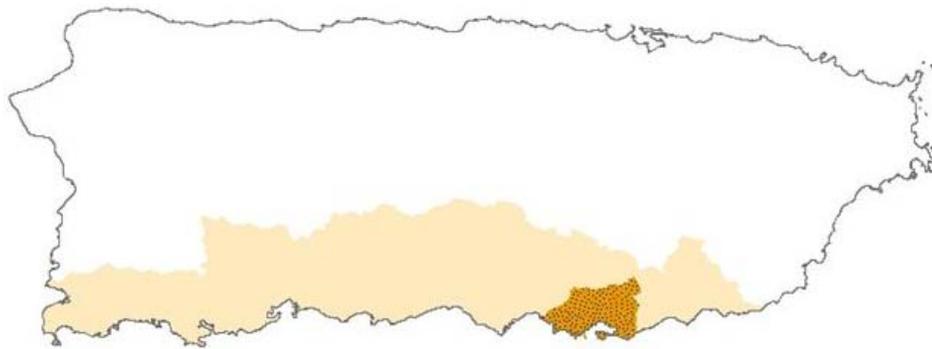




**Conservation Effects Assessment Project:
Jobos Bay, Puerto Rico Special Emphasis Watershed Study**

**A Collaborative Effort by the
U.S. Department of Agriculture and
National Oceanic and Atmospheric Administration**

**Plan of Work
Administrator's Summary**



**Jobos Bay Watershed
HUC: 21010004**

May 30, 2007

Conservation Effects Assessment Project: Jobos Bay, Puerto Rico Special Emphasis Watershed

Executive Summary

The Conservation Effects Assessment Project (CEAP) began in 2003 as a multi-agency effort to quantify the environmental benefits of conservation practices used by private landowners participating in selected U.S. Department of Agriculture (USDA) conservation programs. The Jobos Bay Watershed in South-Central Puerto Rico (PR) was selected by CEAP partners as the first tropical CEAP Special Emphasis Watershed. The project originated from an ongoing collaboration between USDA and NOAA on the U.S. Coral Reef Task Force.

Water conservation and water quality concerns predominate over the entire region. In the uplands soil erosion also threatens natural resources. Improved agricultural water management consists of measures to increase or conserve present or future water supplies in rural areas, improve water quality impaired by nonpoint source pollutants, and increase the efficiency of water management for agricultural purposes.

Investigations will provide field-to-watershed scale data for evaluating and improving conservation practices and the performance of watershed assessment models. Four types of agricultural operations were selected for further study: poultry, papaya/plantain/pasture, corn for animal feed, and sorghum. The main objective of the Jobos Bay Special Emphasis Watershed Study (JBSEW) is to determine the environmental effects that agricultural conservation practices implemented by farmers on the uplands may have on coastal waters and associated habitats in tropical ecosystems, and ultimately to coral reefs.

The NRCS will serve as the lead coordinating agency for this project and conduct outreach activities with the conservation partnership. NRCS will also assist the Puerto Rico Land Authority in implementation and development of innovative conservation practices with farmers. The ARS will lead research to quantify the effects of specific conservation practices on the delivery of water and chemicals from agricultural lands to surface and shallow ground waters. NOAA will lead in defining the state of Jobos Bay water quality, benthic habitats, and living marine resources. In addition, NOAA will collaborate with the Jobos Bay National Estuarine Research Reserve to monitor changes in these ecosystem components and to assess the effects of implemented conservation practices.

During the 2007-2009 timeframe, current partners expect to complete the following products:

- ARS will evaluate suitable field and watershed models. ARS will also conduct field surveys and analyze the data to calibrate their models.
- NRCS will develop a suite of innovative conservation practices, select willing cooperator farms and generate public outreach documents.
- NOAA will complete Summit to Sea modeling and provide maps and GIS data derived from the modeling effort. In addition, NOAA will design and conduct initial water quality and sediment chemistry sampling to support development of a comprehensive water quality and biological monitoring program.

Recognizing that this watershed is a spatially complex ecosystem, all the needs for this project may not be fully met through the existing agency partnerships. Critical project needs not currently being addressed include:

- Near-shore oceanographic models,
- Deep ground water contributions to Jobos Bay,
- Urban, industrial, and other point and non-point source contributions to the bay,

- Remote sensing technologies and capabilities,
- Mangrove ecosystem interactions with the watershed.

We propose to address these needs by pursuing collaborations with additional partners including, but not limited to EPA, NASA, USGS, USDA Rural Development and academic institutions such as the University of Puerto Rico and others.

Project Team

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1. Introduction

1.1. Purpose

The Conservation Effects Assessment Project (CEAP) began in 2003 as a multi agency effort to quantify the environmental benefits of conservation practices used by private landowners participating in selected U.S. Department of Agriculture (USDA) conservation programs. CEAP has three major, inter-related components: 1) National Assessments, 2) Watershed Assessment Studies, and 3) Bibliographies and Literature Reviews.

The Jobos Bay Watershed in South-Central Puerto Rico (PR) was selected by CEAP partners as the first tropical CEAP Special Emphasis Watershed. Investigations will provide field-to-watershed scale data for evaluating and improving conservation practices and the performance of watershed assessment models. The project originated from an ongoing collaboration between USDA and NOAA on the U.S. Coral Reef Task Force. The Jobos Bay watershed was chosen because it is adjacent to a NOAA National Estuarine Research Reserve (NERR).

1.2. Scope

CEAP Special Emphasis Watersheds are strategically located to quantify and demonstrate water quality and other environmental effects/benefits of conservation programs and to fill gaps in the existing CEAP--Watershed Studies Assessment program. The Special Emphasis Watersheds have ongoing research and demonstration efforts.

1.3. Goals and Objectives

The main objective of the Jobos Bay Special Emphasis Watershed Study is to determine the environmental effects that agricultural conservation practices implemented by farmers on the uplands may have on coastal waters and associated habitats in tropical ecosystems, and ultimately to coral reefs. An important study objective is to identify innovative conservation practices and irrigation management that maintain and/or enhance crop production and protect water quality in shallow groundwater and the adjacent NERR.

Current partners are the USDA Agricultural Research Service (ARS) and the Natural Resources Conservation Service (NRCS), National Oceanic and Atmospheric Administration (NOAA) and the Government of Puerto Rico. Initial funds to support the proposed work will come from multiple sources including USDA-NRCS, USDA-ARS, and NOAA.

1.4. Measurement of Progress (Benchmarks)

Progress towards improved environmental stewardship within the study area can be estimated by providing benchmarks that quantify various environmental conditions at specified time intervals. Benchmarks are quantitative variables which can be periodically measured to determine spatial and temporal responses in critical natural resource conditions. An example of a benchmark would be improvements in water quality resulting from reductions in nitrogen loadings.

1.5. Study Area Description

The 10,210 ha (25,219 acre) Jobos Bay watershed is located on the south-central coast of PR. The 8-digit Hydrologic Unit Code (HUC) is 21010004. There are two municipalities within the watershed, Guayama and Salinas, with a total population of about 73,000 persons. The predominant land use is agriculture, including diversified production of agricultural commodities such as plantains, bananas, papayas and hayland, and animal operations with poultry and some beef cattle. The watershed is located within the Subtropical Dry Forest Zone. Puerto Ricos' Central Ridge Mountains serve as a barrier to the moisture-laden

northeast trade winds. Orographic factors give rise to a zone of low precipitation throughout the entire length of the southern coast of Puerto Rico. Temperature shows little seasonal fluctuation.

1.6. Watershed Resource Concerns

Human activity is commonly identified as a major contributor to the observed deterioration of coral reef ecosystem health. Increasing industrial and commercial growth in the watershed has also been recognized as a major concern for coral reef ecosystem health. The global threat to coral reef ecosystems from coastal pollution is surpassed in severity only by coral bleaching from increasing water temperatures and fishing impacts.

Water conservation and water quality concerns predominate over the watershed. In the uplands soil erosion also threatens natural resources. Improved agricultural water management consists of measures to increase or conserve present or future water supplies in rural areas, improve water quality impaired by nonpoint source pollutants, and increase the efficiency of water management for agricultural purposes.

Table 1. Jobos Bay Watershed Resource Concerns

Water Quality	Loading of nutrients, pesticides and other contaminants (e.g., arsenic, copper) to surface and groundwaters Transport to surface water of pollutants adsorbed to soil particles
Water Quantity	Inefficient water use on irrigated land Competition for available fresh water Concentrated water runoff on cropland Reduced capacity of irrigation conveyance system by sediment deposition
Soil Quality	Organic matter depletion on intensively cultivated cropland Salinity in drip irrigated cropland Phosphorus accumulation on cropland
Soil Erosion	Soil erosion on irrigated cropland Soil erosion on steeply sloping lands
Plant Condition	Diminished productivity, health and vigor on croplands Decline in fish and shellfish in the bay
Fish and Wildlife	Habitat degradation and loss
Ecosystems	Fragmentation and mangrove mortality Diminished ecosystem services associated with the bay, including declines in seagrass beds and coral reefs

2. Methods (see Detailed Plan of Work)

2.1. Watershed assessment activities

2.2. Proposed conservation technologies

2.3. Water quality and sediment analysis

2.4. Plan of work for major activities and tasks by Fiscal Year

2.5. NRCS activities/deliverables

2.6. ARS activities/deliverables

2.7. NOAA activities/deliverables

2.8. Summary of Activities

During the 2007-2009 timeframe, current partners expect to complete the following products:

ARS will evaluate suitable field and watershed models. ARS will also conduct field surveys and analyze the data to calibrate their models.

NRCS will develop a suite of innovative conservation practices, select willing cooperator farms and generate public outreach documents.

NOAA will complete Summit to Sea modeling and provide maps and GIS data derived from the modeling effort. In addition, NOAA will design and conduct initial water quality and sediment chemistry sampling to support development of a comprehensive water quality and biological monitoring program.

3. Project Collaboration Opportunities

3.1. Critical Project Needs Not Currently Being Addressed

- Near-shore oceanographic models
- Deep ground water contributions to Jobos Bay
- Urban, industrial, and other point and non-point source contributions to the bay
- Remote sensing technologies and capabilities
- Mangrove ecosystem interactions with the watershed

3.2. Potential Agency and Institution Partnerships

- USGS
- EPA
- USDA Rural Development
- NASA
- University of Puerto Rico and other academic institutions

3.3. Local Agency Partnerships

- Agricultural Extension Service in Puerto Rico
- Sea Grant at UPRM
- The Environmental Quality Board of PR (EQB-PR)
- The Puerto Rico Land Authority
- Puerto Dept. of Natural and Environmental Resources
- Jobos Bay National Estuarine Research Reserve
- University of Puerto Rico – Dept. of Marine Sciences

3.4. CEAP Interagency Activities Matrix

Appendix B is a matrix of CEAP Interagency Activities which subdivides the study area into environmental compartments based on three sectors of human activity (agriculture, municipal and corporate) and associated sub-sectors.

4. Tropical CEAP Collaboration

The detailed Plan of Work will help guide NOAA, USDA and other federal, state, local and academic partners in establishing complementary CEAP Special Emphasis Watersheds in other tropical and sub-tropical environments. The long-term goal is the development of coordinated watershed and coral reef management and conservation options for tropical and sub-tropical ecosystems.

5. Annual Budgets by Agency

The FY2008 and FY2009 projected funding was estimated by each Lead Agency with funding sources and actual amounts to be determined.

Agency	Fiscal Year 2007 (Actual)	Fiscal Year 2008 (Proposed/Requested)	Fiscal Year 2009 (Proposed/Requested)
ARS	\$60,000	\$190,000	\$190,000
NOAA	\$50,000	\$200,000	\$200,000
NRCS	\$115,000	\$200,000	\$200,000

6. References

NOAA Biogeography Branch
<http://ccma.nos.noaa.gov/about/biogeography/>

NOAA Coral Reef “Summit to Sea” Project
http://ccmaserver.nos.noaa.gov/ecosystems/coralreef/summit_sea.html

NOAA Coastal Oceanographic Assessment, Status and Trends Team
<http://ccmaserver.nos.noaa.gov/about/coast/welcome.html>

NOAA National Status and Trends Program (NS&T)
<http://ccma.nos.noaa.gov/stressors/pollution/nsandt/welcome.html>

NOAA Jobos Bay National Estuarine Research Reserve
<http://nerrs.noaa.gov/JobosBay/>

USDA-ARS National Program - Soil Resource Management
http://www.ars.usda.gov/research/programs/programs.htm?NP_CODE=202

Appendix A. List of Abbreviations

AES - Agricultural Extension Service
ARS – Agricultural Research Service
CEAP – Conservation Effects Assessment Project
DNER - Puerto Rico Department of Natural and Environmental Resources
EPA – Environmental Protection Agency
FWS - Fish and Wildlife Service
JBSEW – Jobos Bay Special Emphasis Watershed Study
JOBANERR – Jobos Bay National Estuary Research Reserve
JW - Jobos Bay Watershed
NASA – National Aeronautic and Space Administration
NOAA - National Oceanic and Atmospheric Administration
NRCS - Natural Resources Conservation Service
PRLA- Puerto Rico Land Authority
UPR – University of Puerto Rico
USDA – United States Department of Agriculture
USGS – United States Geological Survey

