

Geogenic phosphate as determinant of benthic food web structure

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Introduction:

Benthic algal communities of small headwater streams mainly depend on phosphate of geogenic origin, because human impact is comparatively low. These algae serve as primary food source for benthic grazers. Other macroinvertebrate consumers, such as shredders, collectors and filter feeders, can more strongly rely on allochthonous resources (litter, POM).

With an increase in phosphate availability we expect:

- I: Increased availability of autochthonous food sources (algae)
- II: Increased diversity and a higher amount of grazers in the benthic macroinvertebrate community



13 µg PO₄-P L⁻¹

Data: LWF Baden-Württemberg



12 µg PO₄-P L⁻¹

Data: M. Kirsten, TU Dresden

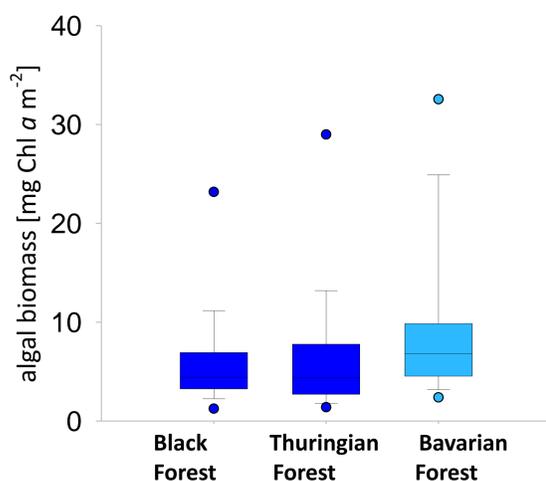
SPP 1685 - Ecosystem Nutrition - study sites, along a geogenic phosphate gradient.

The phosphate-phosphorous values presented are the annual mean measured in stream water samples taken every two weeks (2014)



8 µg PO₄-P L⁻¹

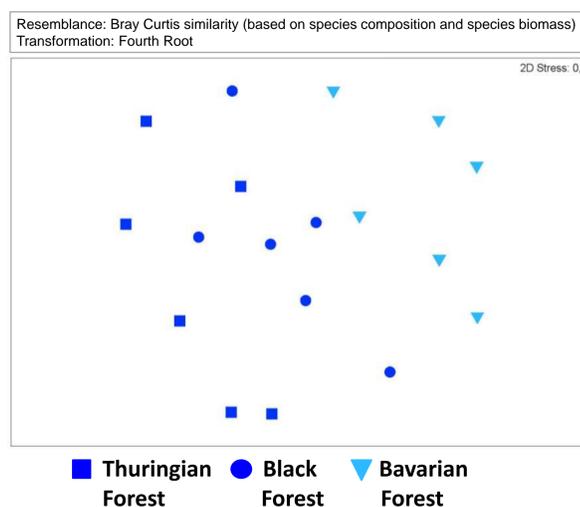
Algal biomass



The algal biomass does **not** increase with increasing phosphate availability.

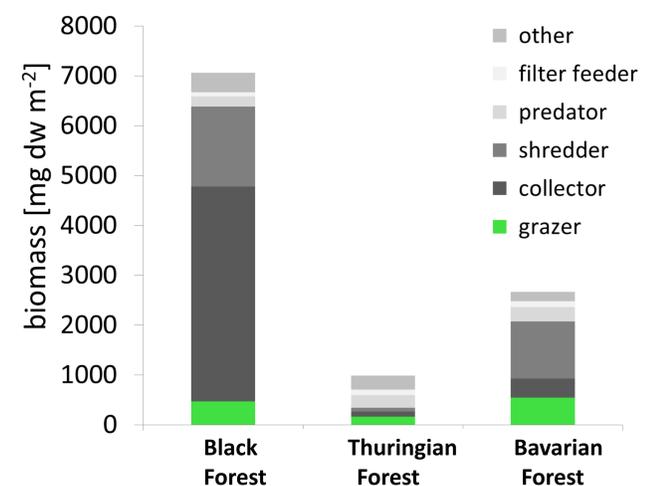
Structure of the benthic macroinvertebrate community

Taxonomic composition



Overall discrimination (R) of ■:● = 0.47; ●:▼ = 0.65, and ■:▼ = 0.71 (p < 0,05; 1-Way ANOSIM).

Feeding types



There are **no** higher amounts of grazers at sites with higher phosphate availability.

Summary:

Although the benthic communities show distinct differences between the sites with regard to biomass and macroinvertebrate species composition, these differences do **not** reflect the phosphate gradient. Neither algae nor grazer biomass increase with increasing phosphate availability.

Conclusion:

General phosphate availability is no sufficient determinant for benthic food web structure of small mountain streams. A more detailed view in the temporal dynamics of the studied systems is necessary to evaluate the impact of the phosphate availability on the stream food webs.

Acknowledgements:

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