

US Virgin Islands Coral Reef Initiative 1999-2004

Background

The US Virgin Islands are located about 1,400 miles south-southeast of Florida, at 65 degrees west longitude and 18.3 degrees north latitude. St. Croix, St. John, and St. Thomas are the three largest islands. However, there are many offshore cays that dot the waters surrounding the three main islands.

The Virgin Islands' climate is temperate, with temperatures ranging from approximately 78 degrees Fahrenheit to 94 degrees Fahrenheit. The surrounding waters remain almost constant year round with temperatures ranging from 75 degrees Fahrenheit in the winter months to 85 degrees Fahrenheit during the summer months.

The topography of St. Thomas and St. John primarily consists of steep mountains which form lush, vegetated valleys that slope gently to the shoreline. St. Croix is not as mountainous as the other two islands, but run-off does reach the shoreline during high rainfall events.

The shoreline of each island is characterized by deep indentations that form bays. Cobblestones line some shorelines, while white sandy beaches or mangrove forests line others. In other places, the land ends abruptly at steep shoreline cliffs. Many bays have ponds located just landward of the shoreline. These ponds act as sediment traps, filtering sediment-laden runoff before it reaches the ocean. In addition, these ponds provide important breeding habitats and feeding grounds for many different species such as waterfowl, wading birds, and crabs.

Magnificent coral formations can be found in the waters surrounding the Virgin Islands (VI). The warm constant water temperature and remarkable clarity provide ideal conditions for coral reef growth. Coral reefs can be found extending out from the jagged cliffs and along the shorelines of the islands and surrounding cays. The cliffs form rocky outcrops on the ocean bottom, thus providing the solid surface to which corals must attach. The coral reefs in the Virgin Islands are shallow fringing reefs that parallel the coastlines. Many of them have been established on a framework of coral skeletons that has taken thousands of years to develop. Some of the VI coral reefs are found many miles from land where the ocean floor rises close to the surface.

The Virgin Islands' coral reefs are, as elsewhere, very fragile. The coral reefs' health depends upon a delicate natural balance. They must have bright sunlight, stable salinity, and a water temperature that stays between 70 to 85 degrees in order to thrive. Clear

water, couples with a relatively shallow depth and plenty of sunlight allow the symbiotic algae within the coral polyps to photosynthesize and produce nutrients needed by both organisms. Gentle wave action is also needed to remove the sediment from coral reefs that would otherwise suffocate and smother them. Wave action also brings a steady supply of planktonic organisms on which the coral polyps feed.

Statement of the Problem

The Virgin Islands' coral reef ecosystems are under heavy pressures. Hurricanes and other major storms, higher than normal wave and water temperatures, and diseases that have affected the coral reefs and their inhabitants have combined with destructive boat anchoring practices, boat groundings and cargo spills, careless land usage, improper dredging practices, and over-fishing to cause dramatic deterioration of the Virgin Islands' coral reefs. Within the last 15 to 20 years, the amount of live coral has declined dramatically, while the abundance of algal life forms has increased proportionately. The increase in algae most likely reflects the increase in available substrate due to coral polyp death and an inability of herbivorous fish and sea urchins to maintain control of algal growth.

Since controlling the destructive forces of nature is beyond our capabilities, we must focus our attention on correcting those human practices which have negative impacts upon our coral reefs and other ocean resources. Following are some of the human activities that require our attention.

Diving and Snorkeling – The Virgin Islands' beaches and coral reefs attract over one million visitors annually. This is in addition to the many residents who utilize these resources for many different reasons. Numerous visitors snorkel or scuba dive over the reefs to view the vast variety of marine species that they support. While no studies have documented exactly how an increase in the number of snorkelers and scuba divers at a reef results in increased reef damage, we do know that breakage occurs when the coral is stood upon, hit by flippers, or otherwise touched.

Even though coral reefs appear to be hard, like rock, they are really very fragile. Touching or stepping on the coral kills the fragile coral polyps. While some of this damage is intentionally done by souvenir seekers breaking off pieces to take home, much of the damage appears to be accidental. Apparently many first-time snorkelers do not know or understand the delicate and fragile nature of coral reefs and how long it takes one to grow and develop.

Anchor Damage – Closely related to the type of destruction caused by swimmers is anchor damage. This is caused by boaters carelessly dropping anchors on coral reefs and in sea grass beds. The number of boats utilizing the Virgin Islands waters has increased tremendously over the past ten to fifteen years. Many of these vessels are bareboat charters, which are crewed or captained by visitors unfamiliar with the territorial waters. Consequently, anchors are dropped on coral reefs, causing breakage and death to the coral polyps. Within the past seven years, the Virgin Islands Park Service officials began diving on sites as mid-size to large vessels drop anchors. In one 1987 case a mini-cruise

ship, “Windspirit,” inadvertently dropped anchor on a coral reef. The Virgin Islands National Park successfully prosecuted the case and received an award of monetary damages from the cruise line.

Boating – Within the past ten years, the National Park Service has begun documenting cases of boat grounding. Much of this information has been received from people witnessing such groundings, and from cases where a vessel has become disabled and cannot free itself. This is also primarily caused by bareboat charterers who are unfamiliar with the territorial waters.

Overfishing – Another cause of reef degradation is a decrease in the reef fish population. This is a growing concern among marine scientists. Overfishing is thought to be the cause of this decrease. Some Virgin Islands’ fishermen make their living from fishing, while others simply fish for recreation. Overfishing is possibly the result of commercial fishermen increasing bag limits to keep pace with the Virgin Islands’ rising cost-of-living. Currently, it is one of the more expensive jurisdictions in the US.

The National Park Service conducted a study on the effects of trap fishing on fish assemblages within the Virgin Islands National Park and Buck Islands Reef National Monument. Using historical information and experimental trapping, the report concluded that commercial and sustenance fishing (primarily trap fishing) is responsible for fish population declines (Beets 1996).

The issue of overfishing has potential political ramifications, and therefore, may not have any easy answers. One possible solution, increased regulations, may be unpopular among politicians due to possible sociological and economic ramifications.

Waste Disposal – Because of its magnificent coral reefs and crystal clear blue waters, the Virgin Islands has a large marine industry. One facet of this industry, the charter boat business, attracts a large number of people. Many of these charter boat owners live aboard their vessels. However, only three marina pump-out stations exist in the Virgin Islands to accommodate the large number of vessels utilizing the territorial waters. The many marine industry support personnel, who find it less expensive to live aboard vessels that they own, compound the problem of waste disposal. While many of the boats are equipped with holding tanks, the current law requires that a boat be three miles offshore prior to having its tanks pumped out. It is safe to assume this law is not universally followed. Consequently, much sewage is pumped directly into the bays surrounding the islands. This has increased the nutrient levels of the nearshore waters and has had a negative impact on the fragile balance of the marine ecosystem.

Sedimentation – Currently, the major stress placed upon the Virgin Islands’ coral reefs is the result of terrigenous runoff due to deforestation for upland construction. Siltation, caused by soil eroded by excessive runoff, has the following deleterious impacts on coral reefs: (a) increased levels of turbidity reduce sunlight penetration, thus interfering with photosynthesis; (b) sediment covered surfaces which are too soft and unstable for coral and invertebrate larvae to colonize, thus reducing reproduction rates; and (c) sediment

physically settling on the coral polyps, thereby interfering with a polyp's ability to capture food and other nutrients, thus leading to death.

Rapid population growth in the Virgin Islands has had a detrimental effect on the coastline and nearshore areas. The increased population growth has led to an increase in housing needs and infrastructure development. The general practice of clearing land for housing has been to remove all the vegetation from the site. There have also been many roads and driveways that have been poorly designed and constructed. The negative environmental impact from these activities is magnified by the islands steep topography. These practices and topography result in sediment-laden runoff entering the bays during periods of medium and heavy rainfall. This is obvious as large plumes of brown are seen entering the water in most bays and harbors after such rainfall events.

A theoretical study of sediment runoff indicated that reef distribution around St. John is a function of watershed size, bay exposure, and bathymetry, distance from sources of land-derived sediments and storms (Hubbard 1997). Current development of private land and construction of new and unpaved roads have increased the flow of sediment into nearshore waters (Anderson 1994).

For many years scientists have monitored the growth of coral reefs in various locations around the Virgin Islands. Their efforts have detected the negative impacts the problems stated above have had on coral reef health. The Department of Planning and Natural Resources, through its Division of Fish and Wildlife, and the National Park Service are two agencies collecting data through ongoing reef monitoring.

It appears that coral reefs are adequately protected under existing Virgin Islands' environmental statutes. Most of these are broader in scope than just reef protection, but some are aimed directly at the coral reef environment. However, the primary reason for the destruction of coral reefs is due to the lack of the public understanding of the importance of coral reefs to our environmental and economic well-being. Coral reefs have historically been damaged from improper boating practices, snorkelers, scuba divers, and shoreline development.

The project proposals have been designed to help managers gain a better understanding of the scientific conditions of coral reefs and to address the public awareness issues that are key to improving overall coral reef management in the US Virgin Islands.

A. Project:	Coral Reef Program Coordinator
Lead Agency:	Department of Planning and Natural Resources
Priority:	High
Start Date:	FY 00
Duration:	Ongoing
USCRTF Reference:	Information Synthesis

Project Description

One scientist (Ph.D. level) will be hired to facilitate and organize the various projects that relate to coral reef management. This person would have experience in both the scientific and administrative areas so that they can be tasked with one or more of the projects while being able to administer the overall program.

Benefits

By selecting a lead person to coordinate the coral reef work, there will be a central venue for dealing with inquiries and for information dissemination about coral reefs. The Coordinator will also be able to minimize the possibility of duplicative efforts by coordinating ongoing work in the territory and ongoing work in other islands and states.

Budget Estimate: \$65,000.00 per year for salary, benefits and travel, \$15,000.00 first year for office setup.

B. Project:	Develop Coral Reef Curriculum for Schools
Lead Agency:	Department of Planning and Natural Resources & Department of Education
Priority:	High
Start Date:	FY 00
Duration:	18 months
USCRTF Reference:	Education

Project Description

Through coordination with the Department of Education, the development of a program of approximately one week in length for use in grade or high school science classes will be undertaken. This will be based upon the EPA Coral Reef book, and the films and videos which the Coastal Zone Management Program (Program) currently has. Segments of the week-long program would focus not just on a coral reef's biology and the surrounding ecosystem, but also on the effects of different types of pollution, watershed management, safe boating practices, and practical ways in which individuals can help protect and improve the Virgin Islands' coral reefs and related ecosystems. The Division will provide training workshops on the marine environment for teachers. Training will consist of two workshops, one on St. Croix, the other on St. Thomas. If successfully implemented, the Division will consider yearly or every other year workshops which will incorporate new information discovered since the last workshop.

Benefits

By introducing the importance of coral reefs to children, the information would be passed on to parents and a general shift in attitude and behavior towards the protection of coral reefs could be expected.

Budget Estimate: \$30,000.00 for the first year for consultants, workshops, inter-island travel and copy & distribution of educational material. \$5,000.00 per year for updates thereafter.

C. Project:	Develop Mobile Information Exhibit
Lead Agency:	Department of Planning and Natural Resources
Priority:	High
Start Date:	FY 00
Duration:	One Year
USCRTF Reference:	Education

Description

This project will involve developing a mobile information exhibit that can be used during Earth Day exhibitions, Coast Weeks, and at other times to distribute information to the public. Interactive exhibits will be used to show how pollution and environmental degradation in the USVI ultimately ends up negatively affecting the surrounding coral reefs. There will also be more traditional methods of disseminating information available, such as pamphlets and bumper stickers. Personnel staffing the exhibit will be able to meet people face to face, thus humanizing the messages to not pollute, pick up trash, and the need to clean up beaches and roads.

Benefits

The public will be informed as much as possible throughout the year about the need to conserve remaining reefs. The Division will be focusing on educating the public and building grassroots support for achieving the goal of preserving the Virgin Islands' remaining coral reefs and related ecosystems.

Budget Estimate: \$10,000.00

D. Project: **Outreach to the Business Community**
Lead Agency: Department of Planning and Natural Resources
Priority: High
Start Date: FY 01
Duration: One Year
USCRTF Reference: Education

Project Description

Produce a program to present to Chamber of Commerce meetings and other clubs, religious, or civic meetings or groups. Statistics will be obtained from the Virgin Islands Department of Tourism on how much money tourists spend in the VI and where the money is spent. Considering that a large number of tourists visit the Virgin Islands because of the beaches, snorkeling, and diving opportunities, the Division will then correlate the spending patterns to show how healthy reefs benefit our economy.

Benefits

By documenting the economic value of coral reefs, the business sector would be more apt to promote and sponsor efforts which will help to protect a valuable resource to the economy.

Budget Estimate: \$18,000.00

E. Project:	Baseline Information and Research
Lead Agency:	Department of Planning and Natural Resources
Priority:	High
Start Date:	FY 99
Duration:	3 Years
USCRTF Reference:	Mapping and Information Synthesis

Project Description

This project has commenced with over-flights by NOAA to map the near-shore coral reefs around the major Virgin Islands. Completion of this project will result in digitization of all near-shore reefs and overlays of adjacent land-based development to include population density.

Benefits

This information would be used in conjunction with the Divisions' GIS program to guide development into areas that would result in minimal impact to coastal resources. Where unavoidable, development in environmentally sensitive watersheds could be more rigorously managed and mitigated to minimize adverse impacts.

Budget Estimate: \$350,000.00 which includes acquisition of data, classification scheme development and training for efficient use of acquired data.

F. Project:	Enforcement
Lead Agency:	Department of Planning and Natural Resources
Priority:	High
Start Date:	FY 00
Duration:	One Year/Ongoing
USCRTF Reference:	Coastal Uses

Description

This project will provide the hiring, training and equipment for at least four environmental officers involved in marine law. Training will be provided to educate the officers about the laws which protect coral reefs specifically and other laws related to coastal resource protection, generally. the officers will be provided with equipment and supplies that would allow them to survey the territorial waters to ensure compliance with these laws in a professional manner.

Benefits

The presence of officers ready to enforce marine laws for the protection of resources in itself would serve as a hindrance to violations. The officers, in their enforcement role will also educate users by providing pamphlets and other educational material about the marine laws which they enforce and other pertinent information.

Budget Estimate: \$120,000.00 for the purchase of equipment, supplies, and training for four environmental officers (\$60,000.00 for each district).
\$75,000.00 each additional year thereafter.

G. Project:	Monitoring
Lead Agency:	Department of Planning and Natural Resources & University of the Virgin Islands
Priority:	High
Start Date:	FY 00
Duration:	Ongoing
USCRTF Reference:	Water and Air Quality

Description

This project will involve monitoring of coral reefs that are not currently part of an existing monitoring program. Monitoring will be associated with reef fish population surveys and measurements of selected water quality parameters. Training will be provided for staff from the Department of Planning and Natural Resources along with staff from the University of the Virgin Islands in the methodological and technical approaches to monitor reef. Because of the proximity to Puerto Rico, monitoring strategies will be collaborated with scientists from the University of Puerto Rico to ensure usability and compatibility of data collected.

Benefits

The availability of baseline data is critical to any long-term restoration or preservation effort. As the Clean Water Action Plan moves toward implementation of the watershed restoration strategy, this data will help to evaluate the effectiveness of best management practices (BMP's) on water quality and ultimately on coral reefs.

Budget Estimate: \$90,000.00 includes salary for one new position, funding for the purchase of necessary equipment and supplies, and travel between the islands and Puerto Rico. \$75,000.00 per year thereafter.

H. Project:	Comprehensive Assessment of Virgin Islands Marine Resources
Lead Agency:	The University of the Virgin Islands
Priority:	Medium
Start Date:	FY 00
Duration:	3 Years
USCRTF Reference:	Information Synthesis

Description

The US Virgin Islands marine resources include coral reefs, seagrass beds and mangrove lagoons along the shoreline of the three main Virgin Islands. Although these habitats act as important nursery areas for commercially valuable species such as snappers, lobster, and conch, they are currently being impacted by human activities including shoreline development, sedimentation, and pollution. In addition to these near-shore habitats, the Virgin Islands are surrounded by isolated coral reefs on the mid-shelf and shelf edge regions of the Virgin Islands plateau. These extensive, yet poorly known, coral reefs function as important spawning aggregation sites for a variety of grouper and snapper species. Together, these three major reef systems provide the essential habitats for sustaining our renewable marine resources. It is essential that management agencies understand the linkages between coastal marine habitats and the fish populations that rely on these habitats as nursery grounds and breeding sites.

This project will provide baseline data essential for evaluating the effectiveness of future management actions. Since many reef fish species utilize all of these habitats throughout various stages of their life cycle, understanding the linkages is necessary for informed management decisions.

Benefits

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Budget Estimate: \$100,000.00 for salary for two positions and for the purchase of necessary equipment and travel, \$80,000.00 per year thereafter.

I. Project:	State of the Reefs Report
Lead Agency:	Department of Planning and Natural Resources and the University of the Virgin Islands
Priority:	High
Start Date:	FY 00
Duration:	Ongoing
USCRTF Reference:	Information Synthesis

Project Description

Produce a printed document and a link to The Virgin Islands Coastal Zone Management Program homepage that describes the status of the Virgin Islands’ reefs annually. The document will include status reports of ongoing projects and identify areas for future research needs.

Benefits

Will provide concise up-to-date information about reefs in the VI that would be useful to policy makers, scientists and others. The information will assist those at the decision making level to plan for the future based on current information.

Budget Estimate: \$15,000.00 which includes costs for layout, design, printing and distribution of the report as well as the costs for linking this information to the VICZM homepage.

Summary Sheet

A. Project: Coral Reef Program Coordinator	\$ 80,000.00
B. Project: Develop Coral Reef Curriculum for Schools	35,000.00
C. Project: Develop Mobile Information Exhibit	10,000.00
D. Project: Outreach to the Business Community	18,000.00
E. Project: Baseline Information and Research	350,000.00
F. Project: Enforcement	120,000.00
G. Project: Monitoring	165,000.00
H. Project: Comprehensive Assessment of Virgin Islands Marine Resources	180,000.00
I. Project: State of the Reefs Report	\$15,000.00
BUDGET TOTAL	\$973,000.00