP presents the following vision for biodiversity in Belize: “Belize’s natural environment is valued, enhanced and enjoyed by all, and contributes to improving the quality of life of its people.”¹⁵

The NBSAP is a five-year plan set within a fifteen-year framework (aligning with the Horizon 2030 national development framework), and is designed to achieve this national Vision, through five thematic areas: mainstreaming, reducing pressures, protection, benefits, and implementation. The NBSAP identifies coastal forests (littoral forests) and beach vegetation (tropical coastal vegetation on very recent, moderately drained sediments) as highly vulnerable, lying in areas targeted for coastal tourism development. Even with the declaration of the TAMR, protection of littoral forest is still under the 10% national target. The NBSAP states that “these ecosystems will be further stressed in the future with the predicted short-term increase in coastal development and long-term rise in sea level”.¹⁶

¹²National Sustainable Tourism Master Plan for Belize 2030, BTB and MTCA (June 2011).

¹³ibid

¹⁴ibid

¹⁵National Biodiversity Strategy and Action Plan, Belize. Ministry of Agriculture, Forestry, Fisheries, the Environment and Sustainable Development, Belmopan, Belize, 2016

¹⁶ibid





THE DAMAGE





Development Activities within Turneffe Atoll

Several developments at Turneffe have avoided Belize's Environmental Impact Assessment (EIA) requirements as well as the Turneffe Atoll Marine Reserve Regulations, the Integrated Coastal Zone Management Plan, National Master Plans and broad-based recommendations for development at Turneffe. These include a large resort development on Ropewalk Caye, land clearing and excavation in the Northern Bogue area and development activities along the northeast side of Turneffe Atoll.

BELIZE DIVE HAVEN RESORT AND MARINA

Belize Dive Haven is a mega-development project being constructed by a Canadian businessman, on Ropewalk Caye¹⁷. According to a promotional video for the development, the resort is a "unique world class diving hub with great proximity to the longest living reef and the Blue Hole¹⁸." The Belize Dive Haven's Environmental Compliance Plan, which has drafted several years after this project was initiated, states that this tourism development is on a 47-acre parcel of land on Ropewalk Caye and consists of the following¹⁹:

- a) One main building comprised of 90 regular rooms, 7 penthouse suites and a service support facility;
- b) One (1) 200 feet long by 40 feet wide swimming pool with a restaurant;
- c) One (1) 260 feet long by 40 feet wide swimming pool;
- d) An access canal measuring 1,800 feet long by 150 feet wide by 6 feet deep that goes from the inner lagoon to near the center of the property. This includes a mooring lagoon at the center of the property with finger piers for small boats;
- e) One (1) 200 feet long by 12 feet wide main pier on the windward side near the center of the property;
- f) One (1) 100 feet long by 8 feet wide service pier on the southern end of the windward side of the property;
- g) A 490,000 gallons capacity fresh water catchment measuring 160 feet by 58 feet by 6 feet under the main building; and
- h) A tertiary level sewage treatment plant.²⁰

A technical site visit on January 12, 2017, confirmed that all the development components listed above are now in place, as are several other components not on that list.

The ECP lists several generic "potential sources of environmental impact during development of the project" and it recommends several measures for the developer to undertake to mitigate the potential negative impacts associated with the development.²¹ While compliance with these measures was not evaluated during the January 2017 site visit, the following environmental impacts were observed:

¹⁷<http://www.responsibletravel.org/home/documents/Turneffe%20Atoll%20Report%20Master%20January%202013%20%20FINAL.pdf>

¹⁸<https://www.youtube.com/watch?v=VR9kXcr-b7w>

¹⁹The Belize Dive Haven property was expanded to 240 acres on Ropewalk Caye.

²⁰BDHRM Environmental Compliance Plan, DOE (August 2014).

²¹BDHRM Environmental Compliance Plan, DOE (August 2014).





- a) Large-scale dredging of the back-reef flat on the seaward side of the property. The dredged material was used to fill mangrove and littoral forest to create land. This has caused irreversible damage to prime habitat for conch, lobster, bonefish, permit, tarpon, and other species. It has also damaged the reef in front of the dredged area.
- b) Brine from two desalinization plants that has the capacity to produce up to 20,000 gallons of fresh water per unit per day is being dumped unto a marshy area on the lagoon side the property. This is contaminating the soil in this area and possibly the wider marine and reef ecosystem.
- c) With additional property being purchased, the size of the property has reportedly been increased to approximately 240 acres;
- d) Further vegetation has been cleared for a 2,300-foot-long landing strip to accommodate Caravan-type passenger planes.

Figure 2: Open Discharge of Brine at Belize Dive Haven



NORTHERN BOGUE AREA

The Smith family own approximately 25 acres of land of which approximately 5 acres of mangroves have been deforested; and, an access channel and harbor have been dug to the middle of the cleared area. There is evidence of sea grass mortality directly in front of this property, quite probably due to high levels of nutrients from rotting detritus emanating from the property. Significant shoreline erosion was also observed.

According to an affidavit signed by the Chief Environmental Officer, the Department of Environment (DOE) received an application from the Smith's for a non-commercial "private family retreat." According to the Smith family, this development was to consist of the following:

- a) A 350 feet long x 50 feet wide x 12 feet deep access channel through the center of the property leading to a safe harbor of approximately 50 feet x 100 ft. x 12 feet deep for personal "watercraft";
- b) One (1) wooden and concrete structure containing a kitchen, dining and living area, and a maximum of 6-bedroom units;
- c) One (1) wooden and concrete watchman quarters and storage building;
- d) An organic garden with a chicken coop;





e) Use of a reverse osmosis water system, backup power generator, wastewater treatment facility, etc.

The DOE granted Environmental Clearance to the Smith development on July, 29, 2015. The Environmental Clearance Plan (ECP) issued at that time indicated; “if the terms were not complied with that DOE was vested with the power to stop the project.” The DOE issued a stop order halting this project on February, 12, 2016. On March, 16, 2016, the DOE mandated that an Environmental Impact Assessment was required for this development to proceed and that the project could not proceed “without the procedures for an EIA being properly followed and carried out.” A lawsuit related to this development was settled in 2017 with the court declaring the Environmental Compliance Plan for this project “Null and Void”.

The Smith project lies within the Turneffe Atoll Marine Reserve (TAMR) General Use Zone. It is worthwhile noting that Statutory Instrument 111 of 2012, which established the Turneffe Atoll Marine Reserve, is the primary legal instrument regulating activities within the TAMR. The Smith project appears to have contravened Clauses 6(3) and 25 of these Regulations (see Section 4.3.3), which state (only relevant sub-clauses listed):

Section 6(3):

A person shall not engage in any activity which may cause negative environmental impact on species, habitats or ecosystems without written approval from the Fisheries Administrator.²²

Section 25:

A person shall not --

- (a) remove from its place or disturb any species of flora or fauna, including rocks, dead corals, shells or sand unless authorized to do so in accordance with these Regulations;
- (c) discharge or deposit any toxic material, garbage or litter in the reserve;

OTHER DEVELOPMENT ACTIVITIES

Tropical littoral forest is Belize’s most threatened ecosystem and this was highlighted under Belize’s National Protected Areas System Plan as being significantly under-represented within the current protected area system. Only 8.6% of the national coverage is under protection, as compared with the national target of 60% for this ecosystem. In 2004, this ecosystem was determined to cover approximately 230 hectares on Turneffe Atoll²³ with much of this being herbaceous beach communities and shrubs, rather than the taller littoral forest.

The Turneffe Atoll Marine Reserve Management Plan states that “much of the littoral forest was historically cleared for coconut plantations, and has more recently been superseded by tourism developments. The higher sandy ridges that support littoral forest are some of the most valuable real estate in Belize. Indeed, much of the area identified as littoral forest in 1990 (Murray et al., 1990) can now be identified primarily by the presence of cleared lands for tourism development—Cockroach Bay, Blackbird Caye, Calabash Caye and Ropewalk Caye.

²²The developers did receive written approval from the Fisheries Administrator but contravened the requirements to maintain a fringing area of mangroves along the shore.

²³(Meerman, 2004).





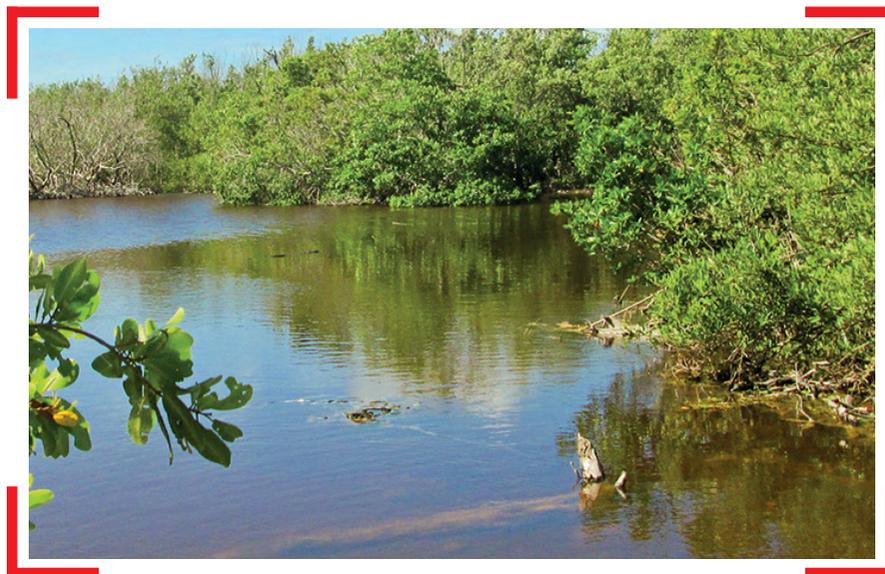
Nationally, Turneffe is considered a critical area for the American crocodile (*Crocodylus acutus*)²⁴. Turneffe Atoll has the largest population of this crocodile in Belize, with an estimated 200-300 non-hatchlings (juveniles/sub-adults) and 15-25 breeding females inhabiting the Atoll²⁵. The existence of large, low-salinity nursery lagoons, elevated beach ridges for nesting and extensive cover protecting hatchlings and adults provides near optimal conditions for this increasingly rare species.

In 2006, Meerman reported that mangroves had been cleared in Cockroach Bay on Northern Caye, where the beach and littoral forest is now exposed. The largest area cleared was on two parcels of land that were acquired shortly prior to that time. According to information from the Forest Department, a Mangrove Clearing Permit was not requested nor issued for this clearing. Further ground-truthing reveals that much of the littoral forest on this site has also been cleared. Similar mangrove deforestation is also noted on a number of locations on Blackbird Caye.

Nesting of American Crocodiles has only been confirmed from the eastern shores of Turneffe. The key sites being Cockroach Bay, Northern Blackbird Caye, Southern Blackbird Caye and Bull Caye. Historical nesting records exist from Northern Blackbird (central lagoon shore) and Deadman's Caye. By far the most important location for American Crocodile nesting is Cockroach Bay. On average 65% of all the reported nests on Turneffe were found there.

In recognition of the national importance of some of the nesting beaches and nursery areas at Turneffe Atoll, and the developmental pressures threatening their existence, the Forest Department declared a portion of Cockroach Bay on Northern Caye a Crocodile Reserve in November 2005 (Figure 43; Belize Gazette, 2005). The declaration of this reserve, however, does not mean that the crocodiles at Cockroach Bay are now fully protected.

Figure 3: Crocodile Reserve Threatened by Mangrove Clearings



²⁴(Vulnerable - IUCN, 2011).

²⁵(Platt, et al., 2004)





A land registration search conducted in 2006 revealed that essentially all the Cockroach Bay shoreline has been surveyed with leases issued for these properties. In total of 9 parcels of land were traced by Meerman (2006)²⁶, and two of these have now been recalled and declared the public/crocodile reserve. With the property map superimposed on the ecosystems map and the known crocodile nests, it is immediately clear that:

- The critical lagoon is not entirely covered by the Public/Crocodile Reserve;
- The new reserve does not incorporate all the recorded nesting locations;
- There are still 7 properties directly adjacent or within the immediate proximity of the areas critical to the crocodiles;
- There are still 7 properties which can be expected to be developed in ways incompatible with the continued existence of the crocodiles; and
- All but one of these properties appear to currently be offered for sale on the international market.

²⁶(Meerman (2006))





Conflicts with Development and Management Guidelines for the Atoll

The tourism industry at Turneffe, according to the Integrated Coastal Zone Management Plan (ICZMP) development guidelines, should be directed towards “low-impact, environmentally sensitive tourism while cautiously avoiding destructive practices which would compromise the source of the atoll’s attraction as a tourism destination²⁷.”

While the tourism industry generates much needed economic development, this industry has often been associated with environmental damage including reef damage, dredging, large-scale clearing and litter. It is also notable that tourism can generate speculative, and not always well-informed, development.

Consequently, the Integrated Coastal Zone Management Plan (ICZMP) development guidelines recognize the need to limit tourism growth, allowing for only necessary improvements and small enlargements for existing homes, resorts, lodges and other tourism facilities on the Atoll. Preservation of the reefs, marine habitats and ecosystems, these guidelines states, is to be the primary concern when assessing the need to make improvements to existing facilities.

Figure 4: Belize Dive Haven - A 97-Room Resort at Turneffe



The table below provides a detailed review of specific ICZMP guidelines and whether they have been breached by the unmanaged developments taking place at Turneffe Atoll.

²⁷Turneffe Atoll Management Guidelines, CZMAI, 2013. pg. 33





Table 3: Development Conflicts with TAMR Development Guidelines

Guidelines	Impacts Observed
Promote low-impact, environmentally-sensitive, nature-based tourism with care to avoid practices that destroy Turneffe Atoll’s sensitive and valuable habitats;	A 96-room resort at Ropewalk Caye utilizing extensive dredging and deforestation of mangroves cannot be considered low-impact or environmentally-sensitive.
Avoid high-impact, environmentally-destructive tourism development;	Evidence of high impact and environmentally destructive tourism development has been observed in several areas around the atoll.
All tourism facilities should meet Belize Tourism Board’s (BTB) minimum standards, including disaster preparedness and evacuation plans; and meet the “Tourism and Recreation Best Practices Guidelines for Coastal Areas in Belize” produced by Coastal Zone Management Authority and Institute (CZMAI).	Standards being applied at Belize Dive Haven on Ropewalk Caye unknown.
Height of buildings permitted on the islands can only go up to twenty-eight (28) feet or two floors only.	The Belize Dive Haven Resort is four to five stories high and far exceeds the 28 feet guidelines.
The protection of Turneffe’s environment, particularly the reef, back-reef flats and seagrass beds, is essential to the survival of its two major economic sectors - commercial fishing and tourism.	Belize Dive Haven Resort has done extensive dredging of the back-reef flats and the central lagoon. Seagrass loss is evident in Northern Bogue near the Smith property due to the clearing of mangroves.
Limit significant man-made stresses from activities such as dredging.	Extensive dredging on a pristine back-reef flat was done at the Belize Dive Haven Resort and canals have been dredged at both Belize Dive Haven Resort and the Smith property in Northern Bogue.
No dredging, sand mining, or land filling, except for limited hand dredging around docks, should be allowed at Turneffe without, 1) a comprehensive Environmental Impact Assessment to include a vetting process involving relevant stakeholders, and 2) compliance with the guidelines.	Extensive mechanical dredging, well beyond “limited hand dredging around docks”, has been done in at least three locations at Turneffe Atoll without an Environmental Impact Assessment (EIA) and in contravention of these guidelines.
Land without feasible access should not be developed and only minimal manual dredging for boat access should be allowed.	Dredging for the purpose of access has been carried out on Ropewalk Caye and in the Northern Bogue area.
Clearing of vegetation should be kept to a minimum and valuable littoral forest should be identified with GPS coordinates, clearly mapped and zoned for protection.	Mangroves have been clear cut in several areas around Turneffe Atoll including the Ropewalk development, the Smith project and in Crocodile Bay near the Crocodile Lagoon.
Preservation of seagrass beds should be a priority in all management decisions at Turneffe Atoll.	Damage to seagrass beds related to development is observed in several locations at Turneffe Atoll.
Due to the economic and ecological importance or Turneffe’s fringe reef, patch reef and back-reef flats, management of Turneffe Atoll should ensure that the integrity and health of these areas is carefully protected.	Extensive damage to the back-reef flats at Ropewalk Caye has resulted from dredging for the Belize Dive Haven Hotel on Ropewalk Caye. Detrimental effects to the coral reef have also been noted due this dredging.





Tourism and residential developments should be required to provide detailed plans about how they will provide adequate fresh water which will not degrade natural fresh water resources used by wildlife.	Most resorts on Turneffe Atoll use a combination of rainwater harvesting and desalination. Due to its size, the Belize Dive Haven Resort will have a significant rate of water consumption for these methods.
Rainwater collection, recycling of gray water, and other water preservation methods, should be utilized as much as possible.	Most resorts on Turneffe Atoll use rainwater collection as a matter of necessity, including Belize Dive Haven Resort. To our knowledge, gray water recycling is currently only being done at one resort.
Maximal use of solar and wind power is recommended, yet it is recognized that some fuel based power will be necessary.	Belize Dive Haven Resort will depend on two large diesel generators for power and there do not appear to be plans for using solar and wind power. This is also true for other resorts at Turneffe although Turneffe Flats has applied for a development concession for a solar energy project.
Power requirements should be minimized to the extent possible using power-saving measures and other efficiencies.	Power conservation measures at Belize Dive Haven Resort are unknown. Other resorts have instituted several power-saving measures.
Fuel related contaminants must be disposed of responsibly and all tourism and residential development proposals should include responsible plans for these processes.	Plans for disposal of fuel related contaminants at Belize Dive Haven Resort are unknown.
Underground septic tanks and soak-aways are not recommended as a means of handling liquid wastes.	Belize Dive Haven Resort is not planning to use underground septic tanks and soak-aways.
The use of above-ground septic tanks with drain fields in several of the development sites recommended.	Belize Dive Haven Resort has an above-ground septic processing system with injection wells planned for the effluent.
The CZMAI recommends that developers must consult with the Central Building Authority on standards for the construction of above-ground septic tanks with drain fields.	Consultation of the CBA by Belize Dive Haven Resort is unknown.
For tourism and residential developments, solid waste from toilets should be treated by means of an earth tub or similar type technology with the resulting compost used in landscaping. Open septic tanks should not be permitted for tourism or residential facilities and closed septic tank/drain-field systems should be permitted only with pre-approval from the Department of the Environment and Central Building Authority.	The degree of compliance with DOE and CBA standards for resorts on Turneffe is unknown.
Gray water should be recycled and reused as much as possible.	Gray water recycling is currently being done at one resort.
Food waste from tourism and residential properties should be composted and used on-site as fertilizer.	The full extent of compliance with this guideline by all established resorts is unknown. Food waste management plans at Belize Dive Haven Resort unknown.





<p>All hazardous waste, including batteries, tires, propellant cans and petroleum-based products, should be properly stored to avoid contamination and transported to the mainland for final disposal.</p>	<p>The full extent of compliance with this guideline by established resorts is unknown. Plan for disposal of hazardous waste at Belize Dive Haven Resort is unknown.</p>
<p>Metal containers should be used for incinerating burnable inorganic waste, although such incineration should be done in a manner that is not a nuisance to neighbors. Large-scale resorts (yet to be defined) should be required to utilize incinerators for these purposes.</p>	<p>The full extent of compliance with this guideline by established resorts is unknown. Plan for disposal of inorganic waste at Belize Dive Haven Resort is unknown.</p>
<p>There are no basic health care facilities on the atoll, and as such the guidelines stipulates that all residents should be prepared to provide at least basic medical care and resorts are encouraged to aid the wider community when needed.</p>	<p>The full extent of compliance with this guideline by established resorts is unknown. Plan for the basic provision of health services at Belize Dive Haven Resort is unknown.</p>





Conflicts with Existing Environmental Laws and Regulations

The Turneffe Atoll Marine Reserve (TAMR) Management Plan (2012-2017) recognizes that “the increasing development pressures [within the Atoll] may lead to conflicts between user rights and the need to balance development with the conservation of the natural resources in this unique and fragile environment.” It was therefore recommended that “the Atoll and surrounding deep waters be integrated into the conservation framework of the country as a marine protected area”.

The scale of the development at Belize Dive Haven Resort appears to conflict with the principal management purpose of the Turneffe Atoll Marine Reserve, which is to “balance development with the conservation of the natural resources in this unique and fragile environment”. Ropewalk Caye lies within the TAMR General Use Zone, and the Management Plan notes the “existence of high connectivity between reef, seagrass and mangrove and a number of fishing banks and nearby replenishment areas” which make the General Use Zone a valuable and fertile fishing grounds²⁸.

The Belize Dive Haven ECP notes that “environmental clearance does not absolve the need [for the Developer] to obtain required permits and approvals from other relevant agencies”. However, the following rules and regulations of the General Use Zone appear to have been contravened during the construction of the Belize Dive Haven project. These rules are:

- a) No clearing of mangroves shall be conducted without the approval of the Forest Department and the Management Board.
- b) No dredging shall be conducted without the approval of the Fisheries Department and the Management Board.
- c) All proposed tourism development must go through the EIA process, and be conducted following relevant guidelines and legislation, with adequate monitoring.²⁹

Most notably, an EIA was not carried out for this development, although the project clearly fits the definition of a Schedule I project under the Environment Protection Act. Under Section 20 of the Environment Protection Act which states that, “any project that may significantly affect the environment requires an EIA”.

Construction of the Dive Haven Resort began prior to establishment of the Turneffe Atoll Marine Reserve in November, 2012. An EIA was clearly required for this project because a full EIA is required for Schedule I projects³⁰, which are defined as projects likely to have significant adverse impacts that may be sensitive, irreversible and diverse. Schedule I projects often have one or more of the following attributes that make the potential impacts significant:

- a) coastal erosion and the disturbance of the barrier reef;
- b) large-scale physical disturbance of the site and/or surroundings;
- c) direct pollutant discharges that are large enough to cause degradation of air, wa-

²⁸TAMR Management Plan

²⁹The size and extent of the Belize Dive Haven project should have required an EIA, even though the project started well before 2012. After the marine reserve was established, all development at Turneffe requires an EIA by law.

³⁰Procedures Manual for the Preparation of an EIA in Belize, DOE (July 2011 version),



- ter, or soil;
- d) extraction, consumption or conversion of substantial amounts of forest and other natural resources;
- e) measurable modification of the hydrological cycle; and
- f) hazardous materials in more than incidental quantities.

Figure 5: Dredging of Back Reef Flats at Ropewalk Caye



Subsequent to declaration of the Turneffe Atoll Marine in November, 2012, all projects at Turneffe Atoll have required an Environmental Impact Assessment (EIA).

“ THE ECP WAS REPORTEDLY PREPARED TO “REGULARIZE” THE PROJECT BY THE DOE IN AUGUST 2014, ALTHOUGH CONSTRUCTION HAD BEEN GOING ON FOR ABOUT 9 YEARS PRIOR TO THIS DATE. ”

An ECP was reportedly done by the Department of Environment (DOE) in August 2014, to “regularize” the Dive Haven project, although project construction had been on-going for at least 9 years prior to that date.

While the Belize Fisheries Department approved dredging for the access canal that goes from the inner lagoon to near the center of the property, the Department did not give its approval for dredging of the back-reef flats in front of the property. The De-

partment informed the developer that anything other than what was on the ground at the time required an EIA. This is likely , why the Department did not approve any further dredging by the developer³¹.

³¹(pers. comm., Fisheries Administrator).





Our research indicates that the Forest Department granted only one mangrove clearance permit (in late 2015) for the runway/landing strip based related to “an amended ECP which was given by DOE”. This permit was issued several years after most of the mangrove clearing had already been done (in 2005 and 2006). No mangrove clearance permits have been granted for Ropewalk Caye since 2015.

In 2012, the Forest Department sought to charge the developer for illegal mangrove clearance; however, the Department did not proceed because they felt that the DOE should have instead charged the Developer with an offense and that the penalties related to the Environmental Protection Act were “more substantial”³². It appears, however, that no charges were brought by either the Forestry Department or Department of Environment.

The Belize Dive Haven project also appears to contravene Clauses 6(3) and 25 of the Fisheries (Turneffe Atoll Marine Reserve) Regulations (see Section 4.3.3), which state (only relevant sub-clauses listed)³³:

Section 6(3):

A person shall not engage in any activity which may cause negative environmental impact on species, habitats or ecosystems without written approval from the Fisheries Administrator.

Section 25:

A person shall not --

- (a) remove from its place or disturb any species of flora or fauna, including rocks, dead corals, shells or sand unless authorized to do so in accordance with these Regulations;
- (c) discharge or deposit any toxic material, garbage or litter in the reserve;

³²(pers. comm., Chief Forest Officer).

³³These contraventions would apply after 2012.



Conflicts with Existing Master Planning and other Development Plans

The construction of the Belize Dive Haven – a mega-scale tourism development compared to other resorts in Turneffe Atoll – started three years after the National Sustainable Tourism Master Plan (NSTMP) was approved. The development appears to breach many provisions for reef tourism destinations within this Master Plan, as summarized in table 4 below.

Table 4: Development Conflicts with NSTMP

NSTMP Guidelines for tourism development within the Belize Reef region	Development activities at Belize Dive Haven Resort (Ropewalk Caye)
Tourism development should avoid any negative environmental and social impacts.	Dredging of back-reef flats undertaken for land fill and deforestation of mangroves.
A mid-level growth in terms of overnights – low in sensitive sites – and low in terms of density.	With 90 regular rooms, 7 penthouse suites, two Olympic-sized pools and other support facilities, Belize Dive Haven is one of Belize’s largest hotels despite being in an ecologically-sensitive area.
Limit growth, only allowing it for necessary improvements to existing homes, resorts, lodges and other facilities.	Belize Dive Haven is a new facility, constructed three years after the NSTMP was developed.
Preservation of the Barrier Reef and all other marine habitats should be the primary concern when assessing any alterations to existing tourism investments.	Belize Dive Haven appears to have damaged a critical component of Turneffe Atoll’s reef system and destroyed prime conch, lobster, bonefish, permit and tarpon habitat.
Only allow improvements and small enlargements for existing tourism facilities to complete maximum growth allocated of 37 new hotel rooms.	Belize Dive Haven is a development consisting of 90+ rooms which is still under construction.
From 2012 to 2020, Belize Reef should not develop any additional hotel accommodation rooms.	Despite this guideline, construction of Belize Dive Haven started in 2004/2005, and continues to the present day.
From 2025 until 2030, Belize Reef could develop 37 new accommodation rooms in low density facilities. New investments are recommended to be made in facilities devoted to nautical, sun & beach and nature-based activities.	Construction of hotel facility at Belize Dive Haven has rendered this guideline irrelevant for the entire Belize Reef area.

The Belize Dive Haven project on Ropewalk Caye, the Smith’s development in the Northern Bogue area (which is under a stop-order as of the date of this publication), and activities in the Cockroach Bay area are also contrary to the recommendations of the Growth and Sustainable Development Strategy (GSDS) and the National Biodiversity Strategy and Action Plan (NBSAP), as outlined in table 5 below.



Table 5: Development Conflicts with National Plans

National Development Planning Guidelines for tourism development within TAMR	Actual development and impacts at Ropewalk Caye, Northern Bogue area, Cockroach Bay
Efforts will be made to attract investors in hotel plants where the “all inclusive” hotel model will not be pursued. (GSDS)	At 90 regular rooms, 7 penthouse suites, two Olympic-sized pools, plus other support facilities, Belize Dive Haven is a high-density, all-inclusive development in an ecologically-sensitive area.
Tourism is “completely dependent for [its] sustainability on care of the environment and the integrity of Belize’s ecosystems”. (GSDS)	<p>Belize Dive Haven appears to have damaged a critical component of the reef system of Turneffe Atoll through the dredging of a large area of back-reef flats for land fill.</p> <p>Vegetation clearance at the Smith’s property (Northern Bogue area) has destroyed approximately five acres of valuable mangrove forest.</p> <p>Mangrove deforestation has been carried out in the Cockroach Bay area.</p>
Reduce haphazard and unplanned coastal development. (GSDS)	The Belize Dive Haven development was done without an EIA and without clearly defined plans. An ECP was approved by the DOE several years after construction had been underway in an attempt to mitigate environmental impacts of this project. As has been noted, the Belize Dive Haven development is wholly inconsistent with the NSTMP guidelines for this area of Belize. This development is an example of the haphazard and unplanned coastal development which the GSDS recommends avoiding.
Coastal forests (littoral forests) and beach vegetation (tropical coastal vegetation on very recent, moderately drained sediments) are highly vulnerable and deserve protection to help meet the 10% national target for littoral forest protection.	Littoral forest and beach vegetation have been cleared at Ropewalk Caye, Northern Bogue, Cockroach Bay, Blackbird Caye, Calabash Caye, and other areas.



Affected Stakeholders of Turneffe Atoll

The impacts of unmanaged development extend beyond the natural environment to the people who depend on the goods and services of the Atoll. Turneffe Atoll stakeholders, in fact, depend directly upon a healthy marine environment including healthy reefs, seagrasses, mangroves and back-reef flats.

“ COMMERCIAL FISHERMEN WHO USE THE TURNEFFE ATOLL FREQUENTLY COME MAINLY FROM BELIZE CITY, SARTENEJA, CHUNOX AND COPPER BANK ”

The TAMR management plan identifies one principal stakeholder group as traditional fishermen whose livelihoods are based on the marine resources of the area, namely lobster, conch and finfish. Associated with these stakeholders are the fishing cooperatives who process and export products supplied by the fishermen. Commercial fishermen at Turneffe Atoll come mainly from Belize City, Sarteneja, Chunox and Copper Bank, and they produce a substantial amount of the marine products for Belize. Approximately two

hundred fishers regularly work at Turneffe and 950 are registered to fish there. Those based at approximately 25 fishing camps focus entirely on the Atoll. In addition, approximately 20 sailboats and several skiffs regularly fish the Atoll and are considered economically dependent on Turneffe’s resources. While there appears to be some production decline³⁴ from Turneffe, the fishery still provides employment and income for many fisherfolks especially for Belize’s northern communities and Belize City.

A second major stakeholder group affected by damage to the environment is tourism. This includes the eco-tourism resorts at Turneffe that employ approximately 100 individuals plus tourism operators from Belize City, San Pedro and as far away as Placencia who utilize Turneffe for scuba diving, snorkeling and sport fishing. Researchers, mainly from the University of Belize (UB), and the Oceanic Society (OS) are another group who are important stakeholders of the Atoll. They regularly host Belizean and international students for Turneffe-based field courses. Conservation organizations also participate in field research in the area. Research activities at Turneffe Atoll produce direct economic benefits.

The Belize Fisheries Department, which regulates spawning aggregation sites and fisheries activities at Turneffe, is also responsible for the Marine Reserve. The Belize Forest Department is responsible for enforcement of mangrove legislation and protection of wildlife, including the vulnerable West Indian manatee and the American crocodile. Both are important stakeholders at Turneffe.

The Department of the Environment is responsible for regulation of all development activities on the Atoll, including the implementation of the EIA process. The Geology and Petroleum Department is responsible for the regulation of dredging and oil exploration/ extraction activities. The Belize Tourism Board has an interest in the sustainable development of tourism on the Atoll. According to the TAMR Management Plan, six communities on the Belize mainland are identified as key stakeholders in the Atoll area through tourism and/or commercial fishing. While there is no population center established on the Atoll, there are three all-inclusive resorts operating either

³⁴Decline is based on sales to the processing Cooperatives. It could be that fishers are bypassing the Coops and selling directly to hotels, resorts and restaurants in greater numbers.





seasonally or throughout the year at Turneffe with employees originating from communities across Belize. Whilst not considering key stakeholders in the TAMR Management Plan, many communities do benefit from the presence of employment opportunities at Turneffe.

While the stakeholders of the Turneffe Atoll are varied and diverse, those affected the most by the degradation of the resources are tourism stakeholders including those directly employed in the industry and the fisher folks from coastal communities. According to an economic valuation study done for Turneffe Atoll³⁵, most of the diving at Turneffe originates from independent dive shops, dive shops operated by hotels or resorts outside of Turneffe, or from live aboard dive boats. A smaller percentage of diving activity is derived from the all-inclusive resorts at Turneffe. Sport fishing and eco-touring, on the other hand, mostly originates from the all-inclusive resorts on the atoll and relatively few traveling from off-atoll locations to fish or eco-tour. Tourists from cruise ships also utilize Turneffe Atoll for diving and snorkeling excursions.

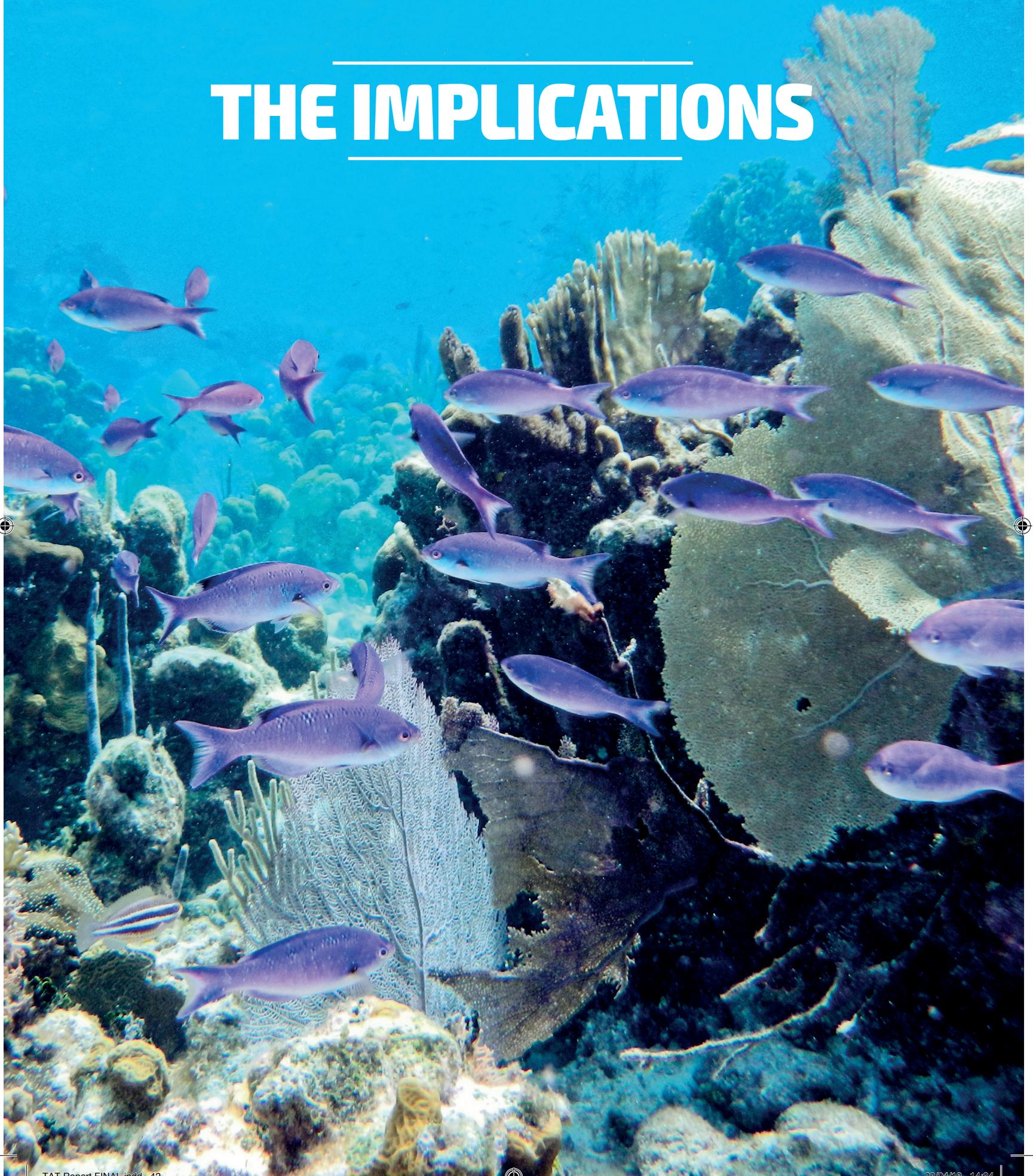


³⁵Fedler, A. J. and Hayes, C. 2011. Economic Value of Turneffe Atoll, Human Dimensions Consulting, Florida, USA.





THE IMPLICATIONS





Economic Feasibility of the Belize Dive Haven Project

This section presents a modeled financial analysis of the Belize Dive Haven Hotel and Marina Resort based on general estimates. As noted, this development has significant negative impacts for the environment of the Atoll and it appears to contradict the type of tourism development envisioned for Turneffe Atoll in the National Sustainable Tourism Master Plan. In addition to potentially being environmentally unsustainable, the Belize Dive Haven Resort and Hotel may not be financially viable given its scale and the substantial constraints related to its remote location.

The case presented here is based on the components and features of the development obtained from the official Environmental Compliance Plan (ECP) prepared by the Department of Environment, first-hand observations during a site visit to the project and the application of generally-accepted financial principles. The ECP lists the main components of the project which were used to estimate costs based on local market prices. We do not have the specific details of the development, and, as such, this analysis is based upon standard construction and tourism industry standards rather than the actual costs of the development.

Cost estimates are split into fixed costs and variable costs of operations. Fixed costs include the cost of construction³⁶, start-up, equipment, insurance, property taxes and wages and salaries. Variable costs, on the other hand, include administrative, operating, maintenance, transportation, food and beverage.

The totals cost of construction is based on standardized building costs for the physical footprint of the building at 108,000 square feet and its various features based on the information provided

COSTS		
FIXED		NOTES
CONSTRUCTION	\$19,896,250	Current quantity costs based on project features
START-UP	\$500,000	Lump sum estimate
EQUIPMENT	\$300,000	Replace every 5 years
INSURANCE	\$100,000	Lump sum estimate
PROPERTY TAXES	\$2,350	Based on GOB annual valuation
WAGES & SALARIES	\$1,480,390	Based on average employee salary of similar resorts in the areas per year
VARIABLE		
ADMINISTRATIVE	\$25	Per guest
OPERATING	\$3,465,000	Annual
MAINTENANCE	\$1,015,688	Annual
TRANSPORTATION	\$100	Per guest
FOOD & BEVERAGE	\$25	Per guest

³⁶Construction estimates were provided by a local engineer.





in the project's ECP. Start-up and equipment costs are estimated based on the demand of the type of facility and the services it intends to provide in a remote location. The replacement of equipment is estimated to occur every five years. Meanwhile, wages and salaries are estimated using employee to guest ratios from Belize Tourism Board (BTB) 2015 figures multiplied by the average salary per employee of a comparable resort in the area. Insurance cost is based on similar expenditures of resorts in the area and taxes are based on government real estate taxation formula of 1% of value of island property. Estimates of variable costs are based on similar facilities in the area, and the demands of the various features of the resort facility calculated per guest or per year as is appropriate.

Revenue estimates are based on the number of rooms at the resort (97), and a varying occupancy rate for three different time periods, Years 1 – 5, Years 6 – 11, Years 12 – 30 and increasing over time. The maximum occupancy rate is based on BTB 2015 figures for average room occupancy. Guest days per year is the estimate of days the rooms will be occupied from which revenue can be generated. This is calculated by multiplying the maximum occupancy by the occupancy rate for the entire year. This estimate was also done over the three phases and which increases over time.

The price per guest or guest charges is estimated based the average room rates from BTB's 2015 figures. A 15% price increase for each time-period was used as prices are generally expected to increase over time. The price per guest figure includes guided tour activities such as diving, fishing, eco-tours and lodging.

NUMBER OF GUESTS	
MAX OCCUPANCY	97
OCCUPANCY RATE	
YEARS 1 - 5	35%
YEARS 6 - 11	40%
YEARS 12 - 30	45%
GUEST DAYS/YEAR	
YEARS 1 - 5	12,392
YEARS 6 - 11	14,162
YEARS 12 - 30	15,932

REVENUES	
PRICE/GUEST DAY	
YEARS 1 - 5	\$400
YEARS 6 - 11	\$460
YEARS 12 - 30	\$529

Cash flow for the investment has been projected over a 30-year period with year 0 being the year the initial capital investment is made with a residual value at the end of the period at 10%. The total cost of the project construction is estimated to be \$19,896,250. The cash flow analysis assumes that operations begin in year 1 after construction which is when operating costs are accrued³⁷. Based on the projected revenue and estimated costs over a 30-year period, the project shows both a negative net benefit and discounted net benefit until year 30 when the discounted net benefit is \$95,391.23, using a discount rate of 10%.

³⁷Construction at BDHRM has actually been going on over several years.



$$NPV = \frac{B_0 - C_0}{(1+i)^0} + \frac{B_1 - C_1}{(1+i)^1} + \dots + \frac{B_T - C_T}{(1+i)^T}$$

where: t = year, B = benefits, C = cost, i = discount rate.

The Net Present Value was calculated using the formula:

The Net Present Value, which is the sum of the discounted net benefits over the 30-year period as shown by the formula above, is negative (-) \$36,812,689.64. This represents a net loss for the project over the period of 30 years considered. Furthermore, the project has a negative rate of internal return at -13%. The Payback Period, which is the accumulation of present value for each year until the cost of initial investment is recovered remains unachieved over the 30-year period.

Considering the consistent negative cash flows, the developer will be unable to recover the initial investment making the project financially unfeasible within the estimated timeframe of 30 years.

“ THE NET PRESENT VALUE OF THE PROJECT IS (\$36,812,689.64) WHICH REPRESENTS A NET LOSS OVER A PERIOD OF 30 YEARS. ”

This is a conservative estimate as other features may be added before the facility becomes operational or there are almost-certainly additional features which we are unaware of. There may be further increase in costs such as additional building materials that must be transported from the mainland to the island with a barge which will likely increase costs significantly.

barge which will likely increase costs significantly.

The Belize Dive Haven Resort development is a major project that has been under construction for at least ten years and is yet to be completed. There is no published master plan for the development, and it is unclear when the project will be ready for business. From the outset, the project should have triggered an Environmental Impact Assessment, and based on the scale and location of the project in a sensitive marine protected area, the developer should have been required to submit a benefit/cost analysis for the project. Using generally accepted accounting and financial principles and conservative estimates, the project is not likely to be financially viable.



Economic Implications for the Future

Economic Value of Turneffe

The damage to Turneffe Atoll's reefs, back reef flats, mangroves, sea grasses and water quality puts in jeopardy significant economic benefits derived from a healthy and functioning ecosystem at Turneffe. Turneffe Atoll contributes considerably to the economy of Belize and this comes mainly from its recreational value and its commercial fishing value which both depend directly upon a healthy environment. World class scuba diving, sport fishing and the diverse wildlife at Turneffe Atoll draw tourists from around the world and this results in economic benefits for Belize totaling US\$36.9 million annually³⁸.

When considering **only direct expenditures** related to Turneffe Atoll's tourism activities, its commercial fishing benefits and its storm protection value, the annual economic contribution of Turneffe Atoll to Belize increases to US\$62.3 million³⁹. When considering the **overall annual economic contribution** of Turneffe Atoll to Belize including income and employment of fishers and taxes paid to the Government, this economic contribution exceeds US\$75.8 million⁴⁰.

“ THE OVERALL ANNUAL ECONOMIC CONTRIBUTION OF TURNEFFE ATOLL TO BELIZE EXCEEDS US\$75.8 MILLION. ”

Turneffe Atoll possesses about 14.7% of Belize's 116,136 acres of coral reefs and 11.7% of the 237,094 acres of the country's mangrove forests. Considering this, the value of Turneffe Atoll's annual storm protection value related to its coral reefs and mangroves totals US\$22.0 million and US\$16.2 million respectively⁴¹. Turneffe's mangrove forests are a valuable asset to Belize, particularly as it relates to the protection of Belize City.

The total economic impact of sport fishing for Bonefish, Permit and Tarpon in Belize in 2007 alone was estimated to be approximately \$56.5 million. Fishing activity associated with Bonefish, Permit and Tarpon generated slightly less than \$30 million in wages and salaries and supported 1,864 full-time equivalent jobs. Total taxes paid to the Government of Belize by independent fishing guides and fishing lodges amounts to approximately \$2.3 million during 2007⁴². These benefits have certainly increased since 2007.

Calculated at US\$587 per acre⁴³, the loss of 52 acres of mangroves on Turneffe (47 acres at Ropewalk Caye and 5 acres at Northern Bogue) represents a loss in value of \$61,048 annually. This, however, only captures the benefits of mangroves related to avoiding storm losses. It does not capture other essential benefits of mangroves such as providing habitat for birds, and nursery areas for juvenile fishes. The already declining commercial fishery will certainly be negatively affected by the loss of these habitats. As the value of coastal real estate increases, the value of coastal protection services provided by mangroves and coral reefs will increase correspondingly. Inversely, the loss of mangroves and coral reefs will become more costly to the Belizean economy with time.

³⁸Fedler, A. J. and Hayes, C. 2011. Economic Value of Turneffe Atoll, Human Dimensions Consulting, Florida, USA.

³⁹ibid.

⁴⁰Fedler, A. J. and Hayes, C. 2011. Economic Value of Turneffe Atoll, Human Dimensions Consulting, Florida, USA.

⁴¹Fedler A. J. and Hayes C, 2008. Economic Impact of Recreational Fishing for Bonefish, Permit and Tarpon in Belize for 2007. Human Dimensions Consulting, Florida, USA.

⁴²Fedler, A. J. and Hayes, C. 2011. Economic Value of Turneffe Atoll, Human Dimensions Consulting, Florida, USA.





CONCLUSION





Although there have been numerous efforts to promote the sustainable management of Turneffe Atoll over the past three decades, the atoll's unique and sensitive habitats have been adversely impacted by several developments in recent years.

Well-established guidelines have been ignored and several regulations have been contravened. In spite of the importance of Turneffe to Belize's tourism sector, development activities are taking place within the Marine Reserve that are incongruent with the spirit and letter of the National Sustainable Tourism Master Plan. By degrading the Atoll's natural resources, these activities place substantial economic benefits for the Belizean economy at risk.

These are serious challenges. Some relate to a lack of compliance with environmental regulations and others relate to insufficient enforcement of environmental laws. It is also likely that some non-compliance by developers is due to a lack of knowledge of Belize's environmental laws and/or misunderstandings about the importance of protecting Turneffe's ecosystems through sustainable developmental practices.

Some of the existing damage at Turneffe will take an extended period to reverse while other damage is simply irreversible. Clearly, there is ample time for a course correction to ensure that development at Turneffe Atoll is approached sustainably; however, this will require additional vigilance on the part of Turneffe stakeholders and Marine Reserve Managers, better compliance with environmental laws and expanded awareness of the critical importance of protecting this valuable asset.





