



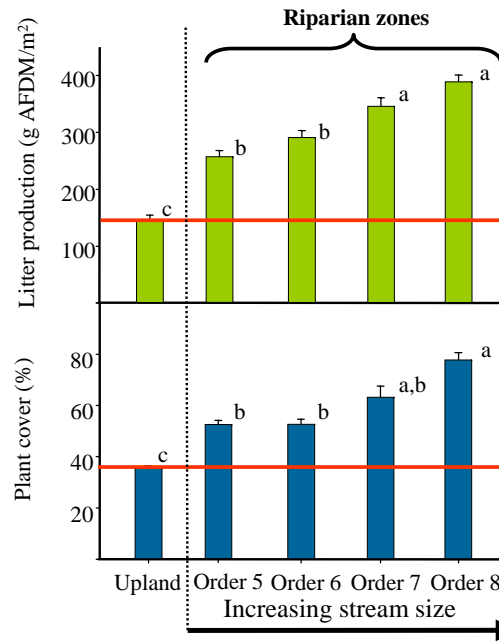
River networks influence patterns of productivity and soil respiration in arid landscapes

Project summary: River networks are prominent, yet little studied features of arid landscapes. I ask how landscape patterns of ecosystem structure and function vary among desert uplands and riparian zones adjacent to increasingly large, more permanent streams of the upper Sonoran Desert. Surveys of plant cover and production, as well as monitoring of soil moisture and respiration have been used to describe ecological patterns in upland and riparian habitats. Results indicate that the stream networks that drain arid basins influence where and when important ecological processes occur in desert landscapes. These patterns exist at scales similar to those at which humans develop watersheds; therefore understanding the ecological role of streams in arid landscapes will help us design more effective management strategies in this rapidly growing, water stressed region.

Results and conclusion:

1. Total plant cover and aboveground productivity was higher in riparian vs. upland habitat, and increased among riparian zones as a function of stream size (here = channel order).
2. Seasonal patterns of soil respiration, as well as annual fluxes of CO₂ beneath plants, vary considerably among upland and riparian habitats. These appear to reflect phenological properties of the vegetation itself.
3. At broad spatial scales, stream networks that drain arid landscapes impart a strong influence on spatial and temporal patterns of vegetation structure, productivity, and soil respiration.

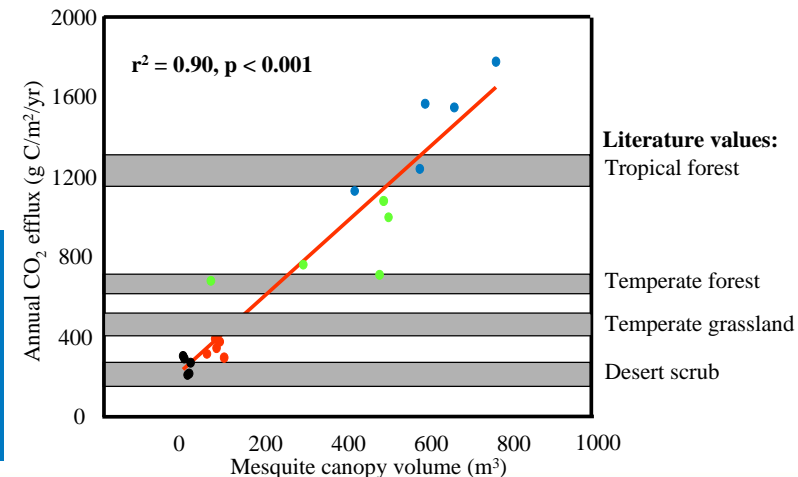
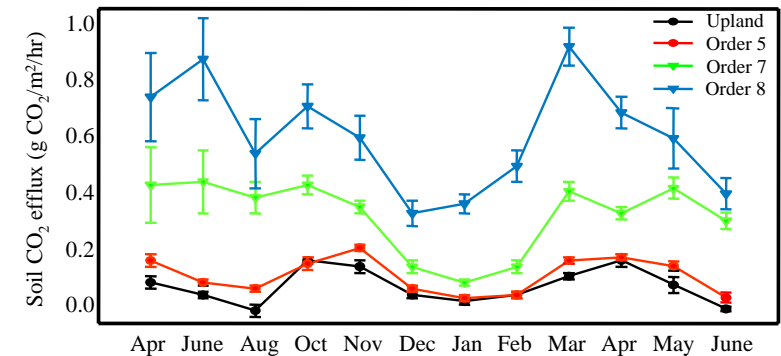
Part A: Patterns in plant cover and production



Figures: Part A shows plant cover and total litter production plotted for upland and riparian habitats.

Part B shows (1) temporal patterns in soil respiration beneath vegetation in upland and riparian habitats, and (2) annual belowground C gas flux plotted against plant size from different sites. Note that the range of annual flux values is equal to that found globally

Part B: Patterns of soil respiration beneath upland and riparian plants



Literature values:
Tropical forest
Temperate forest
Temperate grassland
Desert scrub