Abiotic factors underlying variation in composition of riparian plant communities

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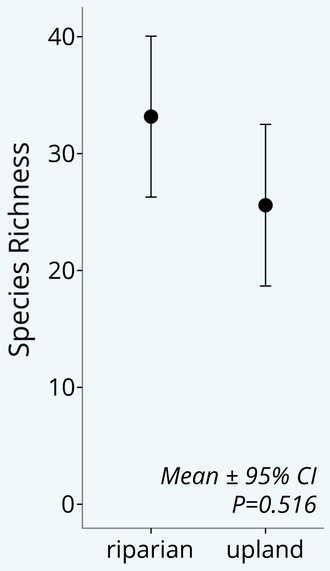
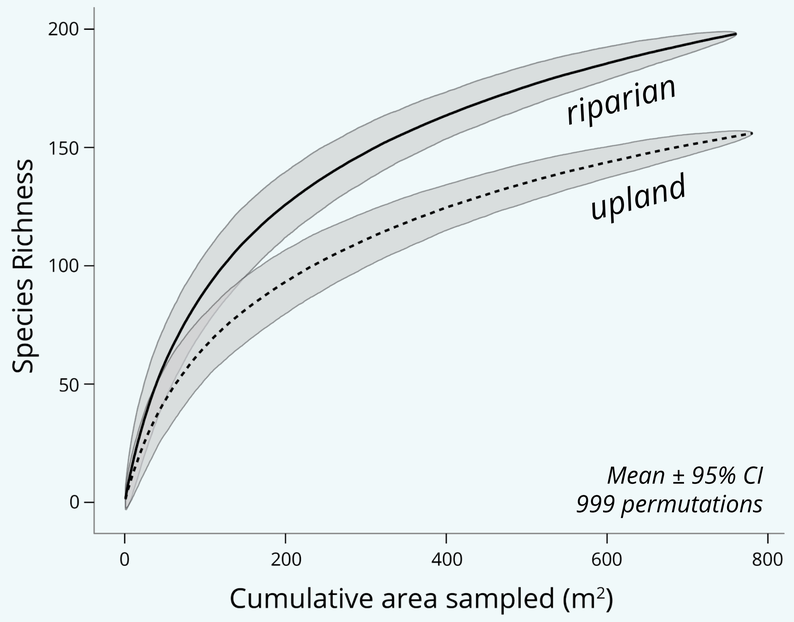
SUMMARY: Environmental characteristics, particularly annual mean temperature and precipitation, partially explain regional variation in riparian plant community composition. These factors largely appear to be unassociated with particular functional groups.

Riparian plant communities are more diverse than uplands at the regional scale.

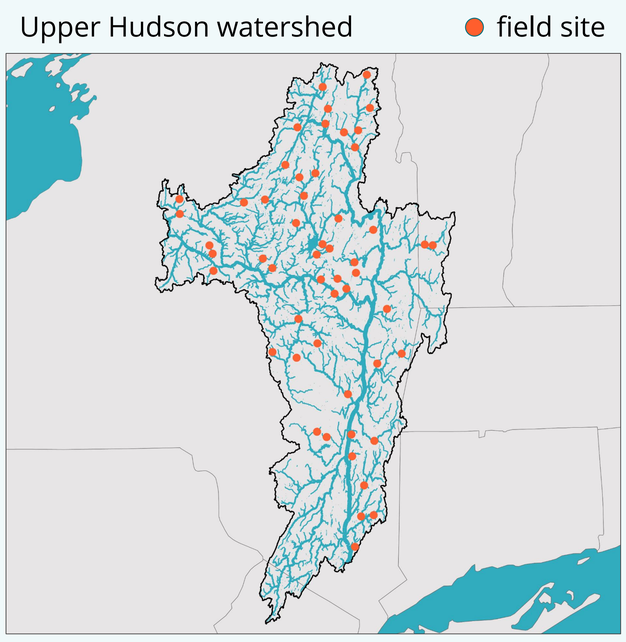




We documented the composition of plant communities in riparian zones and nearby upland areas along several reaches of three small streams in the Upper Hudson watershed (New York).

While the riparian zone of individual reaches were not more species-rich than paired upland areas, riparian zones harbored more species than upland plant communities when considered regionally.

Do environmental conditions underlie species turnover among riparian plant communities?



We documented the composition of riparian plant communities along 53 small streams in the Upper Hudson watershed, and eleven environmental variables at each site:

Soil

pH; % organic content; % sand content

Hydrology

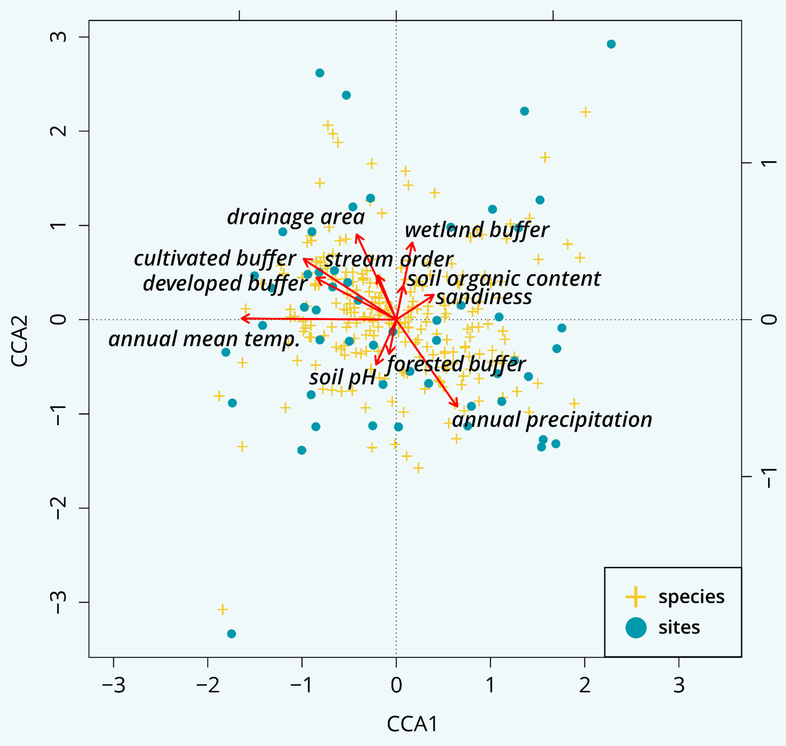
Stream order; drainage area

Land cover

% wetland; % forested; % cultivated; % developed (within 1 km² buffer)

Climate

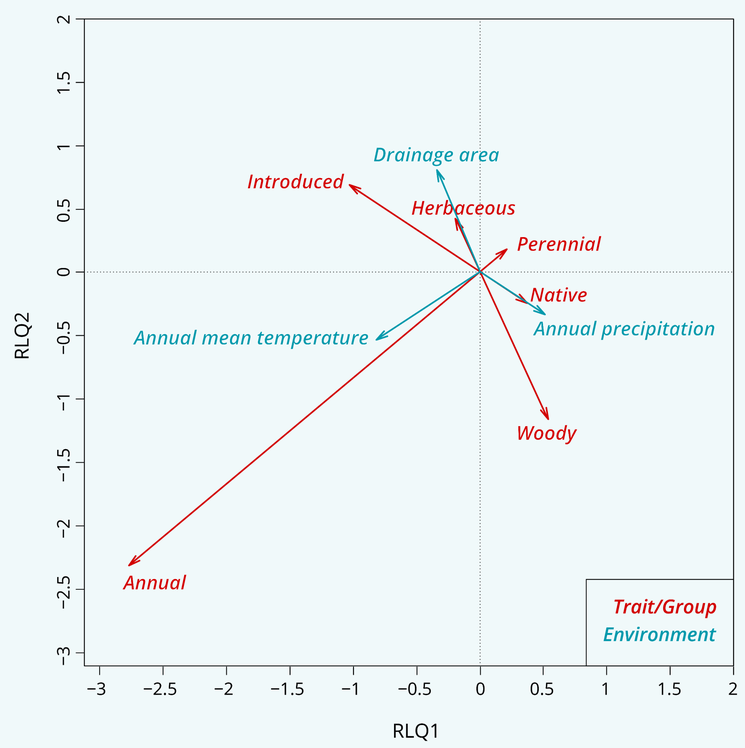
Annual mean temperature; annual precipitation



We used canonical correspondence analysis to characterize how the composition of riparian plant communities differed among sites with different environmental conditions.

Variation in environmental conditions explained 24% of the variance among communities in species composition.

Variation in species composition appeared to be more strongly associated with the climatic variables we examined (annual precipitation and annual mean temperature) than with the other environmental variables included in the model.



We used RLQ analysis to examine relationships between three environmental variables and broad functional groups (lifespan and growth form), as well as species origin.

Lifespan

Annual; perennial

Growth form

Herbaceous; woody

Species origin

Native; introduced

We found that annual plants are more common in warmer areas (P_{adj}=0.0097), but found no other significant relationships between groups of plants and environmental variables.

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