Conclusions and Recommendations

The characterization of the Placencia Lagoon was essential to put into perspective the natural and man induced factors that could affect the health and function of the estuarine system. While there is not yet any cause for alarm, it is essential to stimulate public discussion about the fate of the lagoon and effect monitoring, research and management initiatives in the area to prevent any potential impacts from increasing land-based uses surrounding the lagoon.

The invaluable natural ecological services and socioeconomic benefits derived from the Placencia estuarine system is enough justification to maintain it in healthy and functional condition. Bearing this in mind, it is imperative that future developments are planned to ensure the lowest possible impact on the estuary.

The full version of this report is available at the CZMAI Reference and Resource Library and will be online shortly.

For more information on this report, contact:
The Coastal Zone Management Authority and Institute (CZMAI)
P.O. Box 1884
Princess Margaret Drive
Belize City, Belize
Tel: 501-223-0719/223-5739/223-2616
Fax: 501-223-5738
Email: czmbze@btl.net
website: www.coastalzone.bz

Summary Review

Characterization of a Tropical Estuarine System: The Placencia Lagoon

Eugene Ariola
Coastal Zone Management Authority and Institute

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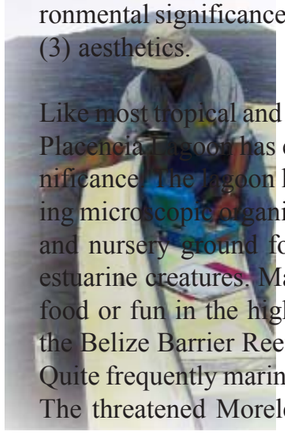
There are 30 coastal lagoons distributed along the mainland coastline of Belize. Most of these lagoons remain in pristine condition. This may be attributed to the fact that most of these lagoons are remote and isolated from direct human impacts. The Placencia Lagoon is one of the larger coastal lagoons in Belize, located between 16°30' and 16°40' N latitude and 88°20 and 88°25' W longitude (Fig. 1). The Placencia Lagoon is 3.4 km wide at its widest extent, 20 km long and covers a surface area of 30 km^2. It is currently a focal area for human settlement, tourism, fisheries and aquaculture development.

How important is the Placencia Lagoon?



The Placencia Lagoon may be considered as an important estuarine system based on: (1) ecological and environmental significance (2) recreational opportunities and (3) aesthetics.

Like most tropical and subtropical estuarine systems, the Placencia Lagoon has ecological and environmental significance. The lagoon has a diverse amount of free drifting microscopic organisms that makes it an ideal feeding and nursery ground for a myriad of larger marine and estuarine creatures. Many of the fish that are caught for food or fun in the higher parts of the estuary or within the Belize Barrier Reef complex depend on the Placencia Lagoon for portions of their life cycles. Quite frequently marine mammals such as dolphins and manatees are sighted feeding in the lagoon. The threatened Morelet's crocodiles also occupy unique habitats of the lagoon for nesting and

survival. The vegetation fringing the lagoon supports nesting sites for several marine birds. Pelicans, gulls and bobbies are seen feeding in the lagoon and roosting on the natural vegetation.

The marshlands surrounding the Placencia Lagoon provide important environmental services such as sediment removal, absorption of nutrients and pollutants from storm water and wastewater. The adjacent alluvial coastal plains are considered as the most suitable lands for shrimp mariculture in Belize.

In addition to the aforementioned benefits, the lagoon also provides unparalleled recreational opportunities for residents of the nearby communities and visitors. During storm advisories, many shallow draft watercrafts (including catamarans) are moored within the safe haven of the Placencia Lagoon. The aesthetics of the Placencia Lagoon fringed with mangroves and coupled with its high biological diversity makes it a focal point of tourist related activities for coastal communities such as Independence, Placencia, Seine Bight and Maya Beach.

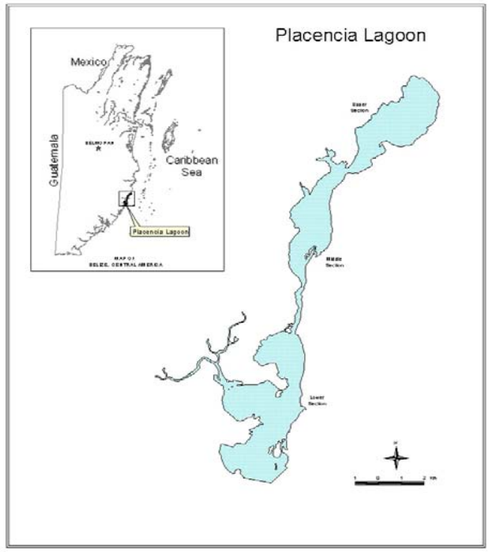


Figure 1: Geographic location of the Placencia Lagoon.

Undoubtedly, there are many benefits that could be used to elucidate the importance of the Placencia estuarine system. However, it is clear that this water body may be regarded as a gem that could not be replaced and hence is priceless.

The need for research

There is growing concern about the current status and fate of the Placencia Lagoon amidst the changing land use in the adjoining catchments. The destruction of natural vegetation to construct dwellings, resorts, roads, and aquaculture development is a major issue in this area. Another issue that is frequently echoed and poorly substantiated is the contamination of the lagoon by domestic and industrial effluent. Based on these concerns, the Water Quality Unit of the CZM Institute embarked on a study of the Placencia Lagoon. The objectives of the study were as follows:

Aquaculture farm in southern Belize.

- To identify and document the characteristics of the Placencia Lagoon
- To elucidate the vulnerability of the Placencia Lagoon to the potential impacts of land use changes including human settlement and aquaculture development.
- To assess the current status of the Placencia Lagoon based on key water quality indicators.

Results

The study generated results that contribute to a better understanding of the estuarine system of the Placencia Lagoon. The depths in the lagoon vary from near zero at the boundaries to approximately 5.8 meters below mean sea level in the deepest channels and the mouth of the lagoon (fig. 2). It is probable that the depressions in the lagoon floor serve as receptacles for organic materials that settle and undergo decomposition.

The data collected confirmed that both the terrestrial and marine environments influence the lagoon. The salinity distribution and the circulation patterns of the lagoon prove that it is a moderately mixed estuary. This means that there is freshwater and seawater mixing at all depths of the lagoon even though the lower layer is always saltier than the upper layer and the salinity levels increase towards the mouth of the estuary.

The spatial distribution of salinity levels within the lagoon indicated a notably high water exchange rate between the middle and low portions of the lagoon with the sea. Conversely, there is a low water exchange between the upper portion of the lagoon with sea. This finding in particular, signals how vulnerable the ecological and environmental conditions of the lagoon are to the impacts of developmental activities in the area of influence. In effect, this means that high discharge of untreated effluent could drastically alter the state of the lagoon.

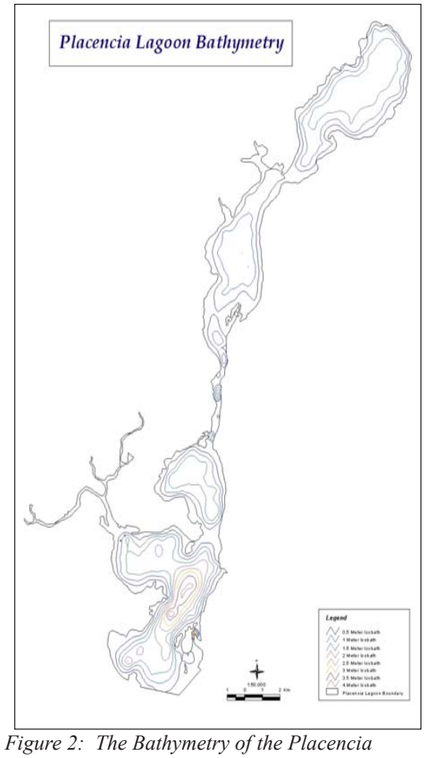


Figure 2: The Bathymetry of the Placencia Lagoon