Río Loco Structure #2 Removal (El Puente)

Task #6 Progress Report

Submitted to:
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TABLE OF CONTENT

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1 INTRODUCTION

Historically, the Guánica Bay area was associated with some of the most extensive and healthy reef complexes in Puerto Rico (Figure 1). Unfortunately, coral reefs worldwide have experienced an unprecedented decline over the past 30-40 years, some estimates suggest that in the Caribbean we have lost more than 50% of live coral and over 90% of sensitive and federally listed *Acropora palmata* (elkhorn) and *Acropora cervicornis* (staghorn) species. Meanwhile studies by scientists in Puerto Rico have shown that nutrients and sediment contaminants have increased by 5-10 times pre-colonial levels and several times in the last 40-50 years (Ortiz-Zayas et. al., 2006). 'Coral reefs of Puerto Rico are among the most highly threatened Caribbean reef systems' (Ramos-Scharrón, 2010; Burke and Maidens, 2004). The U.S. Coral Reef Task Force determined that reducing the contribution from land-based

Figure 1. Actual coral reef area in Guánica. Photo by JP Segarra.

sources of sediment was essential in maintaining the long-term stability of coral reefs (USCRTF, 2000). Even though most soils in Puerto Rico have a high to very high vulnerability to water erosion (Reich et al., 2001) and land erosion is recognized to pose a major threat to both freshwater and marine resources (Torres and Morelock, 2002; Soler-López, 2001), limited actions are generally taken to mitigate its effects (Lugo et al., 1981).

The Guánica Bay/Río Loco Watershed (GB/RLW) area was increased historically to bring freshwater to the dry south coast, almost doubling the drainage areas to approximately 151 square miles through a series of reservoirs, tunnels and hydroelectric plants. Subsequently, the GB/RLW watershed encompasses five manmade lakes and associated reservoirs (Figure 2). The watershed includes the urbanized areas of Yauco, a portion of the Lajas Valley agricultural region, and the upper watershed where coffee farming and subsistence agriculture is practiced on steep often highly erodible slopes. While Guánica Bay receives water directly only by the Rio Loco, the actual total drainage area encompasses much more than just the Loco watershed. This includes the five smaller basins and associated reservoirs: Lago Yahuecas, Lago Guayo, Lago Prieto, Lago Lucchetti, and Lago Loco. Guánica Bay is essentially drained by both the Rio Loco which receives flow from the four reservoirs north and upstream of it as well as by historic Guánica lagoon.

The conversion of upland forested lands to agriculture and man-made channels has altered the natural hydrology of the watershed causing upland soil erosion, in-stream channel erosion, loss of lagoons and the downstream transport of sediment (CWP, 2008). Several studies point to dirt roads and sun coffee within farmlands in the upper watershed

as some of the major elements that contribute to sediment transport to the Guánica Bay and the nearshore reefs.

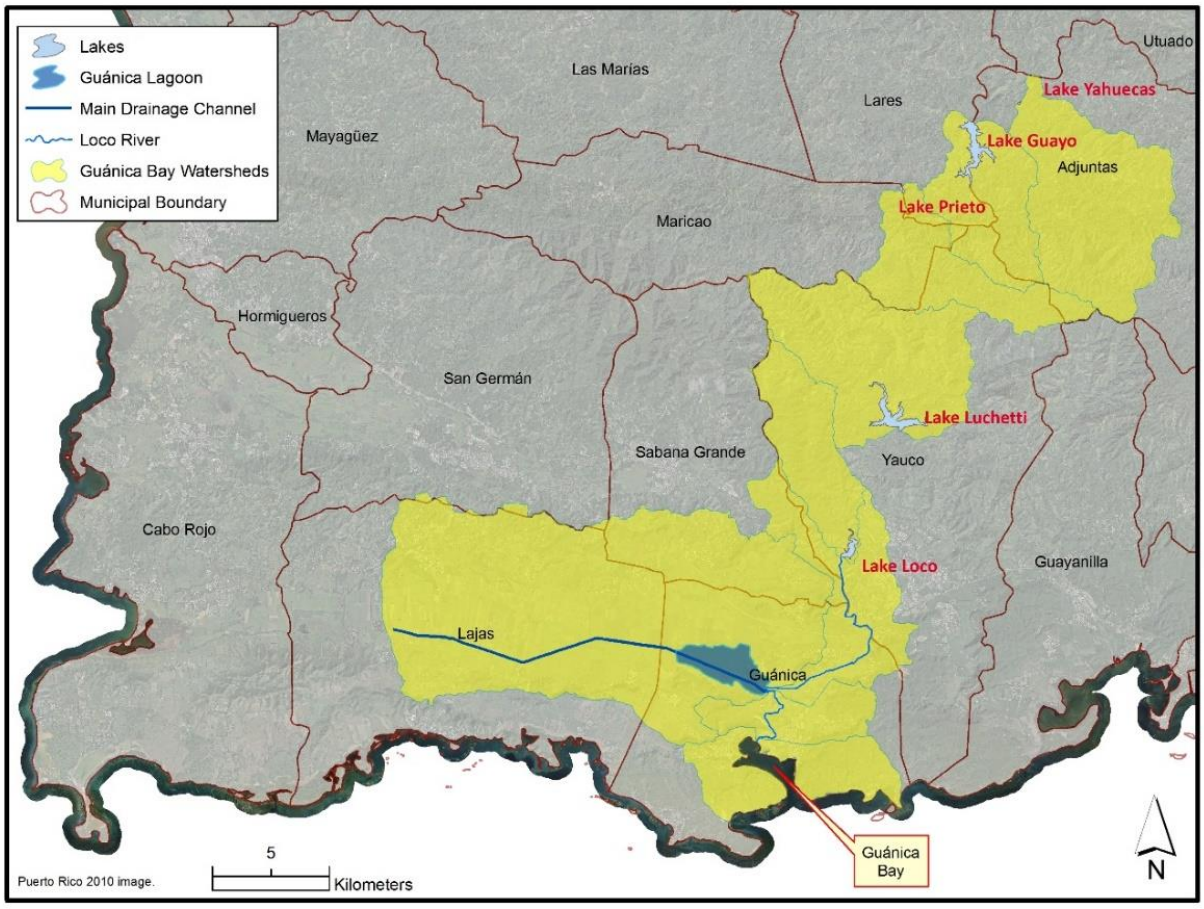

Figure 2. Guánica Bay Río Loco Watershed map.

Figure 3. Site Map

2 IMPLEMENTATION

The implementation of this project was focused to address Objective L1.3 of the Coral Reef Conservation Program- Coral Reef Strategic Goals and Objectives 2010-2015, "Implement watershed management plans and relevant Local Action Strategies (LAS) within priority coral reef ecosystems and associated watersheds to improve water quality and enhance coral reef ecosystem resilience". This project also had been described as one of the priority actions recommended in the ***Guánica Bay Watershed Management Plan***.

Historic infrastructure at these sites had created downstream scour and the low head dams, concrete footers, and other structures were acting as strainers and constrictions in the channel causing debris to become lodged. Changes in erosive forces was leading to destabilize banks, increasing channel erosion, bed scour and sediment transport. This removal was critical to the success of proposed river restoration efforts in the Rio Loco given that the debris caught in the structures creates large areas of erosion at surrounding farms (Figure 3). The presence of these structures is mostly associated with the past use of surface irrigation that has been replaced by drip irrigation in the Guánica Valley. Because of disuse, these structures were in a state of disrepair and inhibit natural flows in the channel and create conditions for excessive erosion.

Based on our previous experience, and after discussing suggestions with the DNER, PDC implemented several components that are described in detail below.

1 INTERAGENCY MEETING FOR PERMITS NEEDED AND ACTION PLAN

Protectores de Cuencas coordinated and led several agency meetings with the purpose to discuss the details concerning the structure removal at the Rio Loco sites. These meetings also served to discuss the necessary permits needed to implement the proposed project. Meetings were held with agency officials from the Department of Natural and Environmental Resources (DNER), the US Fish and Wildlife Service and the US Corps of Engineers.

Site visits with our engineering staff were conducted at El Puente project site. A site survey was conducted, and topographic data was collected. A schematic geomorphologic analysis of the project sites has been completed by our partners from Gregory E. Morris Engineers. The survey and schematic design generated were used to make decisions concerning the removal process of the structures at the project site.

State permit process was initiated in June 2017 with the Oficina de Gerencia de Permisos (OGPe). The permits requested included a description of the proposed tasks and need to complete the project with the purpose to improve the conditions of the sites and prevent the erosion and sedimentation that is taking place in the area.

A Phase 1 Archeological Study was requested by SHIPO and the ICP. Archeologist Aramis Font Negrón was contracted to conduct the study and the site visits was completed as well as the initial Investigation at SHIPO and the General Information Center at the ICP has been completed. Federal permit process was initiated and finalized with the US Army Corps of Engineers (USACoE) and an Endorsement Letter was received from US Fish and Wildlife Service (USFWS).

A series of meetings took place with farmers, Puerto Rico Land Authority, NRCS and the Soil Conservation District to present the project and coordinate logistics. Agreements were established to start structure removal early 2018.

2 STRUCTURE REMOVAL

PDC completed all necessary environmental compliance requirements for the removal of the identified structures from the Río Loco basin. As requested by the Agencies during the consultation process, river banks were not altered, and no fill was deposited on the river basin. The geotechnical report prepared by Gregory E. Morris Engineers was followed thoroughly. Removal process included the use of heavy equipment to brake and remove the structures from the river. The structure removal was completed during periods that power generation would not impede the presence of heavy equipment and PDC staff. PDC

Figure 4. Project site prior to structure removal.

coordinated with the Puerto Rico Electric Power Authority (PREPA) for the working dates inside the River basin in order that hydroelectric power generation did not conflict with working hours for the structure removal.

The "El Puente" site is located northwest of Santa Rita Farm, near El Caño community and upstream of El Caño Bridge. The removed structures were composed of the remnant of an old water intake irrigation infrastructure. At the moment of removal, part of the structure had collapsed at the center, backing up the flow of water toward the banks and causing bank erosion and concentrating flow towards the bridge center pillars putting into jeopardy the structural composition of the bridge itself. The proposed action was to remove the structures and locate them near the bridge central pillars to protect them from the energy of the river flow during storm events. This approach also came from site visits with NRCS Engineer and have the support of NRCS, the Conservation District and the farmers of the area (Figure 5).

Removal of structures from the river bed was completed with heavy equipment that included a backhoe, a skid steer with hammer, and crawler dozer. All of the concrete debris was collected into dump trucks and transported for proper disposal (Figures 6-7). The measures taken with this project will help restore the conditions of the Rio Loco river bed, reduce the amount of erosion taking place, and therefore, reduce the amount of sediments being transported downstream and reaching coastal and marine environments associated with the Guanica watershed. Their removal will ultimately improve the water quality and health of the coral reefs systems, not only by reducing sediment loads but also by reducing the impact caused by the presence of debris that had accumulated by the structures.

Figure 5. Project site prior to structure removal.

Figure 6. Project site during structure removal.

Figure 7. Project site upon completion of structure removal.