A Summary Report for the

Community Mapping Exercises of

Marine Resources, Livelihoods & Threatened Areas of the Grenadine Islands

for the Grenadines Marine Resource and Space-use Information System

(MarSIS)

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Kimberly Baldwin

Centre for Resource Management and Environmental Studies

University of the West Indies, Faculty of Pure and Applied Sciences

Cave Hill Campus, Barbados
Table of Contents

Research Rationale .................................................................................................................. 3
Methods of Community Mapping Exercises ........................................................................... 3
Conclusion / Remaining Research Activities ............................................................................ 6
Acknowledgments .................................................................................................................... 7
Appendix I. Local knowledge feature classes and corresponding letter codes used in mapping exercises. 8
Appendix II: MarSIS Publications & Presentations ................................................................... 13

Citation:

Research Rationale

Marine resources are of vital importance to the people of the Grenadines, yet planning and management of the use of marine resources of the Grenada Bank is becoming increasingly complex. Not only are marine resources distributed across the Grenada Bank but they are shared between two nations and utilized by a variety of marine resource users emanating from nine inhabited Grenadine islands. Management thus far has taken a conventional, top-down, command-and-control approach guided by standard non-specific regional management plans and based on limited biophysical information. Furthermore, marine management of the Grenada Bank has not been integrated amongst disciplines, between nations or knowledge systems. This segregated management approach has not been effective thus far and has failed to prevent the environmental degradation of the Grenada Bank. It is proposed that effective and proper planning will require a complex and adaptive mechanism tailored to the local environment. Easy access to a variety of integrated knowledge on marine resources and space-use patterns of the Grenadines is priority for allowing better decision-making, management and planning sustainable development.

The Grenadines Marine Resource and Space-use Information System (MarSIS) amalgamates existing scientific information with local knowledge of marine resources, conservation and livelihood areas into a GIS. MarSIS has been collaboratively developed with a range of stakeholders (including both governments, NGOs, marine resource users) beginning in 2005 and data collection is anticipated to be complete by year end 2009. Key spatial information included in MarSIS consist of: marine habitats (i.e. coastlines, reefs, mangroves, seagrass beds, beaches), infrastructure (i.e. seaports, marinas, jetties, desalination plants), marine resource users (areas important for diving, day-tours, yachting, fishing, ships, communities), associated space-use patterns (anchorages, dive sites, fishing grounds, shipping lanes, recreation areas), biological areas (sea turtle nesting, seabird roosting, marine mammals) and conservation (marine protected areas, spawning & nursery grounds, historical sites/shipwrecks, other coastal livelihood opportunities) as well as identified areas of threat (sand-mining/dredging, beach erosion, dumping/land-based sources of pollution, mangrove cutting). The MarSIS research thus far has collected, compiled and converted a wide range of existing scientific marine-related data into GIS information and constructed the MarSIS GIS geodatabase in ArcGIS 9.2. Furthermore a marine habitat classification system was collaboratively developed and applied using satellite imagery to produce marine habitat maps for the entire Grenada Bank. More than 900 interviews have been conducted with key marine resource users (including fishers, dive shops, day tours, yachts, water-taxis, ships and ferries) across the Grenadine islands in order to inventory and understand demographic, socio-economic, livelihood and environmental considerations as well as create space-use profiles for each user group. Remaining activities include community mapping exercises of marine resources, livelihoods and threatened areas, a participatory marine habitat/resource validation cruise and the final stakeholder validation and feedback exercises. Ultimately MarSIS will allow public access (via Google Earth) to an integrated information base to support participatory transboundary resource management thus aiding decision-making processes in the Grenadines as well as strengthen multi-stakeholder communication, education and advocacy.

Methods of Community Mapping Exercises

This is a summary report which reviews a series of participatory mapping exercises conducted with a variety of Grenadine marine resources users in order to identify and map local knowledge of marine resources, livelihoods areas and areas of threat in each of the nine inhabited Grenadine islands as well as approximately 30 of the larger surrounding cays. Information collected from these mapping exercises were digitised and converted into a number of GIS feature class files for inclusion in the public access Grenadines MarSIS.
Over a four week period, a series of community mapping exercises was conducted with marine resource users in each of the nine inhabited Grenadine islands during May and June 2009. A variety of marine resource users were engaged in participatory mapping exercises in order to identify locations of: coastal and marine resources (areas that provide food or materials of tangible value for local communities), resource use or livelihood areas, conservation areas as well as areas under threat or where there are space-use conflicts. Types of local knowledge information which was collected in each island is listed in Table 1.

Participatory mapping exercises were conducted primarily in the form of individual interviews using a hard copy topological map annotated with local names of beaches, bays and cays (which was previously collected for easier identification of areas). Additional persons were consulted when more specialised information was needed as well as field visits to certain areas of interest. A minimum of three mapping exercises were conducted within each island in order to obtain accurate information as well as for validation purposes. At the start of each mapping exercise, each participant was first orientated with the basemap of their respective island which was annotated with the local names of beaches, bays and cays. The purpose of the mapping exercise and information to be collected was explained. Then participants were shown a picture legend of resources, livelihood areas and threats to coastal and marine resources to be identified (Appendix 1). During each mapping exercise, participants were asked to identify the location of each feature to be mapped and in a counter-clockwise direction around each island they assisted the researcher in drawing points, lines or polygons around the boundaries of each identified area of interest on the provided basemap (Figure 1). Each type of feature identified was annotated with a corresponding letter code (Appendix 1, Figure 2). This general process occurred for each of the mapped variables. Most mapping exercises took between 1 – 1½ hours to complete. In conclusion, participants reviewed the final map annotated with local knowledge for completeness.

**Table 1. Information collected during marine resource user mapping exercises**

<table>
<thead>
<tr>
<th>RESOURCES</th>
<th>USES, LIVELIHOODS &amp; OPPORTUNITIES</th>
<th>PROBLEMS, CONFLICTS &amp; ISSUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea Turtle Nesting Beach</td>
<td>Dive Sites</td>
<td>Dumping / Pollution</td>
</tr>
<tr>
<td>Seabird Roosting Sites</td>
<td>Nursery Areas</td>
<td>Beach Erosion</td>
</tr>
<tr>
<td>Baitfish bays</td>
<td>Breeding / Spawning Ground</td>
<td>Dredging</td>
</tr>
<tr>
<td>Sea Moss</td>
<td>Ship Wreck</td>
<td>Sand-mining</td>
</tr>
<tr>
<td>Wilks</td>
<td>Cultural / Historical Area</td>
<td>Artificial Structure / Breakwater</td>
</tr>
<tr>
<td>Oysters</td>
<td>Recreational Area</td>
<td>Mangrove Cutting</td>
</tr>
<tr>
<td>Iguanas</td>
<td>Fish Pots</td>
<td>Desalination Outfall Pipe</td>
</tr>
<tr>
<td></td>
<td>Seine Nets</td>
<td>Use Conflict</td>
</tr>
</tbody>
</table>
After completion of all of the mapping exercises, the geodatabase attribute schema was developed for each of the different feature classes (listed above). Information collected on paper maps from the various mapping exercises was digitized (either as points, lines or polygons) and all of the individual islands’ datasets merged together using the ArcEditor 9.3 GIS software. A total of 17 new feature class shapefiles were created as a result of these community mapping exercises. FGDC compliant metadata was also created in ArcGIS for each feature class developed. Final atlas maps were created (Figure 3) for each island and printed for distribution and for validation and feedback in a series of community meetings to be held within each of the Grenadine islands during August–September of 2009. Participatory feedback and evaluation techniques central to collaborative research principles will be used for this validation exercise. After this final maps will be released.
Information obtained from these mapping exercises will be used to compare areas in which scientific information is available (where possible) but will primarily supplement the limited scientific information that currently exists for the Grenadine islands. This information is crucial in that it will capture the wealth of local knowledge about existing marine resources, space-use patterns and threats in light of limited scientific information. By incorporating these types of local knowledge into the information base, it is hoped can allow for more informed decision-making in regards to marine conservation and sustainable development within the Grenadine islands despite the physical and financial obstacles currently faced by this transboundary island chain.

Remaining research activities include the marine habitat mapping cruise to be held from August 15th – September 5th 2009. Marine habitat data will be collected using a combination of ground-truthing for the shallower coastal waters and a live-action drop camera will be deployed off the stern of the catamaran in deeper waters up to 250 ft in order to create a baseline 3-D marine habitat map for the Grenada Bank. Moreover, all datasets created as a result of these Mapping Exercises will be presented and validated in a series of community meetings held in each of the Grenadines Islands. The MarSIS catamaran research crew will consist of two Grenadines fishers, a marine park ranger from the Tobago Cays Marine Park, a local captain and two fisheries biologists from the UWI. This cruise is sponsored by The Moorings, Lighthouse Foundation/Sustainable Grenadines, Mustique Company, Tobago Cays Marine Park and the CERMES Dept. of the University of the West Indies.

In November 2009, a series of four stakeholder utilisation and final evaluation of the MarSIS workshops will be conducted. These workshops will examine the practical application, added value and cost of using this alternative approach. A variety of participants including: government, marine resource users and local NGO stakeholders will be guided through a series of structured computer exercises to test the application of the MarSIS geodatabase and quality of information generated. Participation will be examined in terms of the
added value of the multi-knowledge system information produced and the increases of cost in terms of time and resources. Evaluation surveys will be administered to critique both the overall functional usefulness of the geodatabase as well as to appraise the use of participatory research, communication and validation mechanisms applied throughout the research.

Acknowledgments
This portion of the MarSIS research was made possible by the PADI Project AWARE Foundation grant funding which was awarded to the Grenadines MarSIS research in May 2009. Much appreciation and thanks goes out to the AWARE Foundation. The completion of this series of mapping exercises and the documentation of local knowledge of the marine resources of the Grenadines would not have been possible without your financial assistance! In addition, I would like to acknowledge the continued assistance of the ESRI GIS Conservation grant program which recently awarded a second conservation grant to the MarSIS research. This grant entailed additional GIS software, training courses, books and attendance to the 2009 International GIS Users Conference held in San Diego, CA from July 12-17th. A presentation was made at the conference reviewing the MarSIS research methods and these mapping exercises in the Conservation Hall on Wednesday July 14th. Thanks again ESRI – all of the various training and software support received have been phenomenal!
Appendix I. Local knowledge feature classes and corresponding letter codes used in mapping exercises.

RESOURCES: areas that provide food or other materials of value to community

- **Sea Turtles - Nesting Beaches & Feeding Areas (T)**
- **Sea Birds - Roosting Area (B)**
- **Baitfish Bay (BB)**
- **Seamoss (M)**
- **Wilks (W)**

- **Oysters (O)**
- **Iguanas (I)**
- **Sea eggs (SE)**
- **Wild Goats (G)**

**USES, LIVELIHOODS & OPPORTUNITIES:** areas that provide benefits to community

- **Recreational Area (RA)**
- **Nursery Area (NA)**
Shipwreck (SW)

Historical Area (HA)

Anchorage (A)

Landing Site (LS)

Shoreline Protection (SP)

Livelihood Areas:
Ship Building (SB), Aquaculture (A), Vending (V)
PROBLEMS, CONFLICTS & ISSUES: areas that pose a problem or threat to community
### Appendix II: MarSIS Publications & Presentations

<table>
<thead>
<tr>
<th>Year</th>
<th>Author(s)</th>
<th>Title</th>
<th>Details</th>
</tr>
</thead>
</table>


All relevant documents, maps & surveys can be accessed on:

The MarSIS research webpage:

www.grenadinesmarsis.com

or

and the MarSIS Yahoo E-group at:

http://tech.groups.yahoo.com/group/grenadinesMarSIS/