Lac - Implementation of long term monitoring and research plan

Bonaire, N.A.

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Mangrove wetlands, sea grass meadows and coral reefs dominate the land-sea margins in the Caribbean tropics. They harbour high biological diversity and, together with the land nutrient run-off, they form the basis of the coastal marine productivity. The primary productivity of mangrove, sea grass and coral reef ecosystems is assumed to be the basis of present and potential future yields of shallow water marine resources in the region. Lac has seen a decline in its mangrove population since the 60's. Lac supports Bonaire's only significant mangrove and sea grass ecosystem. As such, it is a recognized RAMSAR site. The mangrove stands are particularly important as nesting and roosting areas for birds. Most reef fish in the area spend at least some portion of their lives within the mangroves when mangroves are available. When mangroves are absent there is a reduction in size and overall biomass of the fish species once they reach the reef (Ref. University of Exeter Marine Spatial Ecology Lab). This has obvious implications for an island whose main tourist attraction is currently diving. The sea grass beds are important foraging areas for turtles (especially green turtles), which are protected by international law.

The Lac area will continue to grow as a tourist attraction. The green of the mangroves against the turquoise sea with black winged, pink flamingos flying overhead will continue to lure entrepreneurs and potential builders. We have a responsibility to find and maintain a balance where Lac can continue to grow as a tourist attraction (as it will no matter what), while preserving the very elements of this environment that make it so appealing. What impact will a new housing complex have on the area? What effect will an increase in tourists staying and playing in the area have on the sea grass beds and turtle and conch populations? Having a baseline for certain parameters paired with ongoing monitoring will help answer these questions. Any adverse changes can be more easily remedied when recognized early.

One example of a preventable degradation of the mangroves is the road that was built leading into Cai and the dams built in the area of Bacuna. The road is made of upraised dirt and gravel. This gravel has become compressed and because there are no aqueducts to channel water through the road, no water can flow through it. In the late 60's dams were also built to contain fresh water to be used for irrigating crops. The crops ultimately failed, but the dams remain. These

dams have since been diverting precious freshwater away from the back of the mangrove system resulting in a large die-off of the trees there. Wildlife is resilient. Has there been any re-growth in this area? Can the mangroves overcome such an obstacle or do we need to address the hydrology issues of the area? At what rate is the mangrove die-off happening? Had a baseline been established back then, perhaps these dams and road would never have been built. A baseline is an important tool for recognizing and also forecasting impacts on the system.

Like the mangrove die-off, other concerns for the Lac area have arisen. There is an increase in sand accumulation in the bay, which is also a world-renowned wind surfing area. If the sand continues to accumulate unchecked, this will no longer be a viable area for wind surfing and, in a worst-case scenario, will cease to be at all. This has obvious environmental implications, but also affects many businesses and many local Bonaireans. Elvis and Roger of Wind & Surf have an outreach program that works with local youths to help teach and pay for wind surfing lessons. Some of these youths have become internationally recognized wind surfing champions.

The promise of seeing turtles either gracefully swimming, casually gnawing on sea grass or just poking their heads above the water for a quick breath, is always alluring to visitors of all ages. This species that has already been designated as "endangered", is falling victim to unidentified stressors in Lac. Twenty percent of the green turtles captured in Lac in 2005 by Sea Turtle Conservation Bonaire, had cancerous tumours resulting from the fibropapilloma virus. The numbers of infected green turtles have increased rapidly in only the last seven years since the first infected turtle was observed.

This initial monitoring plan is an important first step in what needs to be a long-term commitment to this important area and to the island of Bonaire. Including international interns as well as local volunteers will create interest and awareness, which in turn helps to create a lasting commitment to the protection of this area. Including local stakeholders is also important. Keeping those who benefit directly from the Sorobon and Lac areas apprized of what is being done, what problems we are facing and what can be done, will also help to build a community of understanding and involvement. We believe that by empowering the business owners in the area with information, an entirely new group of advocates will also be born. It is only through a broad base of support that long term and ongoing protection of Lac will succeed.

Approaching the present threatened problems, like the mangrove die back and the sand accumulation, is a considerable part of the conservation and protection of this unique environment. In order to do this, Progressive Environmental Solutions will monitor a selected set of specific abiotic parameters and socioeconomic parameters for one full year. In the case of the abiotic monitoring, attention will be called to the parameters of salinity, water level, depth, dissolved oxygen levels, nutrient levels and sand movement. The socio-economic monitoring

parameters will be based on fishing activities, recreation activities, (illegal) sand extraction, etc. The socio-economic data has to be collected to estimate the level of use of Lac and get an impression of the different functions of this water system.

This is an excellent opportunity to begin collaborations with universities that have Marine Science studies. Interns who have achieved a certain level of knowledge on field research will do three to six month internships focusing on Lac. After initial training, interns will be responsible for the monitoring as well as data entry. The supervisory staff will closely supervise all activities. These activities include:

- 5 to 7 days a week Salinity/Water level/Temperature monitoring activities around Lac
- Monitoring circumstances (Temperature, Wind, Rainfall, etc.).
- Tidal fluctuations
- Monitoring Plan for Lac (one year)
- Water circulation (current speed and direction)
- Sand movement monitoring activities
- Depth monitoring activities
- Presentations: education/awareness for local people/tourists/students
- Fresh water inflow
- Socio-economic parameters-analysis of tourist numbers in and around Lac by surveying proprietors of attractions and hotels/restaurants

Supervisory Staff will be responsible for:

- Data processing and data analyses
- Training of interns
- Monitoring to ensure integrity of data obtained from interns
- Reporting
- Presentation of progress reports (journals) every three months
- Final exit strategy with recommendations on maintaining and continuing monitoring program

Upon completion of this project, there will be a complete set of data for at least one full year of monitoring the Lac area. This data will serve as a baseline. From this baseline, sustainable solutions for the mangrove die-off, sand accumulation and fibropapilloma in green turtles can be derived. All data sets will be compiled and made publicly available. STINAPA-Bonaire (BNMP) has agreed to perform "maintenance monitoring" on an ongoing basis, which will be based on the data derived from this project. At the termination of our portion of this monitoring, a complete exit strategy as well as long term monitoring plan will be turned in to STINAPA-Bonaire (BNMP) and the local stakeholders in the area.