

# THE STRUCTURAL AND FUNCTIONAL CONSEQUENCES OF MANIPULATING TOP-DOWN AND BOTTOM-UP FORCES IN A NEOTROPICAL STREAM

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**Abstract:** The structure and function in stream ecosystems reflects a sites dynamic physical and chemical template as well as trophic interactions within the resident community. Research that examines the relative importance of bottom-up and top-down forces in structuring biological communities has a rich history in ecology. Historically, streams have been viewed as physically demanding environments in which flow, and to a lesser extent light availability, are recognized as dominant factors controlling community structure. However, several recent studies have documented the importance of biotic factors in structuring stream communities in a diversity of streams. In this presentation, I'll review the results of ongoing research in Trinidad in which whole stream manipulations of both bottom-up (light) and top-down (fish introduction) have been conducted. In this study, 2 pairs of focal streams in the Guanapo river basin in Trinidad's Northern Range have been sampled bimonthly for 4 and 5 years, respectively. At the end of the first year of sampling, one stream in each pair had the canopy thinned. At the end of the second year, guppies (*Poecilia reticulata*) from high localities were introduced to the lower reach of each stream. Upstream migration of introduced fish was blocked by waterfalls in each stream. Similarly, upstream migration of guppies evolved under low predation risk were excluded from the experimental reach by downstream waterfalls. The influence of these manipulations on water chemistry, algal standing stocks and invertebrate abundance and diversity will be presented. In addition, functional responses of these ecosystems the manipulations described above were determined using whole-system metabolism measurements and  $^{15}\text{N-NH}_4$  tracer additions. The presentation will conclude with a brief review of guppy phenotypic variation and its ecological consequences.