CLASSIFYING HYDROLOGIC REGIMES OF THE AMAZON

Sharmin F. Siddiqui[1], *Xavier Zapata-Rios*[2], *Sandra Torres-Paguay*[2], *Andrea C. Encalada*[3], *Elizabeth P. Anderson*[4], *Mark Allaire*[1], *David A. Kaplan*[1]

[1]University of Florida, Gainesville, FL, USA
[2]Escuela Politécnica Nacional, Quito, Ecuador
[3]Universidad San Francisco de Quito, Quito, Ecuador
[4]Florida International University, Miami, FL, USA

As the largest watershed in the world, the Amazon River basin contains a vast diversity of habitats and accompanying hydrologic regimes. Further understanding the spatial distribution of flow regimes across the Amazon can inform river management and conservation, especially in areas with limited or inconsistent streamflow monitoring. This study compares multiple inductive approaches to classify streamflow regimes across the topographic Amazon basin using an unprecedented compilation of streamflow records from Bolivia, Brazil, Colombia, Ecuador, and Peru. Inductive classification schemes use attributes of streamflow data to categorize river reaches into similar classes, which then may be generalized to understand streamflow behavior at the basin scale. In this study, inductive classification was accomplished through principal components analysis of 67 hydrologic indicators (including environmental flow components) and k-means hierarchical clustering for 361 stations (representing 6,833 station-years) across five Amazonian countries. Classification was performed using both indicators of hydrologic alteration (IHA) of each station as well as median annualized hydrographs. For both approaches, the removal of magnitude influence led to a more equal distribution of classes and streamflow behaviors related to rate of change became stronger drivers of flow classification. Comparison of classes produced by each inductive flow classification method led to the development of five primary hydrologic classes, which generally led to different class membership in each of the four methods. These results highlight the diversity of flow regimes across the Amazon and provide a framework for studying relationships between hydrologic regimes and ecological responses in the context of changing climate, land use, and human-induced hydrologic alteration. The methodology developed here provides a multi-faceted framework and data-driven approach for classifying flow regimes based on observed data. When coupled with local knowledge and expertise, these classifications can be used to develop hydrologically and ecologically relevant conservation management practices.

PRESENTER BIO: Sharmin Siddiqui is a 2nd year PhD student and NSF Graduate Research Fellow in the Environmental Engineering Sciences Department supervised by Dr. David A. Kaplan. Her work focuses on understanding the relationship between human activities (such as dams and land use change) and ecosystem stability across the Amazon River basin.