Headwater stream biodiversity in a landscape perspective

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THE PROJECT IN PICTURES

UNIQUE HABITAT

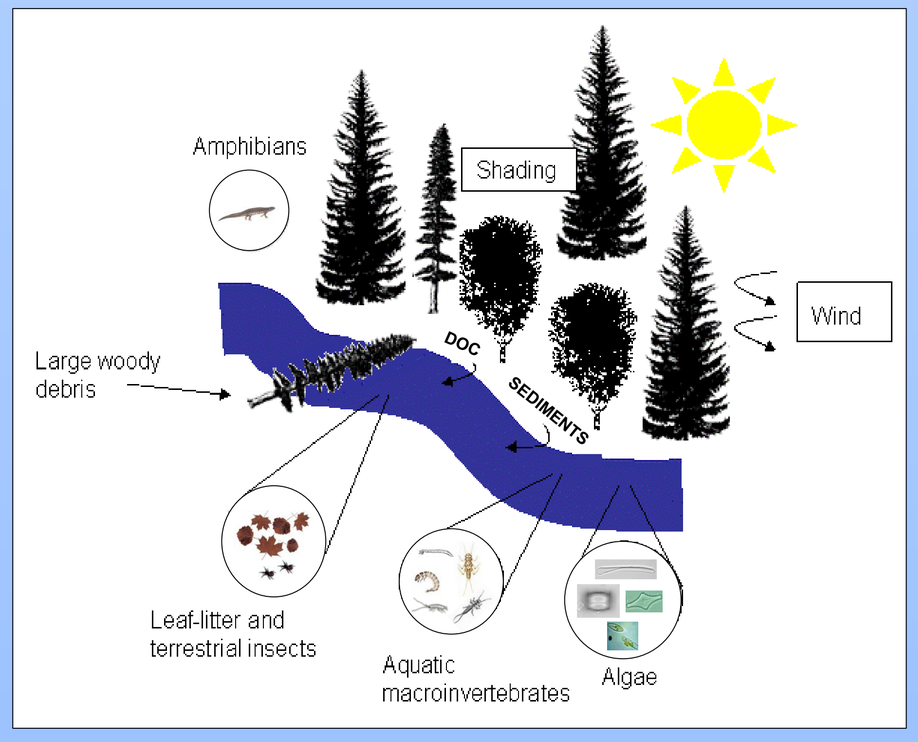

Figure 1. Illustration of the unique headwater-habitat and the close connectivity with surrounding terrestrial landscape.

UNIQUE DISTRIBUTION

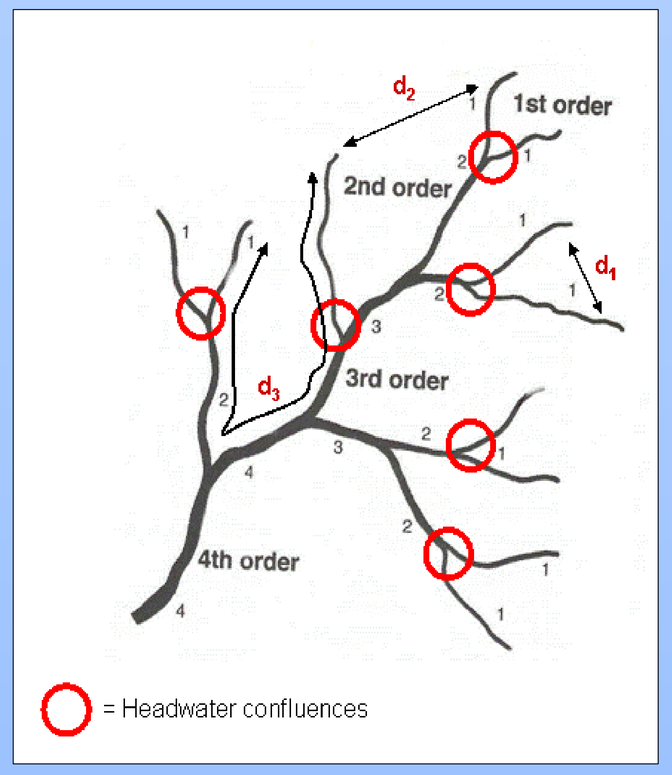

Figure 2. Illustration of the characteristic geometry of stream networks and the location of headwater confluences (red circles). Arrows (d_1, d_2, d_3) represents the travelling distances for organisms to reach another site, which is potentially important for structuring species communities in riverine landscapes.

MOVING AWAY FROM THE LINEAR PERSPECTIVE AND INTO THE "RIVERSCAPE"

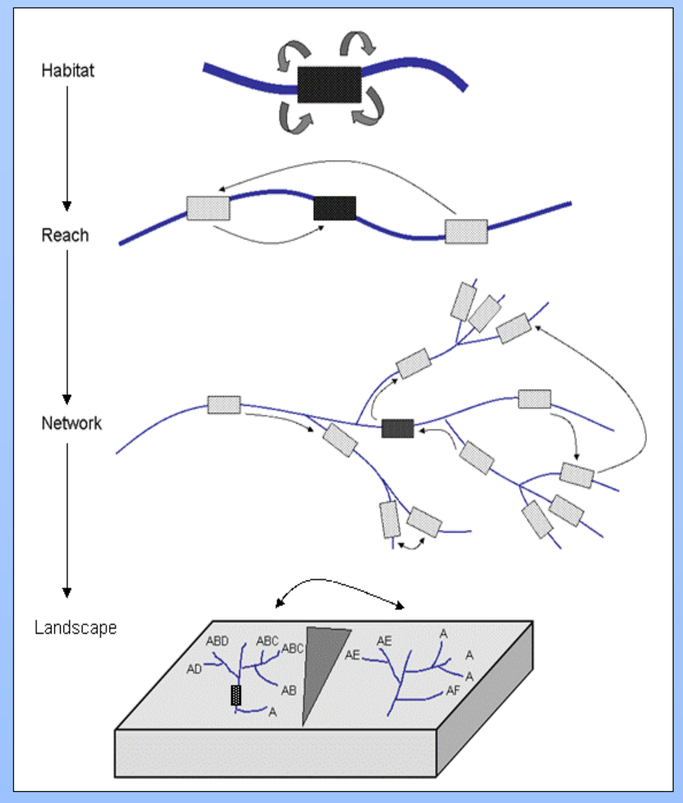

Figure 3. Illustration of four scales at which a study can be performed. Arrows indicate potential pathways for species movement. Letters indicates species with different dispersal abilities. Dispersal capacity of species A > B > C, D, E > F. Grey triangle symbolizes a dispersal barrier. The picture is modified from Lowe et al. 2006 and Clarke et al. 2007.

UNDERLYING MECHANISM		EXPECTED BIODIVERSITY PATTERN
Branched structure of stream networks	→	Low biotic similarity between headwaters
"Chemical fingerprint"	→	"Biological fingerprint"
Unique physical habitat and network geometry	→	Unique and endemic species
Heterogeneity in resource distribution at nodes	→	Biodiversity hotspots

STUDY ORGANISMS

HEADWATERS AND REFERENCE CONDITIONS

Headwaters are potentially less affected by human intervention than downstream reaches. Information on the hydromorphological conditions of small streams and their biota could therefore be important in defining the "reference state" of running water ecosystems. Their importance for the structure and function of downstream ecosystems would also make these streams important for preserving hydromorphologically unimpacted stream sections within stream networks.

THE PROJECT IN WORDS

BACKGROUND
Headwater streams represents unique habitats, partly because of their strong connectivity with adjacent landscape and characteristic hydromorphology (Richardson and Danehy 2007). The spatial structure of stream networks and wide distribution of headwaters also gives an excellent opportunity to perform studies at multiple scales and incorporating principles of landscape ecology into stream ecology (Lowe et al. 2006, Wiens 2002).

AIM
Investigate biodiversity patterns of macroinvertebrates and diatoms in headwater streams at multiple scales, with a focus on larger scale patterns and possibly identify biodiversity hotspots within the stream network.

CITED LITTERATURE

Clarke, A., R. MacNally, N. Bond, and P. S. Lake. 2008. Macroinvertebrate diversity in headwater streams: a review. Freshwater Biology **53**:1707-1721.

Lowe, W. H., G. E. Likens, and M. E. Power. 2006. Linking scales in stream ecology. Bioscience **56**:591-597.

Richardson, J. S., and R. J. Danehy. 2007. A synthesis of the ecology of headwater streams and their riparian zones in temperate forests. Forest science. **53**:131-147.

Wiens, J. A. 2002. Riverine landscapes: taking landscape ecology into the water. Freshwater Biology **47**:501-515.