

BELIZE COUNTRY REPORT
ON
THE PROTECTION OF CORAL REEF
AS IT RELATES TO
THE UN SECRETARY GENERAL REPORT

1.0 Introduction

- 1.1 The Country of Belize has been blessed with one of the great wonders of nature: The most spectacular, diverse and productive coral reef system in the Western Hemisphere. It is second only to the Great Barrier Reef in linear extent and geographic scope and is known variously as the Belize Barrier Reef, the Meso-American Barrier Reef System and the Great Barrier Reef of the Western Atlantic.
- 1.2 The Belize Barrier Reef is a source of great National Pride in Belize, the splendor and magnificence of which has been captured in great works of art, poetry, sculpture and song, including the National Anthem.
- 1.3 The Belize Barrier Reef is also functionally integrated into the social and macro-economic development picture of the Nation where it contributes significantly to employment, food security, GDP and foreign exchange earnings. It is the basis of the national fishing industry and in large measure tourism, which is the greatest contributor to GDP and economic livelihood.
- 1.4 The Belize Barrier Reef is not only of great importance to the nation and people of Belize, but also the wider global citizenry. In this regard, the Belize Barrier Reef was inscribed as a World Heritage Site by UNESCO in 1996 as a function of its outstanding universal value.
- 1.5 The Belize Barrier Reef and its associated ecosystems at the macro-scale relates to the full range of coral reef eco-types and seagrass beds, as well as mangrove forests along the mainland coast and cays. This association of closely related ecosystems comprises a wide and diverse range of habitats including: patch reefs, reef crests, semi-emergent dry reefs, shallow fore-reef, deep slope, pelagic open ocean, deep seafloor, mudflats, sandy beaches, seagrass meadows, mangrove channels or 'boggles', and inter-tidal red mangrove prop roots.
- 1.6 Forty-four (44) species of reef-building or hermatypic corals have been documented for the Belize Barrier Reef. This is not the full compliment of these 'stony' corals in the jurisdictional seas of Belize but is instead a function of the extent of scientific inventory efforts thus far.

- 1.7 Over 700 species of vertebrate fish has been documented in the Belize Barrier Reef environment: Again this effort is not complete. The number of macro-invertebrates such as the Queen Conch (*Strombus gigas*), the Spiny Lobster (*Panulirus argus*) and the Donkey Dung Sea Cucumber (*Holothuria mexicana*) has not been systematically tallied, however they are also expansive in diversity.
- 1.8 The Belize Barrier Reef and its associated ecosystems also provide a habitat for the largest assemblage of West Indian Manatees (*Trichechus manatus*) in the insular Caribbean as well as Central America. The last census showed that there were over 700 manatees in the jurisdictional seas and continental water-bodies of Belize. The Bottlenose Dolphin (*Tursiops truncatus*) is also another widely occurring aquatic mammal of the Barrier Reef ecosystem.

2.0 The Value of Coral Reef

- 2.1 The Belize Barrier Reef and its associated ecosystems is important in the National Consciousness from the standpoint of its contributions to economic growth and development, as well as from the standpoint of its value as a significant contributor to the biodiversity compliment of the nation, and its underpinnings and contribution to cultural identity.
- 2.2 In terms of its contribution to economic development, earnings from reef related tourism were estimated at US\$150 - \$196 million in 2007. This represented 90% of total Tourism Revenues. Tourism contributed 12 - 15% of GDP, which is the largest input source. Earnings from commercial fishing were estimated at US\$14 – 16 million over this time-frame. This amounted to 3.5% of GDP. The sector was the third largest foreign exchange earner for Belize: This situation has not changed.
- 2.3 Reef-related Tourism employs 20% of the National work-force, while the Fisheries Sector employs 2 – 3%. The latter entails the direct employment of 4,000 fishers and processors.
- 2.4 From a comparative regional standpoint the contribution of the Fisheries Sector to the economic and social development of Belize in terms of percentage contribution to GDP is among the highest in the CARICOM Caribbean economic bloc, as well as that of Central America Countries.
- 2.5 The primary attraction of coastal tourism is related to the superlative aesthetic grandeur of the Barrier Reef and its multitudinous variety of floral and faunal forms. These range from attached and sedentary forms such as the Azure Vase Sponge (*Callyspongia plicifera*), and Christmas Tree Worm (*Spirobranchus giganteus*), to errant and fast moving macro-invertebrates and finfishes such as the Caribbean Reef Octopus (*Octopus briareus*), the Queen Angelfish (*Holacanthus ciliaris*) and the Blue Chromis (*Chromis cyaneus*).

- 2.6 The Belize Barrier Reef is also important from a historical and cultural perspective. The association of the reef and its associated habits and ecosystems with food and economic livelihood goes back to the days of the ancient Mayas. Most of the coastal communities in Belize regularly utilize the seas and reef environment for subsistence fishing, as well as a source of fill material for land reclamation purposes. Fish remains a staple in the diet of many coastal communities. This relates to a representative cross-section of the various ethnic groups living in Belize and includes the mestizo communities (Mayan and Spanish heritage) living in the popular tourist destinations of San Pedro and Caye Caulker, as well as the creole communities (African and European Extraction) living in Belize City, the commercial capital of the Country, and the Garifunas (African and Ameri-Indian Ancestry) living in the southern Town of Punta Gorda.
- 2.7 In terms of non-market value ecosystems services the Belize Barrier Reef was estimated to contribute US\$120 - \$180 million to shoreline protection in 2007: This relates largely to the buffering against storm surges and erosion by ocean waves. Relatedly, the reef is a macroscopic and net 'Carbon Sink' for the Nation which has huge positive implications in relation to the 'fixing' or removal of Carbon Dioxide and other greenhouse gases from the atmosphere.
- 2.8 Although the exploration of the Belize Barrier Reef for bio-active compounds that would have relevance in the international pharmaceutical industry has not proceeded, it is believed that the potentials are huge.

3.0 Threats to Coral Reef

- 3.1 The primary threats to the Belize Barrier Reef and its associated ecosystems are from sedimentation and turbid influences, nutrient enrichment or eutrophication, thermal stress and direct mechanical damage and destruction. Ecological imbalances are also a noted primary threat to the viability and health status of corals and coral reef systems. Sedimentation and turbid influences derives from non-point sources such as land-based run-off, as well from point-specific sources such as dredging of the seafloor. This activity has increased significantly in frequency and magnitude over the past decade and has been associated in large measure with the expansion in resort development and related infrastructure. The land-based sources of sediments are technically a subset of what has been referred to as Land-based Sources of Pollution (LBSP) are related in large measure to poor upland agriculture practices, as well as deforestation from timber extraction and land-clearing associated with human settlement and urbanization.
- 3.2 The nutrient-enrichment or eutrophic impacts on the Belize Barrier Reef derives from sewage, domestic effluents laden with detergents, and to a lesser extent land-based run-off. The diminished contribution of the latter is related to the distal geographic placement of the reef system from mainland Belize. In areas where the reef system is in relatively close proximity to

the larger and more populous cays such as Ambergris Caye and Caye Caulker, the eutrophic impacts from land-based run-off is more significant. The situation is similar to that of the impacts of sedimentation on the reef.

- 3.3 Much of the turbidity and sedimentation impacts to the reef are wrought by dredging and land reclamation activities associated with the general expansion in tourism, as well as population growth and urbanization on the cays. Again the impact is magnified for the more populous and larger cays. The remoteness of mainland Belize to the Barrier Reef eliminates or greatly dampens any impacts related to turbidity and sedimentation from this source.
- 3.4 Thermal stresses to the Belize Barrier Reef are precipitated by high sea-surface temperatures. These events are periodic and can be attributed to the variability in weather patterns associated with the Climate Change and Climate Variability (CCCV) phenomenon being widely postulated and/or accepted by the scientific community, environmental activists and forward-thinking policy makers and governments, including the Government of Belize.
- 3.5 The ecology-related impacts are driven by over-fishing and heavy fishing pressures, as well as by invasive species. In the case of the latter, the Pacific Lionfish (*Pterois volitans*) has established breeding populations in the Belize jurisdictional seas and it has been theorized that this is having a huge predatory impact on native stocks. This is related in large measure to the decimation and depletion of the smaller and more colorful stocks in the reef environment such as the Princess Parrotfish (*Scarus taeniopterus*), the Bluehead Wrasse (*Thalassoma bifasciatum*) and the Spotfin Butterfly Fish (*Chaetodon ocellatus*). The effect of the reduction in populations of these species, which are herbivores and primary consumers on the reef, has the potential to affect coral health by allowing the reef to be overgrown by macro-algae and seagrasses.
- 3.6 The effect of overfishing when it is related to the higher order predatory species or 'Apex Predators' in the reef environment such as the Mutton Snapper (*Lutjanus analis*) and Nassau grouper (*Epinephelus striatus*) is that there is a proliferation of herbivores and primary consumers. The resultant impact is one of the overgrazing and the subsequent demise of corals and the reef system.
- 3.7 The Belize Barrier Reef is also impacted by direct mechanical damage from the grounding of ships and scarring from anchors, as well as the physical damage arising from breakage and other physical impacts from Tourists and other recreational users of the reef environment such as breaking or standing on corals.
- 3.8 Natural disasters, especially Hurricanes and its associated cyclonic systems are a threat to the status and viability of the reef system. Pathogenic diseases are also a major threat to the health status and viability of the Belize Coral Reef Ecosystems.

- 3.9 Ship groundings and the associated physical damage to corals and spillage of oil and chemical cargo has remained a threat in the Belize jurisdictional seas. Groundings are more visually impacting. In recent times the cost associated with at least one (1) of these groundings has been determined. The Courts of Belize has fined the owners of a shipping line Bz\$12 million for the damage caused to the Barrier Reef.

4.0 Management Strategy

- 4.1 Management interventions on the Belize Barrier Reef vary in scope and orientation. Historically much effort has been expended in relation to raising public awareness in regards to the ecological sensitivity and value of the reef. At the policy and legislation level, the harvesting, physical damage to and/or removal of corals is illegal.
- 4.2 Three (3) of the strategic intervention at the national level in regards the sustainable stewardship of the Belize Barrier Reef and its associated ecosystems are: the environmental management programme enshrined in the Environmental Protection Act (EPA), the national fisheries management strategy reflected in the National Fisheries Act, and the Integrated Coastal Zone Management Programme as a function of the Coastal Zone Management Act.
- 4.3 The requirement for development projects to obtain an Environmental Compliance Plan (ECP) is one of the most valuable tools in assuring the maintenance of the integrity of the environment. This has immediate and significant positive implications for the health status and quality of the Belize Barrier Reef and its associated habitats. An Environmental Compliance Plan (ECP) obligates developers whom are permitted to proceed with their project(s) to proceed along those lines that would not injure and unduly erode the status and viability of the environment.
- 4.4 The monitoring and compliance of development projects within the context of the ECP has been effective in circumventing and ameliorating the impacts to the habitats and species associated with the Barrier Reef. This is especially in regards to projects related to dredging and land reclamation, as well as mangrove clearance and the construction of piers and other over-water structures.
- 4.5 The environmental management programme in Belize is overseen by the Department of the Environment (DOE).
- 4.6 Fisheries management in Belize is focused at both the levels of the fish species and stocks themselves, as well as the wider ecosystem and habitats that support them. Classical Fisheries Management Tools that would guard against stock depletion and protection of habitats include: closed season, size limits, prohibited areas and gear restriction such as the establishment of mesh size limits for seine nets. Other classical interventions include prohibition on the use of

dynamite and poisons, as well as the taking of species critical to the health of the reef such as grazers. The latter include Parrot Fishes (Scaridae) and the Tangs (Acanthuridae).

- 4.7 In terms of the invasive species threat, management measures to mitigate the threat from the Lionfish (*Pterois volitans*) invasion include: culling tournaments to curb populations of the species, promotion of local consumption of the species, public awareness on the impacts the species has on the juvenile reef fish stocks, and research on the feeding ecology and colonization rates of the species.
- 4.8 The wider ecosystems approach to fisheries management is most aptly represented in the Marine Protected Areas Programme of the Fisheries Department. The Marine Reserves designation is the MPA option in Belize that is specific to fisheries management. Marine Reserves embraces the multiple-use concept which entails extractive use as well as non-extractive resource utilization. Marine Reserves embraces the three (3) principles of the 'Ecosystems Approach to Fisheries Management' which are:
- A prevention of any decrease in the size of the harvested populations
 - The maintenance of the ecological relationships between harvested, dependent and related living resources
 - Prevention (or minimization of the risk) of changes to the ecosystem.
- 4.9 The goals of the Ecosystems Approach to Fisheries Management are largely realized through the zonation scheme associated with these areas. The 'General Use Zone' of these Marine Reserves allows for commercial fishing, while the 'Conservation Zone II' allows for some fishing in the form of subsistence take: This is only accorded to those fishers who have long-standing and proven use of area. The 'Conservation Zone I' is a non-extractive area that allows mainly for snorkeling, scuba diving and other tourism-related recreational activities. Scientific research is also permitted in the 'Conservation Zone I' of the Marine Reserves.
- 4.10 The 'Preservation Zone' of the Marine Reserves equates to the 'Wilderness Zone' in the classical Terrestrial Park System, with the strictest level of protection. The only activity that may be permitted in this zone is limited research activities. These would need to be of singular importance or of an exigent nature.
- 4.11 The zonation within Marine Reserves is prescribed by legislation. The 'General Use' generally comprises 80% of the total area of the Marine Reserve, while the remaining 20% comprises the 'Conservation Zone I', 'Conservation Zone II' and the 'Preservation Zone'.
- 4.12 The primary extractive use in Marine Reserves in Belize is commercial fishing, while the main non-extractive activity is recreational tourism. The latter is primarily snorkeling and scuba diving in the reef environment.

- 4.13 There are eight (8) Marine Reserves in Belize occupying an area of 165,263 Ha of sea and marine habitat. This represents 66% of the MPAs in coastal Belize which occupy a total area of 250,399 Ha.
- 4.14 Apart from the intervention of Marine Reserves and classical responses such as 'Closed Seasons' for various fish species, there is also a focus on the revision and upgrading of the fisheries legislation. The Principal Fisheries Act, which dates back to 1948, is currently in the process of being revised and updated to reflect modern approaches to fisheries management. These include embracing the 'Precautionary Principle' and more expansive elements of the 'Ecosystems Approach to Fisheries Management', as well as various aspects of the United Nations Law of the Sea Convention (UNCLOS).
- 4.15 The Integrated Coastal Zone Management Programme which has been firmly established in Belize since 1991 is in principle designed around the principle of unifying and coordinating efforts to assess and evaluate those developmental activities impacting the coastal zone and to synthesize and derive those interventions that would need to be brought to bear to address and resolve these issues.
- 4.16 Two (2) institutions have been crafted to realize the goal of Integrated Coastal Zone Management (ICZM) in Belize - these are the Coastal Zone Management Board and the Coastal Zone Management Authority and Institute (CZMAI). The CZMAI is comprised of the Coastal Zone Management Institute (CZMAI) and the Coastal Zone Management Authority. The CZMI is the technical arm of the institution that is involved with scientific research and monitoring, as well as development planning: The is adjunct to the mission of the CZMAI to provide advisory support to the CZMA which is largely involved with the genesis and promulgation of policy and macro-decisions in regards to those Public Sector institutions with a management mandate in the Coastal Zone, such as the Ministry of Tourism and the Ministry of Natural Resources. The CZMA also entails a coordination function for these institutions, as it relates to their management mandate in the coastal zone of Belize.
- 4.17 The genesis of a National Coastal Zone Management Plan by the CZMA, which in principle is to include some zoning scheme to balance conservation and development, has positive implications for the sustainable stewardship of the Barrier Reef and its associated ecosystems.

5.0 Future Outlook

- 5.1 The Government of Belize (GOB) is committed to maintaining the ecological integrity of the Belize Barrier Reef and the services and benefits accruing from this great bio-physical asset. This includes the building of capacity to improve and strengthen scientific monitoring and research related to the health and productivity of the reef and its associated ecosystems.

- 5.2 The GOB is also committed to the building and strengthening local partnerships, as well as to foster cooperation and commitment at the regional and wider global levels that would relate to improving management and conservation of the reef system. The latter includes ratification of various Conventions and Protocols that the GOB has signed onto at both the global and regional level such as: the Convention on Biological Diversity (CBD), the United Nations Law of the Sea Convention (UNCLOS), the Cartagena Convention, the SPAW Protocol and the 1995 FAO Fish Stock Agreement on Straddling Stocks and Highly Migratory Fish Species.
- 5.3 The GOB is also committed to improving and strengthening co-management arrangements that would enhance the participation and benefits accruing to local communities from the management of the bio-physical resources associated with the Barrier Reef. The latter relates in large measure to livelihood issues and access rights.