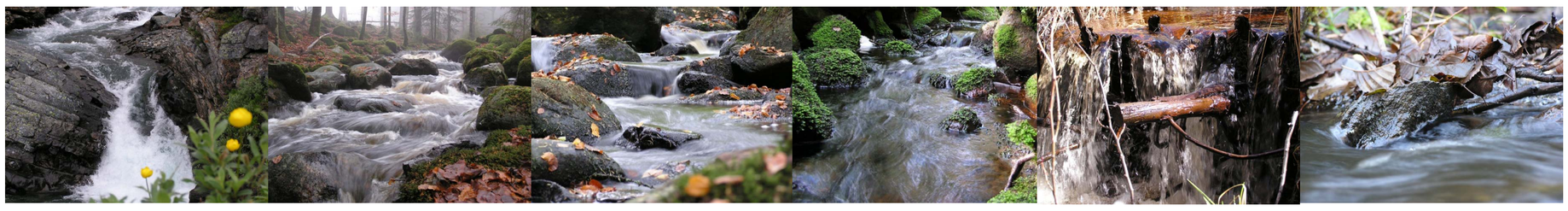
How do species and trait assembly control ecological processes?

Zlatko Petrin, Tungasletta 2, NO-7047 Trondheim, NORWAY, zlatko.petrin@nina.no

Biological diversity including diversity in species traits has recently received considerable attention in the scientific community, as studying patterns in biodiversity may facilitate the development and implementation of mitigation measures to halt the degradation of life-sustaining ecosystems and ensure ecological functioning. Yet, our understanding of how species traits control ecological processes and ultimately ecosystem services is still imcomplete.



Background

The EU Water Framework Directive requires using the condition and functional performance of various biotic components to assess, monitor, and manage the ecological status of European water bodies. River networks in particular have been recognized as vital, as they link different geographical regions, habitat types within regions, and facilitate the exchange of native biota, invasive species, and harmful chemicals. Ironically, the implementation of monitoring and management programs has missed the largest component, the headwater streams.

Headwaters

- constitute 90 % percent of the total length of fluvial ecosystems (Bishop et al. 2008)
- exhibit an especially high degree of hydrochemical variation, whereas larger streams and rivers are chemically more uniform (Temnerud & Bishop 2005)
- harbour a diverse pool of macroinvertebrate species, partly endemic, featuring a high degree of species turnover between neighbouring streams (Meyer et al. 2007)
- show high rates of ecological processes (Melillo et al. 1983, Alexander et al. 2000, Peterson et al. 2001)
- intimately link terrestrial and aquatic ecosystems (Petrin et al. 2007a)

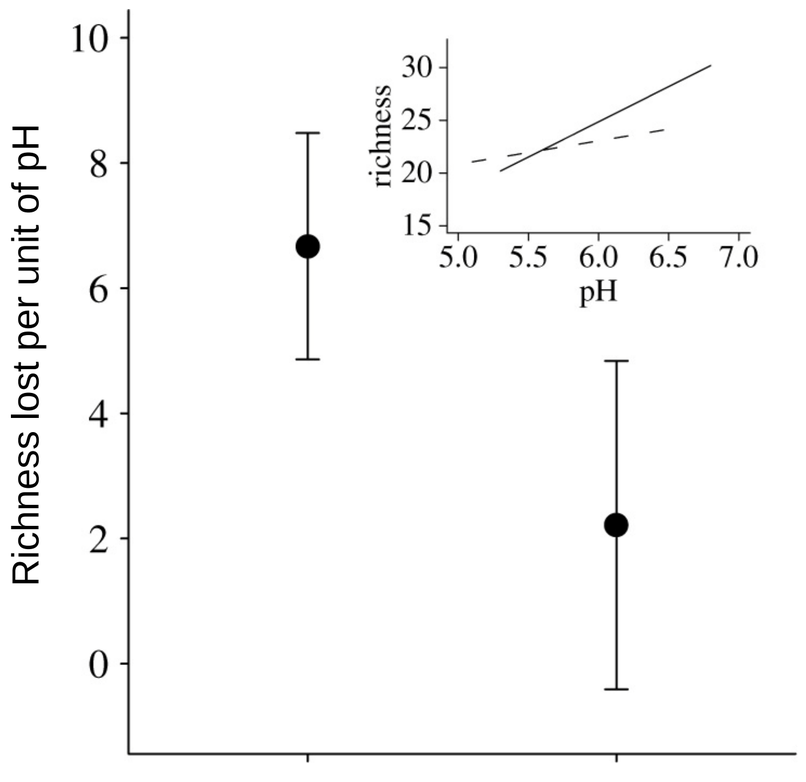
Headwaters constitute a fluvial ecosystem component likely to be strongly affected by climate change (Laudon & Bishop 2002, Laudon 2008). Yet, the structural and especially functional consequences for habitats further downstream remain largely unknown.

My **research interests** centre around how

- environmental variables control species diversity in headwater streams
- species diversity translates into trait and functional diversity and the assembly of functional feeding groups

Anthropogenic acidity affects species richness more strongly than natural acidity

Large-scale human activities have caused extensive acidification of freshwater environments on continental scales resulting in the loss of freshwater diversity. Yet, natural acidity does not necessarily have the same adverse effects due to the possibility of adaptation to low pH levels (Petrin et al. 2007a, b, 2008a, b).



Research interests (cont.)

- trait and functional diversity of invertebrate assemblages translate into ecological functioning including the decomposition of allochthonous organic material
- the microbial loop contributes to ecological functioning including nutrient cycling
- ecological functioning ultimately relates to abiotic factors