Tropical Hydrology Under a Changing Land Use Dynamics: Development of Sustainable Watershed Conservation Scenarios in the Reo Cobre Watershed, Jamaica - Shimelis Setegn, Florida International University (FIU), Miami, FL (co-authors: Assefa M. Melesse, Michael E. McClain, Xixi Wang)

Global and regional temperatures, rainfall patterns and other climatic variables are changing due to an increase in the atmospheric concentrations of carbon dioxide and other greenhouse gases. This results in changes in the timing and magnitude of runoff, soil moisture storage, lake and river depths and water quality. These possible changes could have serious implications for future global and regional water resources in particular to the availability and management of water in tropical areas. The demand for adequate and safe supplies of water is becoming crucial especially in the over-populated capitals of tropical countries. Moreover population growth coupled with environmental degradation, and possible adverse impacts of land use change are major factors limiting water resources availability. And hence, the study of impact of land use changes on the hydrological water balance of watershed is of major interest to water resources management, particularly in tropical regions where the impact of land use changes on the hydrological cycle is more obvious and more serious. The main objective of this study is to analyze the impact of land use/land cover changes on the hydrology of the Rio Cobre Basin, Jamaica. Spatially distributed physically based hydrological model, SWAT (Soil and Water Assessment Tool), was calibrated and validated in the basin and used for the study of land use change impacts in the watershed. Different land cover types were tested to analyze the hydrological responses to land use change. The result indicated that a decrease in vegetative cover contribute more for an increase in surface runoff in the watershed.

Sustainable Financial Planning for Water Quality Improvement and Management – Stacey Isaac Berahzer, UNC Environmental Finance Center, Marietta, GA

Management of water resources tends to be at the mercy of whatever grants happen to be available at a particular point in time. While grant funding is an important source of watershed management efforts, it does not always facilitate the holistic, long-term management of water resources. It goes without saying that each watershed is unique. When the biggest problems in a given watershed do not match the activities that grant agencies have chosen to focus their funds on, management efforts are stranded. Evolving toward a more sustainable method of financing water quality efforts serves to address this problem. Where funding for water quality efforts can be generated by the people living within a watershed or political jurisdiction, overall management of the resource stands a better chance. This presentation will highlight the problems inherent in the disconnect between watershed lines and political boundaries. It will demonstrate an interactive tool that has been created for water utility managers, and other water resource managers to use in considering options for generating local funds. The tool includes a “slider” that can manipulated to show the addition of x cents to a water utility bill; and how much revenue that will generate across the entire system. It also includes other options such as tackling this “watershed fee” to a property tax bill instead of the utility bill. Funds generated by these options can be used as a match for grants that require a cost-share. Or they can be used to amortize a loan, since the tool demonstrates to lenders how the funds will be generated for loan repayment. Below is an image of a sample of the interactive tool. This tool helps to introduce a fairly novel concept for generating financial resources for watershed management. Being a citizen of a Caribbean county, I know that the political hurdles to such an approach in this region are bound to make for interesting discussion.
Heritage Rivers of Puerto Rico – Marianela Torres, Department of Natural and Environmental Resources, San Juan, PR

The Comprehensive Water Resources Plan of Puerto Rico is the instrument through which public policy and strategies are established in order to protect, conserve and utilize this important natural resource.

One of the projects established as part of the plan was called Heritage Rivers. The project is aimed to protect rivers, or portions of them, whose natural attributes are in good condition, as well as encouraging their restoration processes and to minimize the impact so as to ensure their ecological integrity. These rivers meet the basic selection criteria of: no major dam in the main channel, lead to the sea, and have no significant water quality problems. The Río Grande de Manatí was selected due to its hydrographic attributes and recreational value. Río Grande de Manatí meets the following criteria’s: Free flow, Recreational Value, Scenic and Cultural or historical value.

It is the interest of the Government of Puerto Rico to protect rivers or sections of rivers that still have natural characteristics and that have been little disturbed, which shall remain in that state to grant future generations the right to enjoy Puerto Rico’s freshwater bodies.

The Hawaii Stream Visual Assessment Protocol was used. This provides a basic assessment of the condition of the river to maintain aquatic ecosystems. Ten physical variables are evaluated in each selected section of the river. Also the Rapid Bioassessment Protocols for Use in Streams and Wadeables Rivers, was performed. This protocol was carried out to determine biodiversity and used to make inferences about the ecological state of river segments.

The combination of the two methodologies and the analyses of the collected data concluded that the addition of the evaluated sections forms a 23.4 mile segment whose characteristics make it a candidate for designation as a Heritage River. Based on the collected information, the Puerto Rico Department of Natural and Environmental Resources will submit the nomination of the Río Grande the Manatí to the U.S. Environmental Protection Agency to be designated as part of the American Heritage Rivers.


Florida has one of the globe’s few warm-latitude deranged stream networks, with numerous discontinuous streams punctuated by in-line lakes and wetlands. Analogous systems also occur in some tropical wet-dry savannas in Central and South America, central Africa, and northern Australia. These areas share similar hyperseasonality in their annual and inter-annual rainfall patterns with Florida. Many such areas, previously pastoral, are under increasing pressure from actual or proposed expansions of intensive agriculture and inter-basin water transfer projects. After nearly a century of trying to simplify and tame Florida’s water environment, water managers have largely come full-circle and billions of dollars are now being spent to undo the effects of projects with unintended consequences. New projects are subject to regulations that recognize the ecological and commercial value of wet-dry cycles, while trying to cope with the natural pulses of droughts and floods that can adversely affect human infrastructure. Much is yet to be learned and this presentation aims to illustrate the problems that Florida has encountered related to past decisions concerning attempts at flood control, water supply allocations, and environmental protection in a very challenging environment that alternates between being very wet and very dry. Ultimately, this presentation aims to generate discussion and technology transfer among those working with the utilization and protection of natural savanna drainage networks.