Ecosystem Response to Climate Change in Mountain Wetlands

Juan Mauricio Cañoño (PI) (Associate Professor), Jay Martín (US PI Partner/Professor), Dr. Gabriel Colorado (Auxiliary Professor - Fauna), Jorge Herman Marulanda (Biologist), Marcela Uribe (PhD Student – Wetland Vegetation), Jeymmy Walters (Master Student – Aquatic Macro invertebrates – Aquatic Habitat Assessment – Children Education), Victor Borrurede (Master Student – Stream Morphology – Energetic Analysis), Santiago Restrepo (Master Student – Wetland Vegetation – GIS - Birds), Juan Camilo Berrío (Master Student - Instrumentation), Norma Castro (B.S. Enr. Management, Young Researcher – Water Resource Management Modeling), Carlos Rodríguez (B.S. Biology Program - Frogs), Mariel Cardona (B.S Biology Program -Mammals), Laura Velez (B.S Biology Program, Mammals). 1 Universidad Tecnológica de Pereira, Facultad de Ciencias Ambientales, 2 Ohio State University, Department of Food Agriculture and Biological Engineering, 3 Universidad Nacional – Sede Amazonas, 4 Aguas y Aguas de Pereira, 5 Universidad de Caldas, Departamento de biología.

Introduction
Colombia is one of the most vulnerable countries to Climate Change. Recently the effects of the extreme climatic events caused several deaths and economical loses to the country (Jaramillo 2009). The adaptation to Climate Change based on ecosystems is focused on how to use the environmental services they provide to adapt society to a changing climate (Vignola et al. 2009, Locatelli, 2015). Under this perspective, mountain wetlands are important not only by their capacity to regulate water flows and improve water quality, but also because they can be used as a central part of an early warning systems of anomalies in the ecosystem functioning.

The objective of this project is to develop an early warning system based on long term monitoring and modeling of water environmental services of mountain wetlands located in a small watershed in the central Andes of Colombia.

Materials y Methods

Base line
A base line of three components has been conducted: instrumentation and hydrological monitoring (Rainfall gauges network and flow gauges); fauna (frogs, aquatic macro invertebrates, birds, mammals), flora (wetland vegetation).

Early Warning System
With the capture of hourly images of the wetlands area, with digital cameras, the variation of primary productivity of wetland vegetation is tracked through the estimation of green chromatic coordinate (gcc) index. These changes are then correlated with climate and hydrological changes to develop the base of an early warning system.

Networking
This collaborative approach is developed in three dimensions: One institutional, with the local drinking water and sewer company and the state environmental agency (CARDER), focused in natural resources conservation and risk management of the Otún River watershed. Another academic, with University of Caldas and National University of Amazonas, focused in research. One last, with children of schools and Scout groups, focused in education.

Conclusions
The knowledge of ecosystem structure, function and its relations is needed to make decisions that better prepare our communities to the effects of climate variability and change. This knowledge must be the result of an interdisciplinary approach that helps us to understand ecosystem changes and the variations in amounts and quality of the goods and services they provide to society. This understanding is our long term goal, and we walk through the right path to it with this project.

Besides this, we face the enterprise of improving the study site as a long term ecosystem research place. In order to achieve this goal we must to build and institutional network that goes beyond the results of this particular project. In this sense, the educational strategy with children has shown to institutions, such as the drinking water company of the city of Pereira that owns the study site, how relevant is to support over time the goal we are working for.

Additional Information
Juan Mauricio Cañoño Rojas, PhD
E-mail: jmcr@utp.edu.co
Tel: 57 (6) 3137246
Universidad Tecnológica de Pereira
Facultad de Ciencias Ambientales
Oficina 205

Acknowledgments
To United States Agency for International Development USAID for its funding support (Gran Award Number: AID-OAA-A-11-00012). To our US partner Dr. Jay Martín at The Ohio State University.

References
