ABOUT US

• The Water Resources and Environmental Research Institute is one of 54 similar research centers in the States, DC, Puerto Rico, Virgin Islands, and Guam/Federated States of Micronesia.

• It was established in 1964 by the Water Resources Research Act and presently operating under Section 104B of the Water Research and Development Act of 1984 (P.L. 98-242).
OBJECTIVES

• Plan, conduct, and otherwise arrange for competent research that foster...
  • the entry of new research scientists into the water resources and environmental fields,
  • the training and education of future water scientists, engineers, and technicians,
  • the preliminary exploration of new ideas that address water problems or expand understanding of water and water-related phenomena, and
  • the dissemination of research results to water managers, professional community, and the public.
RESEARCH PROGRAM

- Externally funded
  - USEPA
  - USGS
  - USCoE
  - USFWL
  - USDA-NRCS
  - FEMA
  - PRASA
  - PREQB
  - PRDNER
  - PRPB
  - PRIFA
  - Office of the Comptroller
  - Municipalities
  - Private citizens
  - Private Professional Firms
  - Commerce
  - Industry
RESEARCH INTEREST

Surface Hydrology and Watershed Management
- Multiobjective optimization for decision making
- Computer model calibration and error analysis
- Sustainable watershed management

Surface Water Quality
- Non-point pollutant sources identification
- Optimization techniques for waste allocation
- Pollutant transport simulation
- Pollution prevention
Water and Wastewater (W&WW) Treatment

- Nanotechnology applications in w&ww treatment
- New material and techniques for w&ww treatment
- Small systems new technology development

Soil Remediation

- Bio-remediation
- Physical-chemical remediation
- Soil amend studies
• Hydraulics
  • Channel flow analysis and simulation
  • Stormwater sewer system analysis and modelling
  • Water distribution system analysis and modelling
  • Flood analysis and simulation
  • Sediment transport processes and modeling
  • Hydrologic and Hydraulic studies
THE COMPREHENSIVE INTEGRATED MANAGEMENT PLAN (CIMP) FOR THE MAYAGÜEZ BAY WATERSHED
THE MAYAGÜEZ BAY
THE MAYAGÜEZ BAY

Sediment discharge from Río Grande de Añasco and Río Yagüez
THE MAYAGUEZ BAY

Sediment discharge from Río Yagüez and Río Guanajibo
RESEARCH PROGRAM

• Monitoring the Water Quality Parameters of Mayagüez Bay.
NUTRIENT DISCHARGES FROM MAYAGÜEZ BAY WATERSHED.
RESEARCH PROGRAM

DEVELOPMENT OF AN EDUCATION PROGRAM FOR THE CIMP PROJECT.
JBNERR

USING BASINS TO ASSESS POINT AND NONPOINT SOURCES OF POLLUTION WITHIN THE JOBOS BAY WATERSHED
RESEARCH PROGRAM

• Potential Fecal Coliform Contamination Index
RESEARCH PROGRAM

• Development of Land Use Maps for the Río Grande de Añasco, Río Yagüez, and Río Guanajibo Watersheds (PREQB).
RESEARCH PROGRAM

• Microbial Sources Tracking to Determine the Host Origin of Fecal Contamination in Two Puerto Rico Watersheds (PRWRERI)

• Sediment transport studies in Río Grande de Añasco, Río Yagüez, and Río Guanajibo (ERDC, US ARMY CoE)
Our graduate students are multitasking.
RESEARCH PROGRAM

RURAL COMMUNITIES SEPTIC TANK SURVEY IN RÍO GRANDE DE AÑASCO WATERSHED (UPRM)
Communities with septic tanks

Sanitary sewer served communities
**Water Quality Index for Surface Streams in Puerto Rico**

- Consider most important pollution parameters
- Series of surveys to experts (Delphi method).
- Allows monitoring of WQ changes with time.

\[
WQI = \left( 1 - N + \sum_{i=1}^{n} S_i^{-2.5} \right)^{-0.4}
\]
MICROBIOLOGY SHORT COURSE – EPA FUNDED
104B RESEARCH PROGRAM

Field Demonstration of Removal of MS2 Bacteriophage and *Bacillus subtilis* with a Solar-Powered Engineered Experimental Drum Filtration and Disinfection (SEED) Unit
Development and evaluation of a hybrid multimedia-filter prototype (HMP) for the degradation of natural organic matter (NOM) and bacteriological control from raw waters.
Microbial source tracking: The hunt for *E. faecalis* the dominant Enterococci among non-pigmented environmental enterococci in the water systems of Puerto Rico.
104B RESEARCH PROGRAM

An Integrated Approach for the Detection of Estrogenic Activity in a Tropical Urban Watershed
104B RESEARCH PROGRAM

Mapping Field-Scale Soil Moisture Using Ground-Based L-Band Passive Microwave Observations in Western Puerto Rico
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