USDA United States Department of Agriculture

Natural Resources Conservation Service – Caribbean Area
654 Plaza, Suite 604
654 Muñoz Rivera Ave.
Hato Rey, PR 00918-4123
Voice 787.766.5206
Web: http://www.pr.nrcs.usda.gov

Success Story

RÍO LOCO / GUÁNICA BAY WATERSHED – BIOENGINEERING PROJECT

The Río Loco / Guánica Bay Watershed Project is a multiagency initiative begun in 2009 to support U.S. Coral Reef Task Force efforts to reduce sediment and nutrient runoff from southwest Puerto Rico's Río Loco / Guánica Bay Watershed to help protect and restore near shore coral reef ecosystems. NRCS is working with producers and partners in the watershed to voluntarily implement conservation practices to reduce land-based sources of sediment and nutrients impacting coral reef habitats in Guánica Bay, and improve wildlife habitat while maintaining agricultural productivity.

Background

Sediment plume entering Guánica Bay from Río Loco.

Guánica Bay's coral reefs are being buried by sediment from the Loco River Basin, where eroding agricultural land and river banks lose tons of sediment to the sea each year. Riverbank erosion along the Río Loco has eaten away large sections of agricultural land, changing the course of the river. Sediment transported downstream after each rain event is deposited into Guánica Bay, smothering coral reefs, seagrass beds and other aquatic ecosystems. NRCS has calculated that as much as 6,000 tons of sediment per year were eroding from the two largest segments of Río Loco's failing river banks (see tables below).

Sediment resulting from bank erosion
Rio Loco - Las Latas Segment (L = 170m)

Year	Period (yr)	Area (m^2)	Volume (m^3)	Mass (Tons)
2006				
2010	4	600	2,880	4,068
2012	2	2,634	12,643	17,859
2014	2	360	1,728	2,441
Total	8	3,594	17,251	24,368
Yearly Avg	1	449	2,156	3,046

Sediment resulting from bank erosion
Rio Loco - Susua Segment (L = 165m)

Year	Period (yr)	Area (m^2)	Volume (m^3)	Mass (Tons)
2002				
2004	2	1,289	6,445	9,104
2007	3	1,242	6,210	8,772
2010	3	518	2,590	3,658
Total	8	3,049	15,245	21,534
Yearly Avg	1	381	1,906	2,692

Since 2010, NRCS has allocated more than $3.46 million in funding under the **Environmental Quality Incentives Program (EQIP)** to provide financial and technical assistance to private farmers and landowners to help them conserve, maintain and improve their natural resources in the Río Loco watershed. NRCS designed conservation practices applied in Guánica Valley agricultural lands and on three riverbank segments along the Río Loco. The riverbank stabilization project used bioengineering

practices that have proven effective and environmentally-friendly in similar applications in the U.S. (***Soil bioengineering*** is a system of living plants used as structural components to stabilize soils.) Project goals were to:

1. Stop riverbank erosion and reduce sediment flowing onto Guánica Bay's coral reefs, and
2. Retain agricultural land in Guánica Valley by reducing the continuous riverbank erosion.

Accomplishments

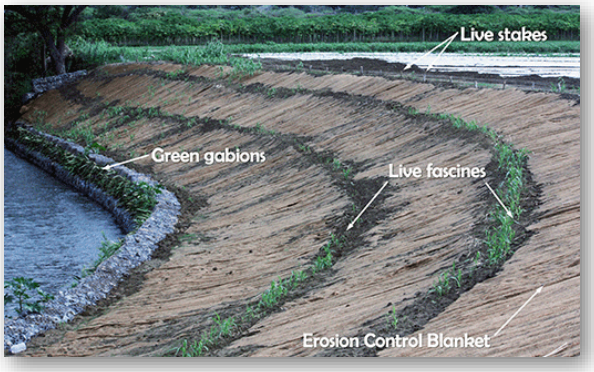
NRCS Caribbean Area engineering staff teamed up with engineering specialists in streambank protection from the NRCS National Design, Construction, and Soil Mechanics Center and Central National Technology Support Center. They analyzed the project sites and designed riverbank protection using ecological techniques. Phase I of the project stabilized 600 linear feet of riverbank towards the Las Latas Community in Susúa Baja. Phases II and III stabilized another 737 feet near the communities of La Joya (600 feet) and Vía (137 feet) in the same neighborhood.

Aerial photos showing erosion of Las Latas segment of Río Loco and movement of river channel over time.

The three river bank segments were armored with structural practices such as ***gabion baskets*** (rectangular wire mesh containers filled with stone and wired shut) and ***stream barbs*** (low rock barriers projecting out from a streambank to redirect streamflow away from an eroding bank), and stabilized with a variety of bioengineering practices including:

Close up view of fascine installation.

- ***Green gabions:*** gabions with live branches placed between each row of gabion baskets;
- ***Live stakes:*** inserting & tamping live, rootable plant cuttings into the ground. A system of stakes creates a living root mat that stabilizes the soil;
- ***Fascines:*** long bundles of branch cuttings bound together and inserted at an angle to reduce erosion and landslides; and
- ***Erosion control blankets:*** materials (straw, coconut, wood or plastic fibers) woven into a mat or blanket. They are typically rolled down-slope and anchored with wire staples to provide temporary erosion control until vegetation can be established.



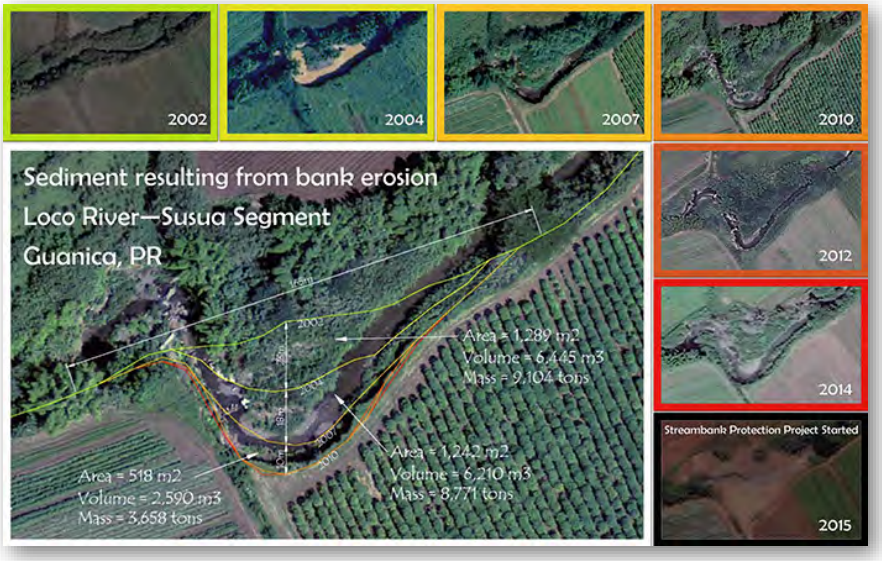
Close up view of four different bioengineering practices installed to stabilize the banks of the Río Loco.

NRCS cost share for Las Latas - $134,880.

This was the first NRCS project in the Caribbean Area to use green gabions! The green gabions helped secure the structural treatments while enhancing aesthetics and providing habitat benefit. The riverbank bioengineering project was completed in November 2015 for total project cost of $475,604, with a total NRCS contribution of $303,480.

We also worked closely on this project with federal and local partners including the National Oceanic and Atmospheric Administration (NOAA), PR Department of Natural and Environmental Resources, PR Department of Agriculture, Suroeste Soil and Water Conservation District, U.S. Fish and Wildlife Service (FWS) and the Center for Watershed Protection.

For additional information on the Rio Loco / Guánica Bay Watershed Bioengineering Project, please contact State Engineer, Damaris Medina, at 787-766-5206 x125 / 787-342-6916 or Damaris.Medina@pr.usda.gov, or visit **www.pr.nrcs.usda.gov**.



Aerial photos showing erosion of Susua segment of Río Loco and encroachment of river channel into adjacent farmland over time.

For More Information:
USDA-NRCS
654 Plaza, Suite 604
654 Muñoz Rivera Ave.
Hato Rey, PR 00918-4123
Voice 787.766.5206
Web: www.pr.nrcs.usda.gov

NRCS cost share for Susua – $134,880.

NRCS cost share for Via - $33,720.

Las Latas Sector before the project

Las Latas Sector after the project