EFFECTS OF WILDFIRES ON ANNUAL STREAMFLOW RESPONSE IN THE SOUTHEASTERN AMAZON

Sharmin F. Siddiqui *and David A. Kaplan*
University of Florida, Gainesville, FL, USA

Amazon rainforests are an integral component of global atmospheric evaporation and precipitation processes and are increasingly threatened by accelerating fire regimes driven by large-scale deforestation and climate change. Forest disturbance can alter river hydrology, with changes in streamflow magnitude, baseflows, and peak flows. This study uses a multi-tiered analytical approach to relate the landscape-level disturbances of deforestation and fire to hydrologic change in the southeastern Amazon and assesses the spatial and temporal scales over which deforestation and fire alter riverine hydrology. First, a before after control impact (BACI) approach was applied to control (no fire) and experimental (fire-affected) catchments in the Araguaia-Tocantins basin. Across a range of catchments, we found no significant differences in slope between control and treatment catchment flows in the period before and after large fires. However, water years with higher burn proportions were more associated with higher mean recession constant, lower baseflows, and lower runoff rainfall ratio (Q:P) in the following year compared to nearby reference catchments, with increased flow variability in dry-season months. These results highlight a variable catchment response to landscape-scale disturbance and contradict our expectation that larger burns would be associated with higher Q:P ratio. Next, random forest and multiple linear regression models were applied to all study catchments (n=99) to determine the most influential variables on annual hydrologic response. In addition to precipitation, cumulative burn area, deforested area, and temperature were important for predicting catchment hydrology in a region with an accelerating fire regime. The results from this study contextualize the effects of fire and deforestation (relatively low) versus climate (high) on hydrologic response at the catchment scale, especially for catchments with low to moderate (<20%) treatment effects.

PRESENTER BIO: Sharmin Siddiqui is a PhD candidate in the Watershed Ecology Lab and Department of Environmental Engineering Sciences at the University of Florida, advised by Dr. Kaplan. Sharmin's research is focused on the effects of shifting fire and flooding regimes on the stability of Amazonian forests and river networks.