

## **DRIVERS OF WATER BALANCE VARIABILITY IN THE “CIENAGA DE LAS MACANAS” WETLAND, PANAMA**

*Andrea Santamaria<sup>1</sup>, Yvanna Serra<sup>1</sup>, David Kaplan<sup>2</sup>, Conrado De Leon<sup>3</sup>, Jose Fabrega<sup>1</sup>*

<sup>1</sup>University of Florida, Gainesville, FL, USA

<sup>2</sup>University of Florida, Gainesville, FL, USA

<sup>3</sup>Centro Regional RAMSAR, Panama City, Panama

The “Ciénaga de las Macanas” is the largest wetland in Central Panama, with a protected area of approximately 900 ha. The wetland is categorized as a “Managed Resource Area” by the Ministry of Environment, which allows for a diversity of land management activities, ranging from conservation, to ecotourism, to livestock and agricultural production. The wetland’s ecological function and economic production are both highly dependent on its hydrologic behavior, and the region has been affected by both drought and flooding events in the past years. Although the various stakeholder groups who use the wetland are generally aware of the possible environmental and economic effects caused of climate variability and change, there are not existing studies supporting an understanding of the wetland’s hydrological regime and resulting ecological and economic functions. This study quantifies the wetland water regime and quantifies the primary wetland water budget components. Data from existing meteorological stations and satellite images were used to obtain historical information on climatic variables and land cover from 2000 to the present. Over that time, temperature increased by 0.54 °C, and precipitation showed a significant and consistent increase of approximately 10 mm/yr. The water balance and corresponding satellite imagery indicate drought years in 2000, 2015 and 2019, pointing to low precipitation as a primary factor in lower water volume and wetland area in these years. Across years, the wetlands showed a strongly seasonal hydropattern, with low water levels from January to April, flooding events in July and August, and consistent inundation in October and November. This hydrological assessment shows that the “Ciénaga de las Macanas” is vulnerable to climate-driven variability, suggesting that water management throughout the basin must consider the water needs of this downstream ecosystem. Further hydrological and water quality analyses that provide objective data are important for informing the integrated management of this protected area.

**PRESENTER BIO:** Dr. David Kaplan is an Associate Professor in the UF Environmental Engineering Sciences Department and Director of the H.T. Odum Center for Wetlands. Research in Dr. Kaplan’s lab focuses on linkages among the hydrological cycle, ecosystem processes, and human activities, with the goal of advancing natural resources conservation and management.