Addressing Global Threats at Local Scales in Coral Reef Communities: Outcomes and Lessons Learned from the NOAA/CRCP Partnership
A Public and Private Partnership
Where are Florida’s Coral Reefs?
Disturbance Response Monitoring (DRM)
• Water Temperature as low as 8°C
• 15°C is critical low temperature for Corals
• Most Severe Cold Water in Upper Keys and Middle Keys Nearshore Zones
2010 January Cold Water Event
Florida Reef Tract
Coral Bleaching Response Plan
2005-2010 Data Analysis

Inverse distance weight interpolations of FRRP data
Improving Management of Florida's Reefs.
Florida Keys National Marine Sanctuary

- 2900 nm² / 10,000 km²
- Jurisdiction to mean high tide
- Surrounds Florida Keys
- Co-trustee Management with State of Florida
- 60% State Waters
- 40% Federal Waters
- 1600 Keys / 1800 miles of shoreline
Partnerships for Coral Reef Conservation in the Virgin Islands

Aaron Hutchins, Program Director
Virgin Islands and Puerto Rico
Coral Assembly 2011

Puerto Rico, US and British Virgin Islands: Improving Regional Reef Management

www.reefconnect.org
The St. Croix East End Marine Park (STXEEMP)

The updated 2013 STXEEMP management plan contains the roadmap for effectively conserving the coastal and marine, natural and cultural resources of the east end of St. Croix.

In recognition of the importance of adjacent natural and cultural resources as well as the imminent threats to them, a collaborative planning process between the STXEEMP community and the Virgin Islands Department of Planning and Natural Resources, implementation partners, University of the Virgin Islands and The Nature Conservancy was initiated in July 2012 to update the 2002 management plan, provide the long-term vision for the area and guide near-term (3-5 years) objectives and activities. The updated management plan does not contain any new rules or regulations that do not already exist in VI Code.
Virgin Islands: Protected Areas

- Shelf (200m Depth)
- Territorial Boundary
- Marine Protected Area and Level of Government
  - Federally Managed
  - Locally Managed
  - Jointly Managed

Virgin Islands Marine Protected Area Network
USVI Climate Change Ecosystem-based Adaptation
Allowing for Resilient Coastal Communities

In the US Virgin Islands, high resolution satellite imagery and GIS-based models are being used to identify and prioritize high risk and vulnerable coastal and marine sites subject to the effects of sea level rise, increasing storm surge and intensity, and altered precipitation patterns. The impacts of future SLR and storm surge scenarios are being validated by incorporating community perception, knowledge and historic events as a baseline to better understand how ecosystem-based adaptation solutions can help increase people and nature’s resilience to these impacts.

The Virgin Islands Department of Planning and Natural Resources, The Nature Conservancy, and partners participated in a two-day strategy clinic in June 2013 to review current knowledge, refine planning tools, and start to identify strategies such as for coastal restoration. Using TNC’s Coastal Resilience site to map scenarios and be able to visualize impact, vulnerability and adaptive capacity, we can further promote the role of ecosystem-based adaptation to address impacts of climate change as a priority for the management of natural resources and protection of coastal communities.

http://coastalresilience.org

This project is made possible with award NAO9NOS4290273, “Addressing Global Threats at Local Scales in Coral Reef Communities” a cooperative agreement with The Nature Conservancy and National Oceanic and Atmospheric Administration's Coral Reef Conservation Program. The Nature Conservancy provided matching funds.
VI Reef Resilience Program

USVI CORAL REEF DISTURBANCE RESPONSE POINTS OF CONTACT
For response, emergency triage, and damage claims for impacts to coral reefs

US Coast Guard
Oil or Hazmat: USCG National Response Center (800)424-8802
Sector San Juan: (787) 289-2041

NOAA Damage Assessment and Restoration Program – Coral Restoration Team
Puerto Rico: (787) 667-7750
Florida: (727) 647-6538

National Park Service
Buck Island, St. Croix: (340) 773-1460 (x235)
St. John: (340) 693-8950 (x225)

USVI Department of Planning and Natural Resources Division of Environmental Enforcement
St. Croix: (340) 773-5774 | (340) 513-4747 (mobile)
St. Thomas/St. John: (340) 714-9538 | (340) 643-6001 (mobile)
**Reef Responsible**

*...see food sustainably*

**USVI Fish Fact Cards**

**Reef Responsible List**

**Good Choice**
- Dolphinfish
- Lionfish
- Tuna
- Tilapia
- Wahoo

**Go Slow**
- Groupers
- Grunts
- Jacks
- Parrotfishes
- Queen Conch
- Snappers
- Surgeonfish
- Spiny Lobster
- Swordfish
- Triggerfish
- Whelk

**Don’t Eat**
- Groupers
- Goliath
- Nassau
- Parrotfishes
- Blue
- Midnight
- Rainbow

**Dolphinfish**

*Other Names:* Coryphaena hippurus, Mahi-Mahi

**Identifying Characteristics:** Large dorsal fin from above the eye to base of tail.

**Biology**
- Max length: 5 ft
- Common length: 2-4 ft
- Found in small schools of a few males and many females. Feeds on fish and zooplankton. Fast growing, pelagic (open ocean), and highly migratory.

**Important Info**
- Popular with recreational anglers and very important to commercial fisheries.
- IUCN Red List Status: Least Concern

**Mutton Snapper**

*Other Names:* Lutjanus analis

**Identifying Characteristics:** Fine blue lines below the eye. A black spot on mid-body line, just below the rear dorsal fin.

**Biology**
- Max length: 2.5 ft
- Common length: 1-2 ft
- Found in small schools during the day. Feeds day and night on fish, crustaceans, amphipods, and gastropods.

**Important Info**
- Some reports of ciguatera poisoning. Closed season April 1- June 30 but may vary yearly as a result of annual catch limit.
- IUCN Red List Status: Vulnerable

**Nassau Grouper**

*Other Names:* Epinephelus striatus

**Identifying Characteristics:** Black saddle spot on base of tail. Notched Dorsal Fin.

**Biology**
- Max length: 4 ft
- Common length: 1-2 ft
- Feeds on fish, crustaceans, and other crustaceans. Very curious.

**Important Info**
- Illegal to harvest this species in local and federal waters around the USVI. Reports of ciguatera poisoning. Overharvesting at spawning aggregations severely reduced their numbers.
- IUCN Red List Status: Endangered
4.3.2. Stormwater Conveyance

Stormwater conveyance is simply a mechanism to guide stormwater in a way that reduces flooding or sedimentation in receiving waters. There are a number of simple designs that can be implemented but in larger scale projects, flow capacity will need to be calculated and stormwater conveyance design will need to be developed by an engineer. The key point to remember here is that if stormwater can be controlled, it will be cheaper than mitigating the impacts caused by uncontrolled water flow.

4.3.2.1. Lined Channels (Drainage Swales)

A drainage swale is an excavated lined channel that directs runoff to a desired location such as a sediment trapping device. These channels are lined with grass, sod, mats, or geotextiles, in order to determine the best type of lining, calculations of the volume and velocity of stormwater runoff to be conveyed will have to be identified by a qualified engineer.

This type of sediment control device is only effective on flatter slopes (<8% / 4.5° for most designs).
Puerto Rico: A NOAA facilitated endeavor

Raimundo Espinoza
The Nature Conservancy Caribbean Program-San Juan, Puerto Rico
Puerto Rico RAPPAM

1st Protected areas and system assessment for the Commonwealth’s reserves
1st. Puerto Rico Natural Protected Areas Congress

Forum to present successes, failures and lessons learned in Protected Area management
DECLARATION OF COMMITMENT TO THE CARIBBEAN CHALLENGE BY PUERTO RICO: “THE PUERTO RICO 20 BY 20 DECLARATION”

The Government of Puerto Rico agrees to formally join the Caribbean Challenge Initiative and effectively conserve at least twenty percent (20%) of its near-shore marine and coastal environment by 2020 and to put in place sustainable finance architecture that will generate long-term funding for the marine and coastal environment and our protected area system.

In order to implement this Puerto Rico 20 by 20 Declaration, we further agree to:

3. Foster and strengthen partnerships between the Government, NGOs, private sector and local communities engaged in conservation of natural resources and sustainable use of biodiversity.

4. Establish sustainable finance mechanisms, such as tourism-related fees, that support and encourage a flow of funds for the protection, conservation and sustainable use of our biodiversity.

17. Agree to review progress to achieve the “Puerto Rico 20 by 20 Declaration” on a biennial basis.

Signed by:

Luis G. Fortuño-Burset
Governor of Puerto Rico

Daniel J. Galán-Kercadó
Secretary
Department of Natural and Environmental Resources
Caribbean Challenge Initiative (CCI)

Leadership to provide for the sustainable use, conservation and effective management of marine and coastal resources

THIRD SENIOR OFFICIALS MEETING (SOM3) & FIRST MINISTERIAL MEETING

to prepare for the Caribbean Summit of Political and Business Leaders

March 18 - 21, 2013 · San Juan, Puerto Rico
The Caribbean Challenge Initiative & Puerto Rico: Integrating Private and Public sectors for Conservation Success
Ecosystem based Adaptation Workshop

The Caribbean Landscape Conservation Cooperative
Providing conservation science for an uncertain future

WORKSHOP

Ecosystem-based Adaptation
Allowing for Resilient Ecosystems

The Puerto Rico Climate Change Council, the Caribbean Landscape Conservation Cooperative, and partners invite you to participate in a 2-day strategy clinic to identify and enhance the role of ecosystem-based adaptation in Puerto Rico

Time: 9:00 am - 5:00 pm
Date: Thursday, September 27, 2012
Place: Copamarina Beach Resort, Route 333, km 6.5, Guánica, Puerto Rico

WORKSHOP GOALS:
- To further promote EBA as a priority for the management of natural resources
- To further EBA work and collaborations in Puerto Rico and
- To share EBA knowledge with key stakeholders

Please RSVP to Raimundo Espinoza at respinoza@tnc.org;
Space is limited to 40 participants

Questions? Please contact:
Eunice Ilene, eilene@gobierno.pr or Bill Gould, wgould@tnc.org

TALLER

Adaptación Basada en Ecosistemas
Permitiendo la Resiliencia de los Ecosistemas

Cooperativa para la Conservación del Paisaje en el Caribe
Proveyendo ciencia de la conservación para un futuro incierto

El Consejo de Cambio Climático de Puerto Rico, la Cooperativa para la Conservación del Paisaje en el Caribe, y socios los invitan a participar en un taller de 2 días para identificar y potenciar el rol de las estrategias de adaptación basadas en ecosistemas en Puerto Rico

Hora: 9:00 am - 5:00 pm
Día: jueves, 27 de septiembre de 2012
Lugar: Copamarina Beach Resort, Route 333, km 6.5, Guánica, Puerto Rico

OBJETIVOS DEL TALLER:
- Para promover aún más ABE como una prioridad para el manejo de los recursos naturales
- Para continuar avanzado el trabajo y las colaboraciones de ABE en Puerto Rico, y
- Para compartir el conocimiento de ABE con el público interesado

Por Favor RSVP a Raimundo Espinoza at respinoza@tnc.org;
El espacio será limitado a 40 participantes

Additional Information:
Eunice Ilene, eilene@gobierno.pr or Bill Gould, wgould@tnc.org
Current and Future Coastal Hazards
Risk assessment for all the coastal municipalities in Puerto Rico

Workshop Outcomes

- Facilitated discussion and better understanding of island-wide concepts and municipal realities
- Validated list of municipal priority vulnerability for the PRCCC Working Groups
- List of gaps and other needs
- Initial list of adaptation strategies

Dr. Adam Whelchel – TNC CT Chapter
Puerto Rico Climate Change Council (PRCCC)

Puerto Rico’s State of the Climate
Assessing Puerto Rico’s Social-Ecological Vulnerabilities in a Changing Climate

2010-2013

EXECUTIVE SUMMARY—ENGLISH VERSION

Temperature
Precipitation
Sea Level
Storms
Ocean Acidification
Human Use Mapping in SW Puerto Rico
Human Use Mapping Cabo Rojo

Ecosystems and Areas of Concern

Recreational Activities

Fishing Activities within the Cabo Rojo Coral Reef Priority Area
**Cabo Rojo Watershed Management**

**EARLY ACTION PROJECTS FOR THE CABO ROJO PRIORITY MANAGEMENT AREA**

**Table 1. Initial early action restoration projects**

<table>
<thead>
<tr>
<th>Project</th>
<th>Description</th>
<th>Potential Sponsors</th>
<th>Initial Ranking/Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Bioretention Green Infrastructure project to treat stormwater runoff from town before it enters nearshore waters</td>
<td>Address stormwater runoff from a busy street by creating a bioretention facility next to a parking area for a vacation resort area to treat stormwater runoff before it flow into coastal waters</td>
<td>Municipalit y of Cabo Rojo, NRCS, DNER, NFWF, NOAA</td>
<td>High, Very High for a demonstration project visible by many visitors and residents $25k - $30k</td>
</tr>
<tr>
<td>4. Connect the town to an advanced sewerage system</td>
<td>Connect the town to an advanced sewerage system to limit nutrient and other contamination of nearshore waters</td>
<td>PRASA, EPA, USDA Rural Dev</td>
<td>Very high but very complex and expensive</td>
</tr>
<tr>
<td>5. Cliff and highly erodible soil erosion at Joyuda subwatershed neighborhood</td>
<td>Area downstream of the eroding cliffs and runoff generating area (3 &amp; 4) plus significant amounts of impervious cover from high density development. Volume control of stormwater runoff (reuse) etc and potential to create a regenerative stormwater conveyance</td>
<td>Developmental NWRI/ NFWF</td>
<td>Very high but very complex — source control is critical $500k-$1M</td>
</tr>
<tr>
<td>6. Stabilization of bare / degraded upland soils</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1. Project locations in and around the Combate subwatershed**
The Cabo Rojo Project

Juvenile lemon shark. Photo: Kristine Stump
Hawaii Marine

Kim Hum
Roxie Sylva
Chad Wiggins
Emily Fielding
Leilani Warren
Rebecca Most
Manuel Mejia
Eric Conklin
Keo Lopes
“Islands on the surface seem separate from one another, but, if you look closer, they are all connected in the deep.”

- Papaliʻi Failautusi Avegalio
Where We Work
We do not heal by looking at the sickness. We heal by looking at the wellness.

~Raylene Kawaiea
PACIFIC ISLANDS

Trina Leberer
Director, Micronesia Program
tleberer@tnc.org
Projected Climate Change Impacts in Micronesia
## Vulnerability Assessment

<table>
<thead>
<tr>
<th>TARGET RESOURCES</th>
<th>CURRENT STATUS OF TARGET</th>
<th>THREATS (non-climate)</th>
<th>CLIMATE HAZARDS</th>
<th>EXPOSURE</th>
<th>SENSITIVITY</th>
<th>IMPACTS</th>
<th>ADAPTIVE CAPACITY (Social and Natural Resources)</th>
<th>VULNERABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>What social and natural resource targets are most important to your community and why?</td>
<td>What is the current status of your targets? (poor, fair, good, very good)</td>
<td>What are the non-climate threats to your priority social and natural resource targets?</td>
<td>Which of the projected climate hazards and impacts are of most concern to our community and why? How do they impact this target?</td>
<td>How much area of your target resource is affected by climate change events? Specify which events? (All/ Most/ Some/ Little/ None)</td>
<td>How severely will your target resources be impacted by increased climate events? And why? (Severely/ Moderately/ Hardly)</td>
<td>What are the current and likely impacts from these events to your target resources and your community? (Severely/ Moderately/ Hardly)</td>
<td>How would you rate the ability of your target resources to cope with impacts climate change hazards? (High/ Medium/ Low)</td>
<td>Rate the vulnerability of each target resources (High/ Medium/ Low)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural</td>
<td>Natural</td>
</tr>
<tr>
<td>Social</td>
<td>Social</td>
</tr>
<tr>
<td>Natural</td>
<td>Natural</td>
</tr>
</tbody>
</table>
Disturbance and recovery cycles are basis

Effectively managed

5-7 years

Not effectively managed

Disturbance event (predator starfish)
Reef Resilience Network: Our online community for coral reef practitioners to exchange ideas and share resources.

The Reef Resilience Toolkit provides the latest information, guidance, and resources to help managers address the impacts of climate change and local threats to coral reefs.

Coral Reef Module
The latest science and management information on coral reef resilience.

Journal Summaries
Papers and publications freely downloadable from this website and others from external sites.

Reef Resilience Network
Our online community for coral reef practitioners to exchange ideas and share resources.
The Coral Reef Module is a resource that provides detailed information about the stressors facing coral reef ecosystems, and offers specific guidance on building resilience into daily management activities and the design of marine protected area networks.

Quick Look

For conservation managers, the module compiles the latest scientific research and tools to help address impacts of climate change and other major threats and promote healthy reefs that persist over time. Watch the video for an introduction, go directly to a section of the module using the navigation menu that appears on the left of each page, or click through the slides below to see what's inside.

Reefs and Resilience focuses on the value of coral reef ecosystems, describes the current status of reefs worldwide, and discusses the definition of resilience. Information is also provided on ecological, biological, chemical, and physical factors used to assess coral reef resilience.
32 case studies--18 countries

75+ journal article summaries on MPAs, climate and ocean change, bleaching, and fisheries management
650+ people
30 issues of newsletter

17 webinars
600+ people
1000+ views

Reef Resilience Webinar

Restoring a Reef Flat: Benefits of Invasive Algae Removal in Hawai‘i

Ariel view of Maunalua Bay after 2 million pounds of invasive algae has been removed. Photo © Manuel Mejia
100+ members
OVERVIEW OF CORAL REEFS AND RESILIENCE

CONTINUE
Reply by Vineeta Hoon on April 20, 2013 at 11:23am

Hi David,

As an NGO we are not directly involved in management actions in Lakshadweep. However we have been influencing management actions through advocacy, involving community in reef related activity monitoring, conducting community based socioeconomic monitoring surveys, developing teacher orientation programs to include marine examples in the class rooms etc. Discussing legal options for involving community in setting up MPAs. Small steps but it will lead to forming a pressure group for co-management.

Reply Message Edit

Reply by David Obura on April 21, 2013 at 1:08am

Hi Vineeta, thanks for your reply ... in fact, I like to think of 'management' as just one aspect of responses that there might be - essentially by a responsible agency, whereas in more general terms society responds in an 'adaptation' framework. Thus the social and advocacy work that you do can be an important element in building capacity and scope for specific management responses. These small steps are vital, I think, in developing a general culture that demands active management - it provides managers with a supportive group of stakeholders!!

Reply Message Edit
95 managers -- 47 countries & territories -- 4 trainings

Reef Resilience Training of Trainer's Workshops, 2010-2013

Map prepared by Laura Flessner, NOAA Digital Coast Fellow, October 2013
Copyright, The Nature Conservancy, 2013
44% lead projects
$55,782+ funding
33 projects
23 countries
900+ people
9 exchanges