

Villalba Streambank Project

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When a natural disaster strikes, USDA NRCS steps in to offer recovery assistance through the Emergency Watershed Protection (EWP) Program. In cases where a structural element is the right choice to rebuild a streambank – bio-engineering techniques offer a rewilding vision of watershed conservation.

By Lark Gilmer, Communications Specialist – Watershed Programs Branch

When hurricanes make landfall, they send torrents of water down the watershed – carving riverbanks in a way that threatens homes, livelihoods and communities. It's not art, but the solution can be.

In September 2017, Hurricane Maria's extreme force compromised the structural integrity of a bridge and neighboring residence along the Jacaguas River Tributary in Villalba, Puerto Rico.

The sheer power and velocity of the rushing river gouged large chunks of land from the surrounding streambank, propelling everything in its current downstream – risking lives and property.

When a natural disaster strikes, USDA Natural Resources Conservation Service (NRCS) steps in to offer recovery assistance through the Emergency Watershed Protection (EWP) Program. In cases where a structural element is the right choice to rebuild the streambank – bio-engineering techniques can offer a rewilding vision of watershed conservation.

Green engineering replicates nature to stabilize an eroding streambank. It offers a natural solution to an impaired watershed providing residual benefits that include improved fish and wildlife habitat, reduced nutrient pollution, improved ability for the surrounding land to absorb water (or become more hydroponic), plus they are often more cost-effective.

The culture of Puerto Rico (PR) drives conservation that embraces green solutions in every facet of the watershed. The Villalba Streambank Restoration project is a “case study” for bio-engineered (green) design. By nature, or rather, in tune with nature – a bioengineering approach fuses the stabilizing features of key structural elements with the watershed’s natural processes. As an example, the gabion wall solution (shown in the video below) provides a self-drainage system, allowing water to flow freely through it – relieving water pressure. The design incorporates ‘plug planting’ with native species to provide a more natural look that will fill-in long-term.

“The Villalba project represents years of experience researching and implementing green solutions in our watersheds,” states Director Luis Cruz-Arroyo. “This is one of many watershed projects driven by green solutions that reflect the PR culture and relationship to the island. We are an island that is a biodiverse hotspot, which drives all conservation efforts with an appreciation of how nature works.”





Top to bottom: Extensive right bank erosion and potential collapse risk of home and gazebo. Erosion along the bridge wingwall and the right bank. Photo Credit: Jaca & Sierra, Geotechnical Engineers – Puerto Rico

With the structural elements in place, native plant species will be planted to provide long-term bank stability and microhabitats along the streambank.



Video credit: Yuhaira Lugo, Civil Engineer – NRCS – Puerto Rico, Ralph Smith, Acting Branch Chief – NRCS Watershed Programs

KEY RESTORATION BENEFITS

The project consists of the construction of a gabion wall, the deposit and compaction of fill material, and the installation of erosion control measures to repair a slope that was eroded by the rains brought by Hurricane María.

Sponsor: Caribbean Conservation District

Architect and Engineering Firm CAR Group LLC

Specifications:

Gravity Gabion Dimensions: 38 meter long by 6 meter's high and 5.5 meters wide. The height of the slope rises two additional meters at a 2H:1H slope gradient with reinforced backfill finished with 4" loamy soil retained with turf mat reinforcement and planted with vetiver grass.

Project total cost: \$530,442 NRCS Emergency Watershed Protection (EWP) dollars invested.

The Villalba Streambank Stabilization project, in addition to saving lives and protecting property, also preserves the watershed.