

**Coral Bay Watershed:  
Development of Management Measures for  
Sediment and Pollution Reduction  
Phase II**

Final Report

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## **Abstract**

Non-point source pollution of coastal embayments resulting from runoff contamination, sediment deposition and the health hazards caused by dumping of unregulated human waste is a common problem in the Virgin Islands and in most small, mountainous, tropical islands throughout the Caribbean and Pacific regions.

The Coral Bay watershed, St. John, United States Virgin Islands, with the highest population growth rate in the Virgin Islands, is typical of many watersheds throughout the Virgin Islands and the Caribbean, having a large watershed to bay area ratio. Many miles of unpaved roads and inappropriate land uses cause runoff and sedimentation, leading to poor water quality and deterioration of marine resources in waters extending well offshore and into the benthic zone.

A Phase I study within this watershed and the surrounding marine waters, funded by the Non-Point Source Pollution Program 319 Program at the Department of Planning and Natural Resources, USVI, has investigated sediment deposition rates, sediment deposition history and the impact on water quality, and coral reef health. This Phase II study has contributed to this project by developing and demonstrating management procedures applicable to many small, mountainous tropical islands trying to preserve the natural environment.

Utilizing the results of the previous work and a knowledge of current watershed management practices, the present project has helped to organize and educate the watershed residents, develop an Island Best Management Practices organization, prepared and distributed printed information, completed a preliminary Marine Resource Inventory, developed a foundation for a GIS Watershed Atlas, and prepared a conceptual stormwater management plan for the entire Coral Bay watershed. Lessons learned in executing this project will surely have an impact on management of similar situations and communities elsewhere.

## **Introduction**

The primary objective of this project is to use the previously collected data to educate and organize the critical audience of residents, businesses and visitors to non-point source issues affecting water quality in the Coral Bay watershed and to assist them in organizing a Watershed Residents Association. The methodology of a watershed focus, where residents have a common identifiable interest in quality of life, has a high impact and transferability within small watershed communities typical of many Caribbean and Pacific locations.

## **Project Activities Summary**

### **1. Methodology**

A variety of methods will be used to meet the objectives of this project. The list of several of the objectives are associated with organizing people in the community, developing educational information, and providing educational meetings to share this information. Other objectives for this project will require more specific methods to gather information.

Coral Bay Watershed Residents Association - Previous projects have demonstrated the need for a community organization to respond to non-point source water quality threats. Using standard methods of community communication ( flyers, brochures, newspapers, radio ads and word of mouth) a Residents Association was organized to meet and discuss activities to protect water quality of Coral Bay. Stakeholders were organized to form committees to address specific issues. The Coral Bay Community Council formed and elected a Board of Directors, began a membership drive, held monthly information and educational meetings and focuses on community issues.

Island Green Building Association – Using a model developed by the National Green Building Association, a group of concerned residents, both professional and lay persons, formed, elected a Board and began the effort to develop Green Building Standards for use in the USVI as well as on nearby islands. Methods for this organization included development of membership, local advertising, Sustainable Green Building standards and educational events to inform the public and private organizations about the impact of inappropriate land use on coastal water quality.

Coral Reef and Natural Resource Assessment – This effort will use the Coral Reef Video Transect Sampling methodology currently in use by U.S. Geological Survey, National Park Service and the University of the Virgin Islands to survey the natural resources of the inner harbor and greater Bay area and develop a map of these resource locations for use in planning and management of Bay waters.

Conceptual Stormwater Management Plan , Coral Bay Watershed - A professional Engineering Firm was hired to complete the task of gathering, modeling and evaluating hydraulic studies of the watershed using the TR55 methodology and physical data supplied by CDC Geographic Information System data layers. From these data, preliminary sediment retention and detention ponds and end-of pipe structures were sized sited and proposed for reducing inputs to Bay water quality. Drainage computations once completed, and preliminary calculations will determine the stormwater alternatives available to address the sedimentation and runoff problems using standard and new, innovative approaches to protecting water quality in steep, tropical watersheds.

Watershed Atlas – Using existing GIS methodology, all data layers useful for watershed planning will be gathered into a hardcopy and digital atlas of the Coral Bay watershed. This will include data layers for topography, vegetation, marine communities, slope analysis, watershed bounds, National Park bounds, Coral Reef National Monument bounds, Area of Particular Concern bounds, soils, bathymetry, flood hazard, existing and proposed zoning and land use changes.

#### Coral Bay Roads Mapping and Rescue Locator System

Using Geographic Information System technology, road types (Primary, Secondary, Paved and Unpaved) were mapped throughout the watershed to understand the extent of pervious and impervious surfaces and their potential impact on water resources.

**2. Principal findings and significance** – This project commenced on February 1, 2004. Activities and efforts conducted to date have completed the following:

1. Watershed Residents Community Organization- A Residents Association, *the Coral Bay Community Council* was organized in February 2004 and membership to date is over 185 of 700 residents. Four committees have been formed, *Land Use and Watershed Protection, Ocean Use and Protection, Infrastructure and Services, and Watershed History and Preservation*. All committees are active in educating, informing and organizing residents, making choices and implementing Best Management Practices. Monthly meetings are held to provide educational programs for residents, Coastal Zone Management and Planning and Natural Resource issues are reviewed and recommendations made, and the group organizes data gathering efforts to provide water quality and natural resource strategies. A website ( [www.coralbaycommunitycouncil.org](http://www.coralbaycommunitycouncil.org) ) provides current information on the groups activities.
2. Island Green Building Association (IGBA) – A Best Management Practices (BMP) organization was formed in August 2004. This group developed a publication, “Guiding Principles of Sustainable Green Building Design and Construction” for educating residents, contractors, and government staff in the Best Management Practices. In addition, a website ( [www.igba-stjohn.org](http://www.igba-stjohn.org) ) was developed to provide current and innovative methods to protect the landscape and water quality around the island. The organization while new, has met monthly,

gotten numerous articles published in several local newspapers and provided more than a dozen presentations to local businesses and groups.

3. Watershed Brochure – A watershed Brochure was completed. This publication has been made available to all residents and visitors, and describes the Resources and Issues prevalent in Coral Bay watershed. Additionally, it gives background information on the watershed association, contact information, meeting schedule, membership application, mission and vision statements.
4. GIS Watershed Atlas – Strategic planning to protect water quality resources requires the latest information in a digital and printable hardcopy format. The initial data layers for the Atlas were gathered, prepared, and developed into a work-in progress Atlas of physical, geographic and biological information. The final system will include multiple layers of all information needed to make sound decisions in the watershed. Layers and maps of topography, vegetation, marine communities, slope analysis, homes, roads, watershed bounds, soils, bathymetry, flood hazard, existing and proposed zoning and land use changes, National Park bounds (VINP), Coral Reef National Monument (VICRNM) bounds, and Area of Particular Concern bounds (APC).
5. Preliminary Stormwater Management Plan – Final delivery of the, “*Conceptual Stormwater Management Plan – Coral Bay Watershed, Final Letter Report (May 2005)*” has been received from Camp, Dresser, McKee Inc. This detailed report includes, background, data collection, preliminary engineering analysis, hydrologic model, conceptual design alternatives analysis and recommendations for addressing stormwater management from a watershed perspective. Stage two will be directed at planning the actual stormwater structures, their location hydrologically and parcel based
6. Natural Resource Inventory and Reef Assessment – A preliminary Report “Outline for a Coral Bay Area of Particular Concern Marine Inventory” was completed. GIS maps were generated of all existing marine resources and will be used to assist in long term planning for the Bay and to provide the necessary data for addressing CZM applications within the watershed.
7. Coral Bay Road and Home Maps – The location, size and type of roads in the watershed are critical factors for determining problematic sediment locations. The GIS road and residence data layers have been completed. Road data is largely complete, names are being added for ID. More than 300 residents have been located on a master digital map. These data will be incorporated into the Atlas, but the data will also be used to identify problem areas within the watershed for priority stormwater repairs to be reviewed along with the stormwater This information was developed into a GIS database and hardcopy mapping of problem areas, guts, home locations, drainage structures took place management plan. The information is used to assist in determining priorities for development of the Stormwater Management Plan. In addition, as the island has no mapping

for rescue due to lack of maps and street names, the system is being adapted by St. John Rescue, Emergency Medical Technicians, Fire and Police as a means of locating and reaching residents in medical emergency.

### **3. Publications produced/ Presentations made**

#### **Publications**

Coldron, S. and B. Devine. 2004. Coral Bay Community Council brochure and membership information. CBCC, 8-1 Estate Emmaus, Coral Bay, St. John, V.I.

Devine, B. and S. Coldron. 2004. Coral Bay Watershed Resources and Issues. CBCC, 8-1 Estate Emmaus, Coral Bay, St. John, V.I.

Devine, B. et al. 2005. Guiding Principles of Sustainable Green Building Design and Construction. Island Green Building Association. c/o Friends of the Virgin Islands National Park. P.O. Box 811, St John, V.I.

Myers, K., Devine, B., and S. Coldron. 2004. Outline for a Coral Bay Area of Particular Concern Marine Inventory. Coral Bay Community Council. 47pp.

Schwartz, L., and D. Honour. 2005. Conceptual Stormwater Management Plan: Coral Bay Watershed, Final Letter Report (May 2005). Eastern Caribbean Center, University of the Virgin Islands. 27pp.

#### **Presentations**

The following presentations of information have been made regarding this project to the Coral Bay Community Council or by persons involved in these projects

1. "Coral Bay Sediment and Reef Assessment Project" (3 presentations) – Barry Devine  
Coral Bay Community Organization  
St. John Rotary  
NOAA/EPA Land-Based Sources of Pollution Conference –
2. Cooperative Extension Service – "Keeping a Healthy Septic System",
3. "Planting for erosion control and drought tolerance". – Eleanor Gibney
4. "Visioning – Planning the Future of Coral Bay" Terri Mars (planning workshop)
5. "Infrastructure Plans for Coral Bay" – Ira Wade, Dept. of Public Works
6. "Comprehensive Land Use Plans and Zoning Revisions" – CZM/DPNR
7. "Coastal Zone Management and Building Regulations" – Bill Rohring, CZM
8. "The Coral Reef Early Warning System" – Jim Hendee, NOAA
9. "Calabash Boom Affordable Housing Project" – Clifford Graham, VIHFA
10. "Natural Resources Inventory of Coral Bay" – Kimberly Myers
11. "Meet Your Virgin Islands Senators" – Senators, David, Hill and Barschinger
12. "Innovative Cable and Telephone Services" – Innovative
13. "Island Green Building Association Guidelines" –

- Coral Bay Community Council - Doug White, Architect
- St. John Rotary – Barry Devine
- Friends of the Virgin Islands National Park – Joe Kessler
- St. John Realtors Association General Meeting – Barry Devine
- VI Territorial Realtors Association – Christy O’Neill
- Vermont Law School Colloquium – Brian Bell
- St. John Flower and Garden Show – Barry Devine
- Maho Bay Sustainable Building Forum – Brian Bell
- 14. “Emmaus Moravian Church Development Plans” – Karl Percell, Attorney
- 15. “Voter Registration Drive” – Coral bay Community Council
- 16. “Coral Bay Roads, Signs and Emergency Services” – Kent Irish
- 17. “VI Police Department Neighborhood Watch” – St. John Police Dept.

- 4. **Student Involvement – None**
- 5. **Notable Awards and Achievements – None**

#### **4. Project Results and Deliverables**

##### Coral Bay Watershed Residents Association

- Coral Bay Community Council (CBCC) brochure. Watershed resources, issues and membership information. 1000 printed and distributed.
- 175+ membership, staff of 20 volunteers
- CBCC website ( [www.coralbaycommunitycouncil.org](http://www.coralbaycommunitycouncil.org) )
- CBCC newsletters, newspaper articles sampling

##### Island Green Building Association – Best Management Practices education

- Island Green Building Association (IGBA) brochure. Mission statement, principles for sustainable green building design. 1000 printed and distributed to builders, realtors, residents, business people.
- Membership of 30; website ([www.igba-stjohn.org](http://www.igba-stjohn.org))
- Presentations to 6 community groups including, Rotary, Land Trust, Vermont Law School, Maho Camps, St. John Realtors.
  - Meetings last Saturday of the month.

##### GIS Watershed Atlas

- Digital Watershed Data Atlas: The following list of more than 15 data layers have been gathered as the foundation of this local planning tool. Future plans call for a local GIS workstation for community use.
  - Data layers: Topography (2’), slope analysis, watershed delineations, vegetation communities, marine communities,

bathymetry, sediment deposition, guts and drainage, Area of Particular Concern boundaries, soils, wetlands, VI National Park and Coral Reef National Monument boundaries, parcels, zoning, roads and types of surface, residence locator.

- **Hardcopy Atlas:** A paper atlas is vital to the planning process and to residents without digital capability. However, it requires considerable artistic talent as well as time to complete. We envision an atlas of 15-20 pages based on multiple layers of Data. We have included the first 5-6 pages of significant data layers and will continue with volunteer time to complete the full atlas.

### Preliminary Stormwater Management Plan

Initial development of a Stormwater Management Plan for the entire watershed. The consulting report completed with CDC assistance and direction includes background, data collection, preliminary engineering analysis, hydrologic model, subbasin boundaries, existing land use, soils, results and conceptual design alternatives analysis. In addition, plans and measures are offered for types of structures and potential siting locations for Phase II efforts. A number of GIS data layers are prepared along with final recommendations for engineering design.

### Coral Bay Watershed Natural Resource Inventory and Reef Assessment

A draft "Outline for a Coral Bay Area of particular Concern Marine Inventory" has been completed by an Intern working for CBCC. The paper includes Study area and site description, Scope of Inventory, Goals and Objectives, Research and Study Methods, Results, Recommendations and Appendices of biological data collected.

### Coral Bay Road and Home Locator System

This initial system maps all roads within the watershed, classifies them to type and develops quantitative information on amount of roadway surface contributing to non-point source sediment pollution. Problem drainage areas are determined and priorities are established for BMP' development and application. In addition, the locator system sets the foundation for a rescue locator system for residents.



## **5. Recommendations**

Coral Bay is a representative watershed in the Virgin Islands and across the Caribbean region. Low level development and a high growth rate are issues that most watershed communities must deal with. The formation of a citizen's advisory group and the thoughtful planning of local activities can provide valuable direction for a growing town. The largest and most important issues for small communities are similar and the lessons learned here can be adapted for many other locations. It is process that is important in setting the stage for citizen action.

This project involved several components, citizen action and information as well as research and data collection. The components allowed for the initiation by the residents of a local organization to assist with planning for the future within the watershed. In addition, specific information was collected and developed for use in aiding the citizens group with their planning activities.

Coral Bay has successfully organized residents and action committees to address pressing issues and take a proactive approach to the future. Several of the activities begun with this project should be continued in order to fully address needed changes for protection of water resources within the watershed.