

Highlights

- Hydrologic Characterization of Goodwin Creek in Mississippi is being conducted by PRWRERI Researchers
- Director visited Costa Rica and Jamaica
- Comprehensive Integrated Management Plan for the Mayagüez Bay funded by EPA

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*Puerto Rico Water Resources and Environmental Research Institute ...
Dedicated to the Research and Sustainable Development of
Water Resources in Puerto Rico*

Hydrologic Characterization of Goodwin Creek: A joint project between the PRWRERI and the US Army Corp of Engineers Waterways Experiment Station (WES)

The Demonstration Erosion Control (DEC) Project is a comprehensive program that provides for the development of a system for control of sediment, erosion, and flooding in the hill areas of the Yazoo River Basin, Mississippi. Goodwin Creek is a tributary of Long Creek that flows into one of the primary tributaries of the Yazoo River. Goodwin Creek is extensively gauged by the U.S. Army Corps of Engineers (USACOE) and the Agricultural Research Service (ARS) as a facility for research of upland erosion, instream sediment transport, and watershed hydrology. The watershed is divided into 14 subcatchments with a flow-measuring flume at each of the drainage outlets.

The research potential of the Goodwin Creek watershed, and the capacity to investigate the temporal characteristics of the water sediment transported throughout the basin provide an excellent opportunity to conduct research.

The Water Resources and Environmental Research Institute received a grant from the USACOE to prepare and calibrate a hydrologic model for Goodwin Creek. The model will use the existing gage information at sixteen locations inside the watershed and develop a detailed examination of the stage/flow frequency and duration relationships for the watershed data. This is the first phase of a comprehensive study that includes sediment yield analysis and development of hydraulic structures and other methods for practical sediment yield reduction.

The project began in early October 1999 and is scheduled to be completed on December 2000. The principal investigator is Dr. Walter F. Silva-Araya from the Department

of General Engineering of the University of Puerto Rico, Mayagüez Campus (UPRM). In charge of the statistical analysis of the hydrologic data is Dr. Rafael Segarra-García from the Department of Civil Engineering, UPRM. One graduate student is also currently working on the project.

During December 6 to 9, 1999, the researchers and the Director of the PRWRERI, Dr. Rivera-Santos, visited the Goodwin Creek basin in Mississippi with the goals of getting familiarized with the basin and all of the instruments installed in it. Dr. David Biedernharn from WES and Dr. Chester Watson from Colorado State University accompanied the researchers from Mayaguez during the visit. In addition, during this trip, the team visited the Sedimentology Research National Laboratory of the Agricultural Research Service of the U.S. Department of Agriculture (SRNL-ARS-USDA). The purpose of this visit was to meet with personnel from SRNL-ARS to discuss the possibility of obtaining information previously

collected by them in relation to the Goodwin Creek Basin. Other topics discussed were the development of collaborative projects with SRNL researchers and the possibility of summer internships for students.

In a meeting with Dr. Sam Wang, director of the Hydrodynamic Calculus Center (HCC) at the University of Mississippi at Oxford, he was interviewed about the development of two and three dimensional hydraulic models for the prediction of the geomorphologic changes in river channels. HCC is willing to provide access to the programs to be tested by UPRM researchers during this research.

This project also provides the opportunity for a graduate student to visit the Goodwin Creek watershed and the SRNL to obtain data relevant to the project and to familiarize herself with the SRNL activities. Several hydrologic models, including WMS and HEC-HMS are being considered at present as candidates to help in the hydrologic characterization of Goodwin Creek.

Reducing Pesticide Run-off to the Caribbean Sea: Kingston, Jamaica (July 11-14, 1999)

The Environmental Program of the United Nations is sponsoring a project of international character to which Dr. Rivera Santos was invited to participate as a member of a steering committee. The first meeting of the committee was held in Kingston, Jamaica where representatives from different countries and agencies were in attendance. The purpose of the project is to reduce the contaminated discharges into the Caribbean basin. The

project involves four countries (Panama, Colombia, Costa Rica, and Nicaragua) with possibilities of Nicaragua joining the project. The purpose of this meeting was to formally describe the project and elaborate the agenda for future meetings and workshops. A proposal will be submitted to the GEF program of the United Nations. This project will be financed by UNEP with a total cost of \$438,000.

San José, Costa Rica (July 14-18, 1999)

In a meeting with Eng. Carlos Sanchez, the elaboration of a proposal for a research project in conjunction with the University of Costa Rica (UCR) and the University of Puerto Rico at Mayagüez (UPRM) was discussed. The proposal will be for a simulation of hydrologic and hydraulic systems for the drainage of storm water systems in the city of San Jose. The possibility of offering a course at UCR in the use of simulation models for hydrologic and hydraulic systems by a professor in the PRWRRI, UPRM was discussed. The possibility and desire of the Civil Engineering Department at UCR to develop a graduate program in environmental engineering was discussed. The program would utilize courses offered at UPRM.

Dr. Fernando Silenski, the dean of the engineering school, showed interest in corroborating with the Civil Engineering Department. He also showed interest in developing remote sensing and GIS projects in collaboration with the UPRM.

A workshop was offered at the department of Geology titled "Hierarchical analytical process and the process of vital issues". Twenty-

five people were in attendance in this workshop were the methods utilized in the management of the Río Grande de Añasco basins, which were designed by PR WRRI with EPA sponsorship. In a meeting with the director of the Geology department, Teresa Aguilar, the strengthening of the management program for hydrologic and hydraulic resources with courses from the UPRM was discussed.

With an attendance of 25, the third panel in the project for the management of the Río Dos Novillos basin was celebrated. The participants discussed the activities that were needed to develop each priority point identified in the second panel. The capacity to realize these activities was evaluated. The panel executed both of these objectives with success.

On August 22, a team from the Escuela de Agricultura de la Región Trópico Húmedo (EARTH) will travel to the UPRM to develop the conjunctive proposal "Living Watershed Research Center".

EPA Project: Mayagüez Bay Watershed

The Mayagüez Bay Watershed is one of the most important resources in the region, it offers many diverse uses to the habitants of the bay and its surroundings. Lately it has fallen upon hard times; it has been listed as one of the four worst contaminated coastal areas in Puerto Rico. The population rise, urbanization, agricultural activity, and industrialization have threatened the basin's intrinsic value. This contamination threatens the coastal resources and the quality and quantity of fresh resources from the water. For years many entities have attempted to

identify the causes and find solutions, but the results have been limited because of the lack of integration and coordination by the interested parties. The UPRM, through its WRRRI with the support of the Environmental Protection Agency (EPA) has developed a partnership between the academia, researchers, government, and interested private groups to develop and implement a Comprehensive Integrated Management Plan (CIMP) for the Mayagüez Bay Watershed.

The objectives of this project are to provide the development of a plan that permits the restoration, conservation, and protection of the natural resources in the watershed and establishes a balance within the system uses and its ecological integrity; to develop an organizational structure that ensures the participation of stakeholders while integrating and coordinating the administration and management towards a solution to the pollution problem; to develop strategies to restore, protect, and manage all pollutant sources within the watershed; and to develop an implementation plan that will guarantee that the developed plan and strategies will perform as intended and expected.

Success in conducting this project will lead to improved quality of the life for all habitants within the Bay and the watershed, as well as surrounding areas. The establishment of such a plan will allow the best utilization of the resources in a way that ensures the integrity of the ecosystem. This project will also enhance integration and communication between the stakeholders.

During the first year, the project was divided into three panels. The objective of the first panel was to establish a goal for the research program and to establish the criteria to evaluate the proposals that will be

considered by the CIMP. The criteria were as follows (in order of rank): magnitude, response level, competence of researchers, likelihood, cost-effectiveness, time frame, and applicability. The goal established was as follows: "The research program of the Integrated Management Plan for the Hydrographic Watershed of the Mayagüez Bay (from Punta Cadena to Punta Guanajibo) seeks to create a system that will include: (1) the collection of technical, scientific, historical and community-relevant information; (2) a process of analysis; (3) an information transfer system that will fully support this plan."

"The research program will provide information over the conditions under which the Hydrographic Watershed of the Bay exists and will recommend strategies to restore, conserve, and protect it. The research program will support the objectives and goals of the Integrated Management Plan."

The purpose of the second panel was to identify, refine, and rank a series of vital issues which would serve as issues addressed in a call for proposals submitted as a part of the CIMP. The final list of vital issues proposed by panelists is as follows (by rank): monitoring plan, definition of the geographical framework, educational program, historical study, data bases, importance of the resources, impact analysis, capacity of system to recover, and revision and analysis of information.

The purpose of the third panel was to identify information needs to be dealt with under proposal topics that were identified by a second panel. Also, this panel began with a series of presentations on the results of a literature survey of studies that already existed on the status of the Mayagüez Bay watershed.

FOR MORE INFORMATION VISIT OUR WEBSITE AT:
www.ece.uprm.edu/cohemis/vip/

Technical and Academic Collaboration: INTEC-UPRM-PRWRERI

Floods in Dominican Republic killed more than 10,000 persons during the last 50 years. Floods in this country produced losses to the economy for more than \$30,000 million dollars during the last 10 years. Floodway Delineation Maps are a useful tool to reduce these disasters because, if used as regulatory maps, they help to establish flood protection measures for structures in the flood zones or even, prohibit any construction in high risk areas. The PRWRERI took a first step in providing this Caribbean Island the basic knowledge and techniques for the development of Floodway Delineation Maps.

A successful collaborative project was concluded with the Technological Institute of Santo Domingo (INTEC, in Spanish) in Dominican Republic and the University of Puerto Rico, Mayaguez Campus (UPRM). The project consisted of an intensive technology transfer program to establish the basis for teaching the techniques and methodology to create floodway maps for the Dominican Republic. The project also strengthened the relations between researcher from both institutions in the area of water resources. The directors of the PRWRERI were the principal investigators and coordinators of the activities in Puerto Rico and, Prof. Alfredo Abel was the project responsible in Dominican Republic.

Three faculty members from INTEC visited the UPRM in February 1999

and shared ideas and possible collaborative projects with faculty member at the UPRM. Professors' Alfredo Abel from the Department of Civil Engineering, and Caterine Catafesta from the Social Sciences Department offered a conference on the effects of Hurricane Georges on the Dominican Republic. The Conference focused on the magnitude of the damage caused to this strong hurricane during its pass by this Caribbean Island. Students and faculty members of the UPRM attended the Conference. Several meetings with colleagues interested in developing collaborative projects were also programmed.

The project also provided the opportunity to four faculty members from the UPRM to offer a sequence of intensive courses to professionals and students from the Dominican Republic to provide them with the essential skill to create Floodway Delineation Maps. Floodway maps are commonly available in Puerto Rico from FEMA Flood Insurance Studies. The Puerto Rico Planning Board uses them as the regulatory maps for Hydrologic and Hydraulic studies in the Island. The Dominican Republic is moving towards the development of a regulation for construction and the creation of a building code. A classification of flood zones is essential to determine the flood protection measures for buildings inside these zones; as well as, to establish regulations for these areas.

Courses in hydrologic statistics, hydrologic modeling, hydraulic modeling and geographic information systems applied to water resources completed the training offered by the UPRM experts, coordinated by the PRWRERI, in Dominican Republic. Engineers, students and other professionals attended the activities offered from September to December, 1999.

Funding for this project was provided by the Atlantea Program from the UPR Central Administration, supplemented by INTEC in Dominican Republic. The project deserved a Special Recognition Award from the Atlantea Project Evaluators Committee in May, 2000.

CALENDAR OF EVENTS

**Dundee Water 2000: Equitable and Sustainable Access to Water
The Water Law and Policy Programme**

July 10 – 14, 2000
CEPMLP University of Dundee, West Park Centre, Dundee Scotland, UK
For more information contact: Seminar coordinator Patricia Jones:
p.a.jones@dundee.ac.uk Phone: +44 1382 344303 Fax: +44 1382 345854

**Living Downstream in the Next Millennium: Reconciling Watershed
Concerns with Basin Management**

Universities Council on Water Resources (UCOWR)
August 1 – 4, 2000
Hilton New Orleans Riverside, New Orleans, Louisiana
For more information contact: UCOWR Phone: (618) 536-7571 Fax: (618) 453-2671
E-mail: ucowr@uwin.siu.edu

**AWRA 2000 Summer Specialty Conference: Riparian Ecology
and Management in Multi-Land Use Watersheds**

American Water Resources Association
August 29 – 31, 2000
Double Tree Portland/Lloyd Center Hotel, Portland, Oregon
For more information contact: AWRA Phone: (540) 687-8390 Fax: (540) 687-8395
Web site: www.awra.org E-mail: info@awra.org

**Sixth Caribbean Islands Water Resources Congress
Puerto Rico Water Resources and Environmental Research Institute and
Virgin Islands Water Resource Research Institute**

February 22 – 23, 2001
Mayagüez Resort and Casino, Mayagüez, Puerto Rico
For more information contact: PRWRERI Phone: (787) 265-3826 Fax: (787) 832-0119
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