

# **Incorporating the Human Dimension in Ecosystem-based Management (EBM): The Grenada Experience of Ridge to Reef Management of MPAs**

## **La Incorporación de la Dimensión Humana en la Gestión Basada en el Ecosistema (EBM): La Experiencia de Granada Ridge para el Manejo de Arrecifes de Zonas Marinas Protegidas**

### **L'intégration de la Dimension Humaine dans la Gestion Ecosystémique (EBM): L'expérience de la Grenade Ridge a la Gestion des AMP Reef**

ROLAND BALDEO\* and OLANDO HARVEY

*Grenada Fisheries Division, Ministry of Agriculture, Lands, Forestry, Fisheries,  
Melville Street Fish Market Complex, St. George's Grenada. \*rolanbaldeo@gmail.com*

#### **ABSTRACT**

The Molinière Beauséjour Marine Protected Area (MBMPA) on the West Coast of Grenada (12° 03' N 61° 45' W), was gazetted on December 28<sup>th</sup>, 2001 and went under active management on February 11<sup>th</sup>, 2009. MPA rangers were hired and daily patrols commenced to ensure that there was compliance with the legislation with regard to on-water activities (e.g. fishing, anchoring). Ongoing biophysical monitoring indicated that despite the gains with regard to on-water anthropogenic impacts, the land-based sources of impact were having a significant negative impact with regard to macroalgae on the coral reefs. This led to the establishment of a "Reef Guardian Program" modeled after a similar program pioneered in Australia. The Reef Guardian Program has three distinct components (i.e. schools, farmers and fishers) and features a number of voluntary actions that individual could implement in their daily lives and while farming and/or fishing that would have a positive impact on the health of the coral reefs. The MBMPA has also implemented a number of alternative/supplemental livelihood activities to ensure that community members who would have been affected by the restrictions on extractive activities within the MPA are adequately compensated. The livelihoods and "Reef Guardian Programs" ensures that everyone who can be affected or who can have an effect on the MBMPA from the fishers on the sea to up the farmers in the mountains and the communities between are actively involved in taking small actions in their daily lives to help enhance the resilience of coral reefs.

KEYWORDS: Marine Protected Areas, Ridge to Reef Management, alternative/supplemental livelihood, Reef Guardian Program

#### **INTRODUCTION**

The closure of specific areas of marine space resulting in enhanced species richness, diversity, and abundance has a long history especially within the Islands of the Pacific (Johannes 1978). However, the formal use of marine protected areas as a management tool for the conservation of a species or habitat dates back to the mid-1800s (Wells et al. 2016).

Grenada legally established its first two marine protected areas (i.e. Molinière Beausejour Marine Protected Area, Woburn Clarkes Court Bay Marine Protected Area) in 2001. Subsequently, the Sandy Island Oyster Bed Marine Protected Area was added to the system. Despite being legally established in 2001, active management did not begin until 2010 and only occurs at the Sandy Island Oyster Bed Marine Protected Area (SIOBMPA) and the Molinière Beausejour Marine Protected Area (MBMPA).

The MPAs in Grenada are multi-use no-take areas with the exception of the traditional capture of small pelagic (i.e. scads, jacks, etc.) with beach seine nets which are still allowed at specific locations under the supervision of the MPA rangers.

#### **ACTIVE MPA MANAGEMENT**

The formal management of the Molinière Beausejour Marine Protected Area commenced with the procurement and installation of requisite infrastructure (i.e. Patrol boat, moorings, office space, demarcation, etc.) and the hiring of staff (i.e. MPA coordinator, three rangers, and office clerk). The MPA rangers commenced their daily patrols in September 2010 at which point the legislated user fee system also went into effect. Owing to almost a decade of stakeholder consultation prior to the designation of the MBMPA, within two years of active patrols the MPA was able to achieve almost an 80% compliance rate with regard to the prohibition of fishing within its boundaries.

The biological baselines for the coral reef within the MBMPA was established when formal management went into effect; therefore, there was insufficient data point available to assess trends with regard to coral reef health in 2013. However, anecdotal evidence from observations suggested that fish sizes and abundance had increased. In addition to observable changes in the fish population, there was also a noticeable increase in the abundance of fleshy macroalgae on the reefs within the MPA (Nimrod et al. 2013). The increase in macroalgae prompted an assessment of the marine water quality which showed elevated levels of nutrients.

In order to determine the sources of the nutrients entering into the MBMPA, a study was commissioned to conduct water quality tests along the Beausejour River which emptied directly into the MPA. The study highlighted that the level of ammonia (103.3 µg/l) and phosphates (i.e. 534.4 µg/l) within the river was ten and one hundred times in excess of Caribbean Environmental Health Institute (CEHI) standards for maximum allowable units for riverine water, respectively (Nimrod et al. 2013).

### RIDGE TO REEF MANAGEMENT

The results of the water quality study highlighted the need to make changes within the communities along the Beausejour watershed in order to achieve the goal of coral reef protection and restoration within the MBMPA. In order to get a more holistic understanding of the sources of the nutrients in order to plan for mitigating them, a survey of point sources of pollution was conducted along the entire river. The assessment of watershed noted the fact that the vast majority of point sources of nutrients were associated with crop and animal husbandry farms, due to the unsustainable practices that were being employed on those farms. Areas of concern with the crop farms included:

- i) Clearcutting in preparation for planting,
- ii) Inappropriate use of chemical fertilizer,
- iii) Lack of riparian zone along the river, and
- iv) Farming within the river course during low rainfall periods.

With regard to the animal husbandry, primarily pig farming, the major concern was the disposal of waste and waste water from the housing directly into the waterways without any treatment.

### REEF GUARDIAN PROGRAM

The Grenada Reef Guardian program was modelled after the successful Australian Reef Guardian Program which is being implemented by the Great Barrier Reef Marine Park Authority (GBRMPA). The Grenada Reef Guardian Program features a number of components targeting the various user groups within the community and focuses on interventions specific to the activities of each user group (i.e. Crop Farmers, Fishers, School & Livestock Farmers). The program focused on education of the public along with tangible actions that could be taken to reduce the community's impact on the marine environment.

The Reef Guardian Farmers Program consisted of 35 farmers from within the Beausejour watershed who are members of the North East Farmers Organization (NEFO). The Reef Guardian Farmers were making a voluntary commitment to make tangible changes in the way that they farm in an attempt to reduce the negative impacts of their respective farms on the marine environment regarding sedimentation, nutrients and solid waste. The GMPA provide practical training for the NEFO farmers in sustainable land preparation (e.g. terracing & contouring), environmental friendly chemical fertilizer application, installation and maintenance of riparian zones, composting and mulching. The farmers also had several presentations and site visits to the MPA which provided them with a more comprehensive understanding of the connectivity between terrestrial and marine environments.

The Reef Guardian School Program was implemented at both a primary and secondary school which were selected based on the fact that their catchment area included primarily students from the communities within the Beausejour watershed. The program included 18 students from Uganda Martyrs Roman Catholic Primary School and 30 8<sup>th</sup> Grade students from Happy Hill Secondary School. The Reef Guardian School Program

focused on providing the students with a solid foundation in the areas of the natural environment (i.e. marine and terrestrial), marine protected areas and environmental stewardship. Students also had the opportunity to implement at least one environmental project (i.e. recycling, cleanup, composting, litter reduction, etc.) within their school and/or community. Students were also given the opportunity to share what they had learned over the course of the school term with their school mates through class presentations.

In an effort to expand the reach of the Reef Guardian School Program to include children from outside of the two pilot schools, the MPA Summer Camp Program was established in 2014 and has ran every year since. The MPA Summer Camp is a three-week intensive (i.e. 7 hours daily) program that is ran during the summer school break which target 40 children between the ages of 9 and 13 years from within the communities of the Beausejour Watershed. Similar to the Reef Guardian School Program, participants in the MPA Summer Camp learn about protected areas, environmental stewardship, marine species identification and the connectivity between the land and sea. They also have the opportunity to learn to swim, snorkel, bird watch, plant mangroves and otherwise interact with the environment in a positive manner.

### ALTERNATIVE/ SUPPLEMENTAL LIVELIHOODS

The establishment of the Moliniere Beausejour MPA resulted in the prohibition of hook & line fishing from boats and spearfishing within its boundaries. Consequently, there was displacement of the fishers that used those fishing methods from within their historic fishing grounds. To mitigate the impacts of fishery closure on the livelihood of these fishers, the MPA management conducted a consultation workshop to identify what the affected stakeholders deemed as appropriate alternative/ supplemental livelihood activities. Among the top options was tour guiding, craft production and non-motorized water sports (i.e. sailing, snorkeling & SCUBA Diving). It was decided that the role out of the livelihood component would begin with the fishers that were displaced by the fishing prohibition. Three former fishers who had transitioned to providing snorkel tours with poorly maintained and equipped boats were selected as the first recipients of the program. The former fishers were given training in entrepreneurship and small business operations, assistance in registering two businesses (i.e. Seatonic Snorkel Tours and K & J Snorkel Tours), and given two fully equipped boats to operate their tour companies. The two business have been tremendously successful and have prompted at least three other fishers to provide similar tour services during the cruise ship season.

### UPCOMING PROGRAMS

The Reef Guardian Fisher Program would focus on the fishers that live within the communities adjacent to the MBMPA and utilize the coastal areas within and adjacent to the MPA for generating their livelihoods. The program would focus on reducing the fishing pressure on demersal species such as reef fish and invertebrates and transition fishing effort to the less/underexploited coastal pelagics

(i.e. tuna, dolphin fish, kingfish, etc.). The program would also introduce new fishing methods and gear including Fish Aggregating Devices (FADs) to enhance productivity and profitability.

The Reef Guardian Livestock Farmers Program would work towards installing small scale biogas digesters on individual farms along with a mechanism for storing the gas in a portable container. The portability of the gas would allow the farms to take the gas to their homes where it could be utilized for domestic cooking or as an energy source on their farms to aid with the slaughtering process. This program would solve the problem of high levels of nutrient entering the rivers through the improper management and disposal of animal waste and wastewater while providing an environmentally friendly and sustainable energy source for the farmers.

### CONCLUSION

On small island developing states (SIDS) such as Grenada, where a contaminant that enters the longest waterway would reach the ocean in a matter of hours, it is important that the population understands the connectivity that exists between the marine and terrestrial environment and how activities that occurs on land impact the marine environment.

Given the financial and human resource constraints that exist in Grenada, the success of any conservation program is entirely hinged on compliance. It is therefore critically important that the resource users and stakeholder understand and possess a shared vision for the management of those resources. In the case of the MBMPA, that meant that it is important for all the stakeholders within the Beausejour watershed understand the importance of the MPA along with the potential for them to negatively impact the marine environment.

It is almost impossible to inspire compliance and develop a shared vision for the conservation of a resource without ensuring that the livelihood of the community is not adversely affected by the protection of those resources. In this regard, the during the establishment process, the management of an MPA must consider measures to ensure that livelihoods and quality of life of the communities adjacent to the MPA are enhanced or at the very least maintained. It is only then that the community could fully embrace the protection of those resources and foster a genuine sense of ownership of the MPA.

### LITERATURE CITED

- Johannes, R.E. 1978. Traditional marine conservation methods in Oceania and their demise. *Annual Review of Ecology and Systematics* 9:349–364.
- Nimrod, S., C. Franco, and C. Andrews. 2013. *Nutrient and Sediment Inputs of the Beausejour River and the Impacts It May Have on the Adjacent Coral Reef System in the Moliniere Beausejour Marine Protected Area*. Organization of American States (OAS) Report Through Reef Fix Program. 42 pp.
- Wells, S., G.C. Ray, K.M. Gjerde, A.T. White, N. Muthiga, J.E. Bezaury Creel, B.D. Causey, J. McCormick-Ray, R. Salm, S. Gubbay and G. Kelleher. 2016. Building the future of MPAs—lessons from history. *Aquatic Conservation: Marine and Freshwater Ecosystems* 26 (S2):101-125.