



GUÁNICA BAY WATERSHED UPDATE

Water Quality Assessment Recently Conducted by the Center for Watershed Protection

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The Center for Watershed Protection spent a week (September 20 – September 24) in Guánica and La Parguera doing a water quality assessment of outfalls, small catchments and nearshore coastal areas looking for hotspots for nutrients and bacteria and other indicators of sewage, septage and other pollution sources. Parameters surveyed included total nitrogen (TN), total phosphorus (TP), Eschericia Coli, Enterococci (Saltwater), fluorescence, ammonia, fluoride, chlorophyll A (saltwater), and potassium.



Assessing a headwater stream in the Headwaters of Guánica/Rio Loco

Several hotspots were identified pending further data analysis from the laboratory. These include an area with high bacteria and ammonia levels in Yauco associated with a cattle farm and suburban area, a pump station with a slow leak with high bacteria levels and several sites around Guánica Bay with high ammonia and bacteria levels that warrant further investigation and action. Several locations in La Parguera had high levels of ammonia and sewage contamination was suspected. PRASA promptly repaired a clogged pump station discharging sewage into a tributary to the Rio Loco.

This work was based on the watershed plan. Additional targeted monitoring and assessment to determine further identify sources and interventions is planned. Also planned is a similar sampling event during the dry season in the early spring (contact: Paul Sturm, pes@cwprg).

Submission Guidance

This is the first issue of the Guánica Bay Watershed update. We plan on issuing monthly Updates. Please send any notices that you would like to share with the group to Patricia Bradley (Bradley.patricia@epa.gov).

Please send photos that support your story and include a caption for each photo.



Monitoring nearshore indicators of contamination in La Parguera



Discharge from a pump station in the Town of Guánica into Guánica Bay

NFWF Awards Seven Grants in Guánica Watershed

The National Fish and Wildlife Foundation (NFWF) recently awarded seven U. S. Coral Reef Task Force Partnership Initiative grants to organizations for work in the Guánica watershed. The Guánica Bay/Rio Loco Watershed is approximately 151 square miles and traverses the municipalities of Guánica, Yauco and a portion of the Lajas Valley, in the south coast of Puerto Rico. Current land uses in the watershed are agricultural (43%, mostly in coffee, citrus, bananas, plantains, vegetables, and pasture land), forests (48%), and urban development (9%). Threats in the watershed include excessive nutrient loading to water bodies, soil erosion, sediment deposition, flooding, and habitat fragmentation. The cumulative impact of these threats over the last 50 years is a steady decline in near shore reef quality (Warne et. al., 2005).

Three projects are addressing agricultural practices in the watershed. Puerto Rico is largely composed of mountainous and hilly terrain, with nearly one-fourth of the island covered by steep slopes. The mountains are the easternmost extension of a tightly folded and faulted ridge that extends from the Central American mainland across the northern Caribbean to the Lesser Antilles. High amounts of agriculture on steep slopes can increase the amount of soil erosion leading to increased sediment in surface water. Farms also export nutrients to water bodies from inorganic fertilizers and non-stable organic residues.

The University of Puerto Rico, Agricultural Extension Service was awarded \$24,918 to develop a capacity building program on conservation buffers for farmers, NGOs and elected officials in the Rio Loco Watershed. Conservation buffers are permanently vegetated areas or strips of land, designed to intercept pollutants and manage other environmental concerns. Strategically placed buffer strips in the agricultural landscape can effectively mitigate the movement of sediment, nutrients, and pesticides within farm fields and from farm fields. The project goal is to improve the water quality of the Rio Loco through capacity building and the implementation of conservation buffers in the farms lands of the watershed.

The University of Puerto Rico, Mayaguez was awarded \$50,000 and is contributing \$29,843 to work in coordination with a local community group, Frente Unido Pro-Defensa del Valle de Lajas, and the University of Puerto Rico Agricultural Extension Service, to use soil testing to assess the current nutrient status of soils in farms and to provide alternative crop nutrient recommendations. The use of soil testing can result in substantial economic and environmental benefits. Previous experience working with farmers in both the Lajas Valley Agricultural Reserve and the upland parts of watershed shows that farmers rarely use soil testing to guide and modify nutrient management recommendations, that will reduce potential nutrient and sediment loads to coral reefs in Guánica Bay.

Joaquin Chong was awarded \$25,000 for a project to work with farmers to implement coffee pulp stabilization, emphasizing compost use on a selected crop. This project intends to reduce overall nutrient export from farms by teaching farmers how to properly compost coffee pulp and then working with the farmers to compost coffee pulp and use it at their farms. Properly composted coffee pulp locks nutrients into humus substances, which in turn increase water-holding capacity. There is also an increase in cation exchange capacity (ability of the compost to provide nutrients to the plant) hence less inorganic fertilizers are required.

NFWF Awards Seven Grants in Guánica Watershed, cont'd from pg 2

The University of Puerto Rico, Mayaguez was awarded \$16,432 and is contributing \$21,741 to study the hydrodynamics of Guánica Bay. This project will carry out the first Lagrangean and Eulerian velocity measurements and numerical simulations of the hydrodynamics of Guánica. Lagrangean techniques follow a water particle, while Eulerian techniques measure the velocity of water at a fixed position. To successfully improve water quality, it is necessary to understand the hydrodynamics responsible for the mixing of pollutants in the Bay.

The Center for Watershed Protection (CWP) was awarded \$35,000 and is contributing \$15,000 to address several initiatives in the Guánica/Rio Loco watershed that require sustained local effort and outreach and communication with the community. CWP will 1) advance the conceptual design of the treatment wetlands to a design that can be submitted for full funding; 2) solicit the support of local leaders of the farming community to assist with the outreach on a part-time basis in the Lajas Valley – particularly in areas that may be affected by the restoration of the lagoon; and 3) reduce farmers' upfront burden of cost share requirements for NRCS and FWS conservation programs through incentive payments or support in developing a market for conservation farmed coffee that protects habitat and coral reefs from sediment pollution.

The Caribbean Maritime Educational Center, Inc. (CAMARED) was awarded \$25,000 and is contributing \$10,000 to promote educational activities and opportunities for positive interactions with the Guánica watershed including kayaking, snorkeling and cleanup activities. The activities with the development community will focus on proper erosion and sediment control education and outreach directly to land disturbance activities and contractors in the watershed.

The Conservation Trust of Puerto Rico was awarded \$24,998 and will contribute an additional \$68,544 to perform twelve educational training and seventeen project site cleanup activities at Punta Ballenas, Puerto Rico. The ecological objective is to create stewards of the Guánica/Rio Loco watershed and its coral reef through educational training and hands-on project site cleanup activities. Target audiences include elementary school, middle school and high school students and teachers from the Island's southern and western areas; potential sources and source communities include project site visitors, the private business sector, local environmental educators, community leaders, universities, environmental groups, and organized groups. The Trust will also partner with Scuba Dogs Society to coordinate a massive Punta Ballenas beach cleanup activity.

For more information contact

Personnel Updates

Edwin Almodovar is the new USDA NRCS Caribbean Director, replacing Angel Figueroa.

Upcoming Webinar on Guánica Bay Objectives

On Wednesday, November 3rd, from 3-4:30 pm eastern, Bill Fisher and John Carriger (EPA's Office of Research and Development) will present a webinar to describe progress for advancing the Guánica Bay Watershed Management Plan.

They will briefly review the plan and the Decision Workshop held in La Parguera this past April, then present a characterization of the information in terms of overall objective and decision context, fundamental objectives, and means to achieve the objectives. The presentation (30-40 min) will be followed by a question-answer period (contact: Patricia Bradley, bradley.patricia@epa.gov).

Audio Dial In: 866-299-3188 then conference code 305-809-4690#

Webinar link: http://hawkeye.epa.gov/imtapp/app/sch_mtg_details.uix?mID=140739

Community Outreach

Roberto Viqueira, the Guánica Coordinator, and Louis Meyer, local farming leader, are busy meeting with communities and large property owners in the historic Guánica lagoon area, including El Fuig, Guánica and Yauco jurisdictions. The communities and property owners have offered support for restoration projects including staff and construction equipment if needed. Design charrettes will be held later in 2011 with the community after the majority of technical information is completed. A charrette typically involves intense and possibly multi-day meetings, involving municipal officials, citizens and stakeholder groups. A successful charrette promotes joint ownership of the design solution and attempts to avoid confrontational situations typical of a diverse group of people.

Roberto has also been performing monitoring of the effluent from the Guánica sewage treatment plant to help determine existing characteristics (contact: Roberto Viqueira Ríos,

U.S. EPA Coral Reef Survey in Southern Puerto Rico

As part of its contribution to the Guánica Bay Watershed Project, the U.S. EPA will assess coral reef condition in southern Puerto Rico from Nov 27-Dec 15, 2010. Among the objectives for the survey are 1) identify coral reef indicators that signal adverse human activities; 2) examine coral reef condition adjacent to watersheds with varying human activity and stressor loads; and 3) collect data to evaluate the potential loss of ecosystem services from sediment efflux in Guánica Bay and La Parguera.

The team will use small dive boats off EPA's Ocean Survey Vessel BOLD, which will be in Puerto Rico for this and other missions (Contacts: Bill Fisher, fisher.william@epa.gov; Buddy LoBue, lobue.charles@epa.gov).



EPA's OSV BOLD

Guánica Bay Decision Support Workshop

The U.S. EPA and Caribbean Coral Reef Institute hosted a Coral Reef and Coastal Ecosystems Decision Support Workshop on April 27-28, 2010 at the Caribbean Coral Reef Institute in La Parguera, Puerto Rico. Forty-three participants, including representatives from federal and territorial government agencies, non-governmental organizations and academic institutions, and Guánica Bay watershed citizens participated in the workshop. The purpose of the workshop was to facilitate development of a decision analysis framework with stakeholder and decision-maker input to help address problems related to ecologically-damaging human activities (e.g., agriculture, urbanization, sediment and nutrient loads, stormwater run-off, and wetland loss) in the Guánica Bay Watershed in Southwest Puerto Rico.

During the workshop we reviewed the characteristics and threats to the Guánica Bay watershed, coral reefs and coastal ecosystems and overviewed ongoing NOAA and USDA activities in the watershed. EPA



John Czapiga (citizen), Evelyn Huertas (EPA), Annette Feliberty Ruiz (EQB) and Francisco Pagan (CCRI) at the workshop.



Aaron Hutchins (TNC) presents breakout group results.

introduced an organizational framework (DPSIR), which can be used to link ecological and socioeconomic factors and to scope the important causal elements of environmental decision-making. The group incorporated knowledge and issues relevant to the Guánica Bay watershed and southwestern Puerto Rico into the framework. Using the Guánica Bay Management Plan as a foundation, we applied a structured decision analysis process to the decision-making processes in the watershed.

We also had some time to relax and get to know one another. The Department of Marine Sciences, University of Puerto Rico, Mayaguez hosted a lovely reception for workshop participants at their facility on Magueyes Island. And the Caribbean Coral Reef Institute organized a wonderful night-time snorkel in the La Parguera Phosphorescent Bay.

Since the workshop we have established “Coral Reefs Puerto Rico” on EPA’s Environmental Science Connector (ESC). The ESC is a password-protected research and collaboration center that provides the capability to customize, coordinate, and monitor the progress of science projects from your desktop. The presentations and workshop exercises have been posted on the ESC (contact: Patricia Bradley, Bradley.patricia@epa.gov).

Recently Added to the ESC

Annotated Bibliography Final 11.16.05. This report is an annotated bibliography of scientific publications, university publications, technical reports, conference proceedings, and gray literature related to studies and observations of the condition of the coral reefs and coralline communities around Puerto Rico. When available, the annotated bibliography also provides a location of where the reference can be obtained. ESC Folder: Reading Room (contact: LisaMarie Carrubba, lisamarine.carrubba@noaa.gov)

Bauer LJ and MS Kendall (Eds.). 2010. An Ecological Characterization of the Marine Resources of Vieques, Puerto Rico Part II: Field Studies of Habitats, Nutrients, Contaminants, Fish, and Benthic Communities. NOAA Technical Memorandum NOS NCCOS 110. Silver Spring, MD. 174 pp. This report summarizes recent field studies which were conducted to complete an island-wide characterization, and to establish baseline values for the distribution of habitats, nutrients, contaminants, fish, and benthic communities. An important objective underlying this suite of studies was to quantify any differences in the marine areas adjacent to the former and current land-use zoning around Vieques. ESC Folder: Reading Room (contact: Laurie Bauer, laurie.bauer@noaa.gov)

Coral Reef Biological Criteria: Using the Clean Water Act to Protect a National Treasure. EPA/600/R-10/054 | July 2010. The purpose of this document is to support coral reef managers in States, Territories, and Commonwealths to establish water quality criteria and standards under the Clean Water Act (CWA) to protect aquatic life from the effects of pollution. The report provides information on the different planning, assessment, and management steps that are necessary for development of coral reef biocriteria. ESC Folder: Reading Room – Coral Biocriteria Report (contact: Pat Bradley, Bradley.patricia@epa.gov)

Jeffrey CFG, Mueller PW, Kendall MS, Buja K, Edwards K, Hile SD and Carrubba L. 2010. *Biogeographic Characterization of Essential Fish Habitats Affected by Human Activities in the Coastal Zone of Puerto Rico - Final Project Report.* NOAA Technical Memorandum NOS NCCOS 115. This report summarizes the historical information on benthic habitats and the status of marine resources in protected and non-protected marine areas around the islands of Puerto Rico. In addition, information on benthic habitat types, Essential Fish Habitat (EFH) requirements, and fishing and non-fishing impacts to marine resources were compiled for two priority areas: La Parguera and Vieques. The information was compiled into a Geographic Information System (GIS) that can support conservation efforts. ESC Folder: Reading Room (contact: Chris Jeffrey, chris.jeffrey@noaa.gov)

Larsen MC & Webb MT. 2009. Potential Effects of Runoff, Fluvial Sediment, and Nutrient Discharges on the Coral Reefs of Puerto Rico. *Journal of Coastal Research* **25**(1):189-208. Coral reefs, have been degraded by human activity in much of the earth's tropical oceans. To contribute to improved understanding of this problem, the potential relation between river sediment and nutrient discharges and degradation of coral reefs surrounding Puerto Rico was studied using stream flow, suspended-sediment, and water-quality data. ESC Folder: Reading Room, Land-Based Sources of Pollution (contact: Carlos Ramos, cramos@irf.org)

Pittman SJ, Hile SD, Jeffrey CFG, Clark R, Woody K, Herlach BD, Caldow C, Monaco ME, Appeldoorn R. 2010. *Coral reef ecosystems of Reserva Natural La Parguera (Puerto Rico): Spatial and temporal patterns in fish and benthic communities (2001-2007)*. NOAA Technical Memorandum NOS NCCOS 107. Silver Spring, MD. 202 pp. This report summarizes the first seven years of fish survey data (2001-2007) and associated characterization of the benthos in the La Parguera region. The objectives were to quantify changes in fish species and assemblage diversity, abundance, biomass and size structure; to provide spatially explicit information on the distribution of key species or groups of species; and to compare community structure across the seascape including fringing mangroves, inner, middle, and outer reef areas, and open ocean shelf bank areas. ESC Folder: Reading Room (contact: Richard Appeldoorn, Richard.appeldoorn@upr.edu)

Ramos-Scharron. 2010. Sediment production from unpaved roads in a sub-tropical dry setting — Southwestern Puerto Rico. *Catena* 82:146–158. The threat imposed by increased sediment loading rates ranks among the most important stressors affecting coral reef ecosystems worldwide. The objectives of this study were to: (1) measure sediment production rates from unpaved roads; (2) evaluate the effect of precipitation, rainfall erosivity, slope, plot length, and vegetation cover on sediment production rates; and (3) compare measured sediment production rates to published surface erosion data from roaded and natural sites in the Eastern Caribbean. Sediment production from nine abandoned road segments with varying slopes and plot lengths were measured with sediment traps in southwestern Puerto Rico from August 2003 to September 2005. ESC Folder: Reading Room, Land-Based Sources of Pollution (contact: Carlos Ramos, cramos@irf.org)

Ramos-Scharron CE & MacDonald LH. 2007. Development and application of a GIS-based sediment budget model. *Journal of Environmental Management* 84:157–172. Resource managers and decision makers need spatially explicit tools to help them predict the changes in sediment production and delivery due to unpaved roads and other types of land disturbance. The objectives of this study were to: (1) develop a GIS-based sediment budget model; (2) use the model to evaluate the effects of unpaved roads on sediment delivery rates in three watersheds on St. John in the US Virgin Islands; and (3) compare the predicted sediment yields to pre-existing data. ESC Folder: Reading Room, Land-Based Sources of Pollution (contact: Carlos Ramos, cramos@irf.org)

Ramos-Scharron CE & MacDonald LH. 2005. Measurement and prediction of sediment production from unpaved roads, St John, US Virgin Islands. *Earth Surface Processes and Landforms* 30:1283–1304. This article presents the results of a study of unpaved roads on St. John in USVI from July 1998 to November 2001. The main objectives of this study were to: (1) measure sediment production rates at the road segment scale; (2) evaluate the importance of precipitation, slope, contributing area, traffic, and grading on road sediment production; (3) develop an empirical road erosion predictive model; and (4) compare our measured erosion rates to other published data. ESC Folder: Reading Room, Land-Based Sources of Pollution (contact: Carlos Ramos, cramos@irf.org)

Ramos-Scharron CE & MacDonald LH. 2007. Measurement and prediction of natural and anthropogenic sediment sources, St. John, U.S. Virgin Islands. *Catena* 71:250–266. The main objective of this study was to quantify sediment production and delivery rates in a dry tropical environment on the island of St. John in the eastern Caribbean. One to three years of measurements were used to determine values and empirical functions for estimating sediment production from streambanks, treethrow, undisturbed hillslopes, zero-order subcatchments, unpaved road surfaces, and road cutslopes. Sediment production also was measured from both undisturbed and roaded first-order subcatchments. ESC Folder: Reading Room, Land-Based Sources of Pollution (contact: Carlos Ramos, cramos@irf.org)

Submit updates to:

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Lajas Valley Survey

Greg Morris Engineering (GME) is in the field collecting data for a detailed survey of the Lajas Valley. The survey will serve as the basis for hydrologic and flood modeling, potential salinity impact determinations, and ultimately for Guánica lagoon restoration design (contact: Juan Amador, jamador@gmaeng.com).

The Guánica Bay Watershed

The Guánica Bay/Rio Loco watershed is located in the southwestern corner of Puerto Rico, approximately 20 miles west of the city of Ponce and 100 miles southwest of San Juan. Due to human alteration, the watershed is approximately 151 square miles and discharges to Guánica Bay near the town of Guánica. The Guánica Bay/Rio Loco watershed includes the urbanized areas of Yauco and a portion of the Lajas Valley agricultural region. The Guánica Bay/Rio Loco is one of the major riverine discharge points in the southwest coast.

Historically, the area was associated with some of the most pristine reefs on the island.



Guánica Bay

Guánica Bay Watershed Cleanup

Marine debris is any man-made object discarded, disposed of, or abandoned that enters the coastal or marine environment. It may enter directly from a ship, or indirectly when washed out to sea via rivers, streams and storm drains. Marine debris has many negative impacts. Medical waste and toxics in marine debris pose a direct threat to human health and safety. Wildlife such as turtles and birds that ingest marine debris can become sick or die. Wildlife that gets entangled in marine debris can suffer injury or die. Marine debris is an unattractive eyesore along beaches and shorelines.



Debris along the Rio Brasura.

On Saturday, September 25th, the Caribbean Maritime Educational Center, Inc. (CAMARED) participated in the International Coastal Cleanup. Some 15,000 volunteers pitched in to clean up more than 300 beaches, rivers, lakes and coastal areas around Puerto Rico.

In the Guánica Bay watershed, CAMARED volunteers picked up trash, including cigarette butts, food wrappers, cans, and bottles from the Rio Loco River and Guánica Bay shoreline (Contact: Madeleine Cancel, camaredpr@live.com).