

Developers are encouraged to optimize water use as follows:

Select low flow toilets in new construction or modify toilets to use less than eight liters of water.

Toilets can be piped to channel grey water from showers for flushing.

The use of composting toilets is encouraged. Composting toilets do not require water.

Install low-water use shower heads.

Institute a "one shower per day" rule.

Housing and other similar infrastructure should be designed to facilitate the collection and storage of rain water in cisterns or vats.

Water from wells is better suited for non-consumption purposes, i.e. bathing and flushing.

The use of desalinization plants or reverse osmosis plants is encouraged.



Artificial Osprey nest, Long Caye

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Recommended Best Practices for the Cayes of Belize

Based on Lessons Learned at Glover's Reef Atoll

BACKGROUND

In 1996 the Belize Barrier Reef Reserve System was inscribed as a World Heritage Site. This declaration accorded to the reef the same status as Machu Picchu in Peru, the Grand Canyon in the United States, and other such wonders around the world. Glover's Reef Atoll is among the cluster of seven protected areas that together form the Belize Barrier Reef Reserve System.

Tourism is an important economic activity on Glover's Reef Atoll. It is the key force of change, driving development on the Cayes and therefore the need for strategies that integrate economic development opportunities with conservation values. Planning, with complementary legal instruments and government support, will help to promote this required integration.



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Condominium-style structure at Isla Marisol Resort, Glover's Reef Atoll



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*Sunset at Middle Caye,
Glover's Reef Atoll.*

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Design: Genesis Arts, Belize 2008

ENERGY continued

- ◆ A contingency plan to mitigate negative environmental impacts in the event of a spill should be in place.
- ◆ Fuel should be transported in secure barrels along navigational routes that minimize contact with the reef or other vessels.
- ◆ Where possible, facilities should use renewable energy sources, such as wind and solar power. Many ecotourism destinations use such sources and energy-efficient practices as part of their marketing strategy, enhancing their reputations as 'green' establishments.

SOLID WASTE DISPOSAL

The Three R's of Solid Waste Management

Reduction – the basic principle here is to reduce over consumption of products particularly those that generate hard to recycle waste such as polythene packaging.

Reuse – here waste generation is avoided or decreased when packaging and products that have fulfilled their primary function are used again by finding a new secondary use for them.

Recycle – here a product that has already fulfilled its purpose is used as raw material for the same or new goods

A proper solid waste management plan (SWAMP) to dispose of solid waste should be developed and implemented, and should revolve around the 'three R's', Reduce, Reuse and Recycle. The SWAMP should at a minimum include the following waste disposal options :

- ◆ **Composting** - Biodegradable domestic waste such as food scraps, leaves, and tree cuttings may be placed in a pit or other suitable container where it can be gradually broken down to a product that can be utilized on site as a fertilizer.
- ◆ **Transport** - Items such as paper, glass, metals including aluminum cans and some types of plastic should be separated for recycling purposes where such services exist. Alternatively, this material can be securely stored for transport to a mainland dumpsite or buried at a properly managed landfill site.
- ◆ **Design of sanitary landfill/pit** - Where a solid waste garbage pit is being established, the site should ideally be evaluated to ascertain that the soil composition is of an impermeable type that will prevent leaching of contaminants to the ground water. The site should be located away from public view and away from sensitive habitats or water.

- ◆ **Burning/Incineration** - Burning should be an option of last resort due to its contribution to air pollution and global warming. It should be conducted in properly constructed "boxes" to promote the complete combustion of material and reduce incidence of fire and degradation of surroundings.

LIQUID WASTE AND SEWERAGE

- ◆ Promote the use of composting toilets (Clivus multrum) in appropriate locations on all cayes.
- ◆ Where septic tanks are used, suitable sturdy plants with tubular root systems (e.g., banana plants and Heliconias) should be planted around or adjacent to the soak away to establish a root zone system which will assist in the removal of nutrients from waste water or septic systems. Plants purify the waste water by absorbing the organic material.
- ◆ Septic tanks ought to be properly designed and constructed, and approved by the relevant authority to ensure that there is no leakage into the water table.
- ◆ Septic tanks should be located as far away from wells as possible. A minimum distance of at least 100 feet is recommended.

WATER

- ◆ Maintain good water quality for consumption, recreational activities and ecosystem habitats by supporting developments that reduce impacts to ground water and adjacent water bodies.
- ◆ Ensure long-term supplies of potable water by performing hydrologic studies prior to drilling of wells.
- ◆ Locate wells far away from possible sources of contamination.
- ◆ The cost of water can be reduced by optimizing its use (see box) – tourists and guests should be educated on how to save water.

Rain Water System, Middle Caye



These best practices have been prepared for use by developers, property owners and resort managers on Glover's Reef. They can be extended, however, to any of the cayes of Belize. The best practices are to be viewed as a tool, which will promote low-impact practices for new tourism infrastructure development that will in the long term mitigate the negative effects to the environment that invariably accompany unplanned development. These islands, an intrinsic part of the marine system, encompass very fragile ecosystems that are easily impacted; for instance, the littoral forests on the cayes are considered one of Belize's most endangered habitats. Furthermore, human activities on the cayes can adversely affect the surrounding marine environment, in particular our coral reefs, sea grass beds, and mangroves. The best practices outline simple steps that can be taken to ensure that new infrastructure is safe, attractive and "green." They provide suggestions for siting structures on the beach, managing waste, conserving water and energy, maintaining the aesthetic value of property and minimizing pollution to coastal waters. More importantly, the recommended best practices speak to the value of stakeholders remaining engaged in discussing the critical issues surrounding the ownership and management of their coastal resources.

PURPOSE

The purpose of this pamphlet is to describe the recommended measures for low-impact development that will promote sustainable use of the cayes of Belize, based on lessons learned at Glover's Reef Atoll. The recommended best practices are consistent with the view of the community of stakeholders and owners of the cayes of the atoll as expressed in discussions held with them. Recognizing that all the properties on the atoll are privately owned, the recommended best practices reflect and reinforce the character and quality of the atoll enjoyed by the owners and shared with their guests, whether family, tourist or fisher.

METHODOLOGY

Glover's Reef Atoll stakeholders were invited to participate fully in the development of this product, including the analysis of issues which led to locally formulated solutions and the integration of local knowledge into the best practices proposed.

Participation was through face-to-face meetings with members of public sector agencies, non-government organizations, property owners and managers of resorts on the atoll, and key stakeholders whose mandate or interest



WCS researcher gathering data on tourism best practices (Glover's Reef Atoll).

impinged on the development of the recommended best practices. The most important element in the process was the discussions held with the *ad hoc* Glover's Reef Landowners Working Group, some of whom are members of the Glover's Reef Advisory Committee. Here the draft document was presented and reviewed. Following this exercise, adjustments were made to the practices based on the recommendations made by this Group.

Best Practices

Private Lands

In the absence of legislation, land owners should be encouraged to enter into voluntary but binding conservation easements or covenants.

The owners of properties that are not necessarily contiguous to each other could also enter into voluntary conservation easements or covenants. Such agreements could be among a group of land owners, and could be directed, for example, at protecting turtle nesting beaches on the islands.

Landowners should be encouraged to become members of the Belize Association of Private Protected Areas (BAPPA) in order to take part in exploring various instruments for private land conservation and associated fiscal incentives (such as reduced property taxes and land tax exemptions),



Part of the landscaping at Off-the-Wall (Long Caye, Glover's Reef Atoll)

and advocating for special legislation toward this end. This would include, for example, legislation recognizing private reserves and providing incentives to landowners for placing their properties in conservation under approved management plans.

CONSERVATION

Vegetation clearing and replanting

Clearing of native vegetation (including mangroves) should be kept to a minimum and consideration should be given to using the natural vegetation as part of the landscaping plans of the properties.

At least the sixty-six foot buffer along shorelines should be maintained and /or restored as far as possible with natural beach vegetation. As well as providing natural habitat for many species, this buffer helps prevent erosion, a growing concern in this time of expected sea level rise and greater storm activity.



Turtle nesting warning sign at Manta Resort, Glover's Reef Atoll.

Turtle Nesting

Turtle nesting areas should be clearly marked with visible signs and information boards to reinforce good visitor behavior.

Visitors should be strongly discouraged to go near or enter turtle nesting areas unless they are accompanied by a trained staff member.

Visitors should be informed that they are to immediately report stray hatchlings, and should refrain from touching them or disturbing them in any way.

A carefully designed network of paths or trails should be laid out leading from the buildings to the beach, to ensure controlled visitor access

Camping and/or campfires on the beach should be avoided, especially during the nesting-hatching season.

Any unnecessary light sources should be turned off. (See box below)

Visitors should be discouraged from bringing pets, such as cats and dogs, to the cayes.

Periodic beach cleanups should take place, removing litter, but leaving the vegetation in place.

Insect Control

Insecticides should be used with care when applying in areas adjacent to any body of water, as many are harmful to humans and aquatic life. Relevant licenses and permits governing their use must be obtained from the Pesticide Control Board.

- ◆ When insecticides are needed, if possible only natural pesticides should be used and fogging should be restricted to the inhabited areas.
- ◆ Natural or biological insect control measures should be considered where feasible, such as use of fish, etc. that feed on the insect pests. Some plants also repel insect pests and can be included in the landscaping.

TOURISM

Property owners and managers should:

Develop initiatives targeted at encouraging guests to help reduce adverse impacts on the environment and to support local conservation programs.

Encourage staff members and visitors to keep the beach clean. One way to do this is to place trash containers at strategic locations along pathways and near the beach.

All consumable goods or products, including but not limited to bathing products, cleaning supplies, household paper products and sunscreen should be biodegradable, whenever possible.

Resort owners should design an interpretive program and implement various levels of guest education to revolve around specific themes, with clear messages relating to local environmental issues. These can increase the quality of guests' experiences and improve occupancy rates.

Beach lighting could be minimized by any of the following:

turning the lighting off (at least during the nesting-hatching season),

reducing the wattage of problem lighting, redirecting lighting away from the nesting beach,

replacing conspicuous lighting on piers and along paths with hidden, walkway-only lighting,

shielding light sources from the nesting beach,

providing emerging hatchlings with shielded pathways from nest to sea,

planting native vegetation as a light screen.

INFRASTRUCTURE

- ◆ The construction of new dwellings higher than two-stories on the cayes should be discouraged. This will preserve the character of the islands and the broader viewscape of the area.
- ◆ Facilities should include some roofs designed to catch rainwater with drainage to a cistern or vat.



Over the water structures at Glover's Atoll Resort.

- ◆ Roofs should be constructed with overhangs to protect dwellings from mid-day sun. This will help to cool the interior of the buildings and reduce energy consumption resulting from the use of fans and air conditioning units.
- ◆ The principles of sustainable design (see box) should be used to integrate the siting and design of a resort (or resort expansion or renovation) into the local conditions and to take advantage of natural features.
- ◆ New resort developments should be sited only where the environmental conditions can support the proposed development.

Some elements of sustainable design include:

Choose materials based on sources that minimize damage, and on properties such as insulation, durability, recyclability, and availability.

Use recycled & renewable materials whenever practical.

Minimize land-clearing at all times, and contribute to habitat restoration efforts.

In landscaping, use native plant species.

Encourage the production & use of compost or other organic substitutes for chemical fertilizer.

Incorporate local styles, including use of thatch roofs, and knowledge in building design.

Take advantage of natural climate conditions for cooling, energy and other needs.

Coral should not be used as a construction material.

- ◆ Over-the-water structures should be designed and constructed based on the guidelines of the Department of the Environment. If dredging is deemed necessary, the development should adhere to the required permitting procedures. This will ensure that the impacts of resort development are mitigated or avoided.
- ◆ Large-scale dredging activities should be avoided, due to the severe impacts such activities can have on the conservation values of the islands and the near-shore marine habitat

PIERS

- ◆ Minimize dredging requirements, which will benefit fisheries, habitats, and submerged and emergent vegetation.
- ◆ Design boat piers to withstand waves, or undermining from erosion or rough waters.
- ◆ Design and siting of a pier should carefully consider the impacts of hurricanes, waves and wind forces.
- ◆ Shading from docks/pier construction reduces the density of submerged aquatic vegetation growth directly under the structure. Docks of 2 feet or higher will significantly reduce impact.
- ◆ Material to be used for pier construction should enhance natural aesthetics and be durable and long lasting. Utilize techniques, such as silt screens, to reduce impacts during construction.
- ◆ In places where many small piers are planned for a local area, a community pier should be considered.
- ◆ Proper illumination is required on every pier or dock to reduce impact as a navigational hazard. However, effects on turtle nesting need to be considered as well.
- ◆ Construction of piers is required to follow the official permitting process.

ENERGY

- ◆ Generators should be regularly serviced and housed in fully enclosed concrete structures that allow for containment in the event of a leak or spill.
- ◆ Used oil should be taken out for recycling or for reuse in industrial application away from the site when such services exist.

Bird-friendly windmill at Slick Rock, Long Caye, Glover's Reef Atoll.

