

National Fish and Wildlife Foundation

NFWF/Legacy Grant Project ID: 0302.10.021725

Coral Reef Conservation Fund 2010 - Submit Final Programmatic Report (Activities and Outcomes)

Grantee Organization: Center for Watershed Protection, Inc.

Project Title: Addressing Stormwater Runoff Impacts to Coral Reefs in La Parguera, Puerto Rico

Project Period	04/15/2010 - 08/30/2012
Award Amount	\$54,091.13
Matching Contributions	\$80,000.00
Project Location Description (from Proposal)	La Parguera is a coastal waterfront community known for diverse coral reefs and a bioluminescent lagoon in SW Puerto Rico with a resident population of 26,000 – it receives 100,000 visitors annually.

Project Summary (from Proposal)	Implement a stormwater plan and demonstration project in a coastal town where coral reefs are impacted by runoff. Capacity will be built by incorporating university students and the public into the design.
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Summary of Accomplishments	Summary of Accomplishments: Staff facilitated a design charette with landscape architectural faculty and students from the Polytechnic University of Puerto Rico (PURP) and members from the community and spent three days in the field screening 39 sites to determine their potential for stormwater retrofitting. The sites were then ranked on the basis of water quality benefit, PAH removal potential, cost, educational benefit, land ownership and local support. The top three candidate sites were chosen and design concepts prepared based on feedback from the charette. Using the field data, the Center contracted with PURP students to develop a Green Infrastructure Plan (GI Plan) for the Town of Parguera. In June, 2011 CWP staff traveled to La Parguera to scope-out the Mangrove Restoration project (site E5) that was identified in the GI Plan but funded by a grant received by the Gulf of Mexico Foundation. This site, which is also included in the GI Plan (site E1/E3), could treat runoff from a municipal parking lot and upstream drainage from a storm outfall. Because of its proximity to the planned Mangrove Restoration, there would be synergies and cost savings by constructing both projects together. While we were not successful in bringing the project to construction, the development of the GI Plan, the stormwater retrofit field screening, and public outreach were important outcomes which will help meet the ultimate goal to restore the off-shore reef system.
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Lessons Learned	Lessons Learned: It is unlikely that stormwater management controls alone are adequate to mitigate sediment from these areas. We recommend a comprehensive watershed study so that the relative contribution of all the non-point sources can be apportioned along with measures to mitigate these. One of the problems that we encountered was due to the unexpected delays for meeting with the town officials and for their design approval. There were further delays for receiving the municipality comments which were needed to submit the permits to the Army Corps of Engineers (ACE). Another of the key lessons learned is that it is difficult to “implement” a watershed restoration plan without sustained community support as there is not a local advocacy group that can serve as the focal point for sustained local action. A final point for consideration is that in retrospect, this project was underfunded as we underestimated the time necessary for on-site “presence”. Spending more time on-site would have enabled better coordination with AG Environmental and more timely deliverables of plans. Additional resources could have been used to help develop a local watershed organization that could have taken “ownership” of the Green Infrastructure Plan and been used as our “eyes on the ground”.
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Conservation Activities and sediment transport from the Town of La Parguera	Creation of a green infrastructure action plan to address stormwater runoff
Progress Measures	# of management plans created or updated within last five years
Value at Grant Completion	1
Conservation Activities	Increased capacity of professors and students to id, design and implement green infrastructure projects to address stormwater runoff and sediment
Progress Measures	Other (Number of professors and students trained and who participate in project fieldwork)
Value at Grant Completion	15
Conservation Activities	Engage the community, jurisdiction and businesses as well as engineers and developers in the restoration planning process and design charette
Progress Measures	Other (# of participants in design charette and planning process)
Value at Grant Completion	25
Conservation Activities	Engage the community, jurisdiction and businesses as well as engineers and developers in the restoration planning process and design charette
Progress Measures	Other (improved participation, public awareness and enforcement of erosion control and stormwater regs)
Value at Grant Completion	80%
Conservation Activities	Development of a standard design and specifications for bioretention for urban areas of Puerto Rico (currently no stormwater design guidance in PR)
Progress Measures	Other (Bioretention design guidance produced for Puerto Rico and made available through the PR Sea Grant)
Value at Grant Completion	1

Conservation Outcome(s)	Reduced concentration of stormwater pollutants leaving stormwater treatment practice (Assumptions based on nat'l ave storm conc and removal rates)
Conservation Indicator Metric(s)	Other (Nitrogen levels transported in treated stormwater runoff (mg/l))
Baseline Metric Value	2.2 mg/l
Metric Value at Grant Completion	1.2 mg/l
Long-term Goal Metric Value	1.2 mg/l
Year in which Long Term Metric Value is Anticipated	2
Conservation Outcome(s)	Reduced concentration of stormwater pollutants leaving stormwater treatment practice (Assumptions based on nat'l ave storm conc and removal rates)
Conservation Indicator Metric(s)	Other (Sediment levels transported from treatment practice to reefs (mg/l))
Baseline Metric Value	68 mg/l
Metric Value at Grant Completion	10 mg/l
Long-term Goal Metric Value	<10 mg/l
Year in which Long Term Metric Value is Anticipated	2
Conservation Outcome(s)	Reduced concentration of stormwater pollutants leaving stormwater treatment practice (Assumptions based on nat'l ave storm conc and removal rates)
Conservation Indicator Metric(s)	Other (Reduction of Oil and Grease and PAH concentrations in treated stormwater runoff (mg/l))
Baseline Metric Value	4.7 mg/l
Metric Value at Grant Completion	0.7 mg/l
Long-term Goal Metric Value	0.7 mg/l
Year in which Long Term Metric Value is Anticipated	2



Final Programmatic Report Narrative

Instructions: Save this document on your computer and complete the narrative in the format provided. The final narrative should not exceed ten (10) pages; do not delete the text provided below. Once complete, upload this document into the on-line final programmatic report task as instructed.

1. Summary of Accomplishments

- Conducted a design charette with students from the Polytechnic University of Puerto Rico and the community
- Developed a Green Infrastructure plan for the town of Parguera
- Conducted a retrofit assessment screening over 39 sites with students and the community
- Developed final design for stormwater treatment wetland and submitted permits

2. Project Activities & Outcomes

Activities

The first task under this grant was the collection of background information to identify potential stormwater retrofit project sites in preparation for an initial field visit to La Parguera. This also included making arrangements for a design charette with landscape architectural faculty, students from local universities such as Polytechnic University of Puerto Rico's (PUPR) and members from the community. The Center for Watershed Protection (CWP) contracted with Angel Garcia, P.E., AG Environmental PSC, to participate in the design charette, assist with field screenings, develop the final design of the stormwater best management practice (BMP) and oversee its construction.

On August 17, 2010 staff travelled to La Parguera and spent three days in the field screening 39 sites to determine their potential for stormwater retrofitting.¹ After the sites were screened they were ranked on the basis of water quality treatment, polycyclic aromatic hydrocarbon (PAH) removal potential, cost, educational benefit, land ownership and local support. CWP staff were accompanied by members of the community as well as faculty and students. Afterward field work, design sketches were made and presented at the design charette. The top three candidate sites were chosen and design concepts prepared based on feedback from the charette. The three candidate sites included:

- Bioretention (street) – Roadway along Supermercado east and west side of street
- Sand filter and rain garden – Plaza Kioscos
- Mangrove Restoration – Adjacent to municipal lot

The Street Bioretention site adjacent to Supermercado was selected as the prime candidate for construction under this project. During the visit CWP staff met with Prof. José J. Terrasa-Soler and PURP students to discuss their involvement in developing a Green Infrastructure Plan (GI Plan) which would include artistic renderings of the top three priority sites from the site screening and charette. After two iterations, PURP submitted a final draft of the plan in June 2011. CWP staff provided additional description information to the plan. The plan was completed this past summer (2012).²

In June, 2011 CWP staff traveled to La Parguera to scope-out the Mangrove Restoration project (site E5) that was identified in the GI Plan but funded by a grant received by the Gulf of Mexico Foundation. While in La Parguera, CWP staff met with Angel Garcia to arrange surveying for the Street Bioretention project site that was adjacent to the Supermercado. During the site visit staff felt that maintenance may be an issue because of the steep slopes and large sediment source upstream from the project. Also, staff were concerned about the adjacent soils which appeared to be "back fill" and would not promote stormwater runoff infiltration that is required for the BMP. Furthermore, there is no storm drainage infrastructure to connect the BMP under drain and/or overflow which is a standard design feature for a bioretention structure. Finally, another staff concern was project construction during the rainy season (fall).

¹ Site screening forms and spreadsheet ranking are available by request

² This is an extremely large document and is available by request. The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the National Fish and Wildlife Foundation. Mention of trade names or commercial products does not constitute their endorsement by the National Fish and Wildlife Foundation.

CWP staff accompanied Angel Garcia to a site adjacent to the proposed Mangrove Restoration project. This site, which is also included in the GI Plan (site E1/E3), could treat runoff from a municipal parking lot and upstream drainage from a storm outfall. Because of its proximity to the planned Mangrove Restoration, there would be synergies and cost savings by constructing both projects together. This site was therefore substituted as the “pilot” stormwater retrofit under this project in place of the bioretention site adjacent to the Supermercado. The proposed retrofit involves the construction of fore bays at both outfall points, connecting the fore bays with an 18 inch deep linear wetland, and allowing the wetland sheet flow to enter the mudflat. The mudflat can then be converted to a shallow marsh wetland. Currently, the parking lot drainage is collected in a clogged trench drain, which can also be improved by this retrofit. The main advantages of this site are the following: 1) its publicly visible location; 2) its potential to treat a large volume of stormwater; 3) its capacity to serve as a demonstration project for other disturbed mudflats; and 4) its proximity to the Mangrove Restoration project, that will support coordinating construction activities and monitoring synergy. The CWP was granted an extension to the agreement to October, 1 2012, to allow additional time to complete the design and secure the necessary permits. It was also hoped that construction could be done in the winter thereby avoiding the “rainy season.” The following tasks were outlined at the time the grant was extended:

1. Conduct site survey and develop concept designs for the stormwater wetland and identify any synergies with adjacent mangrove restoration site.
2. Contract with the Inter American University of Puerto Rico to conduct stormwater monitoring.
3. Finalize concepts into “permit ready” format, present concept design to municipal officials, and present the concept drawings to municipal officials. The municipality interaction will promote the municipality’s support for these projects.
4. Make any revisions requested by the officials from the Municipality of Lajas.
5. Prepare all necessary documentation (excluding the design drawing itself) and submit the necessary permits for construction of the proposed practices and make any changes to the design and associated documents suggested by permitting agencies.
6. Preparation of construction drawings, material estimate, and develop bid package if outside contractor is needed. If an outside contractor beyond the municipality is required, subcontractor will develop appropriate bid package, request bids, and select a contractor.
7. Manage construction and assist construction personnel in building the proposed practices, and inspect the construction at key points in the process.

While we were not successful in bringing the project to construction, the development of the GI Plan, the stormwater retrofit field screening, and public outreach were important outcomes which will help meet the ultimate goal to restore the off-shore reef system.

Outcomes

- Increased capacity of professors and students to identify, design and implement green infrastructure projects to address stormwater runoff and sediment
- Engaged the community, local officials, businesses as well as engineers and developers in the restoration planning process by holding a design charette
- The Green infrastructure plan and retrofit assessment is available as a blueprint for full scale BMP implementation
- The design of the stormwater wetland pilot is complete with the permits almost approved which will make the implementation much easier for a future grant
- Since this project did not go forward with construction there are no other quantifiable outcomes

3. Lessons Learned

The obvious key lesson learned is that the lack of stormwater controls in Parguera is severely impairing the near-shore water quality and the implementation of the Green Infrastructure Plan developed under this project can substantially help to mitigate these impacts.

While the Green Infrastructure Plan is adequate for planning where to implement stormwater best management practices, future funding should consider a more depth assessment of the cost-benefits of the individual projects identified in the plan. This would include the application of a simplistic water quality model such as the Watershed Treatment Model developed by the Center for Watershed Protection. Also, while uncontrolled stormwater related to urbanization is a major

source of contaminants contributing to the impairments of the near-shore area, it is obvious that erosion from the hillslopes above the town of Parguera is also a major contributing factor.

It is unlikely that stormwater management controls alone are adequate to mitigate sediment from these areas. We recommend a comprehensive watershed study so that the relative contribution of all the non-point sources can be apportioned along with measures to mitigate these.

One of the problems that we encountered was due to the unexpected delays for meeting with the town officials and for their design approval.

There were further delays for receiving the municipality comments which were needed to submit the permits to the Army Corps of Engineers (ACE). The permits were finally submitted to the ACE in July 2012. Due to the new timetables another contract extension was needed to complete construction.

Another of the key lessons learned is that it is difficult to “implement” a watershed restoration plan without sustained community support. While we had overwhelming participation and support during the site screening process and development of the Green Infrastructure Plan, there is not a local advocacy group that can serve as the focal point for sustained local action. This could have been extremely helpful in working with Town officials.

A final point for consideration is that in retrospect, this project was underfunded as we underestimated the time necessary for on-site “presence”. Spending more time on-site would have enabled better coordination with AG Environmental and more timely deliverables of plans. Additional resources could have been used to help develop a local watershed organization that could have taken “ownership” of the Green Infrastructure Plan and been used as our “eyes on the ground”.

4. Dissemination

Since we were not able to complete this project we were not able to disseminate the lessons learned. However this information is critical to disseminate to the environmental community working to protect and restore the reef system especially the GI Plan which provides a blue print for mitigating the effects of urban stormwater.

5. Project Documents

Include in your final programmatic report, via the Uploads section of this task, the following:

- 2-10 representative photos from the project. Photos need to have a minimum resolution of 300 dpi and must be accompanied with a legend or caption describing the file name and content of the photos;
- report publications, GIS data, brochures, videos, outreach tools, press releases, media coverage;
- any project deliverables per the terms of your grant agreement.

The GI Plan is uploaded with associated retrofit assessments and pictures.

POSTING OF FINAL REPORT: *This report and attached project documents may be shared by the Foundation and any Funding Source for the Project via their respective websites. In the event that the Recipient intends to claim that its final report or project documents contains material that does not have to be posted on such websites because it is protected from disclosure by statutory or regulatory provisions, the Recipient shall clearly mark all such potentially protected materials as “PROTECTED” and provide an explanation and complete citation to the statutory or regulatory source for such protection.*