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

<table>
<thead>
<tr>
<th>Black Forest</th>
<th>Thuringian Forest</th>
<th>Bavarian Forest</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 µg PO₄-P L⁻¹</td>
<td>12 µg PO₄-P L⁻¹</td>
<td>8 µg PO₄-P L⁻¹</td>
</tr>
</tbody>
</table>

Data: LWF Baden-Württemberg  Data: M. Kirsten, TU Dresden

SPP 1685 - Ecosystem Nutrition - study sites, along a geogenic phosphate gradient.
The phosphate-phosphorus values presented are the annual mean measured in stream water samples taken every two weeks (2014).

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:
Many thanks to Claudia Hellmann, Hendrik Sallinger, Patrick Lehmann, Yvonne Collet, Jenny Horschbach, Viktor Belsner and Linda Peters for their help in identifying and measuring the macroinvertebrates. To the participants of the SPP 1685 – Ecosystem Nutrition for the valuable support, especially to the LWF Baden-Württemberg and Maximilian Kirsten for additional phosphate data. The study was financially supported by the Ministry for Education, Science, and Culture (MBWWK) of Rhineland-Palatinate (research priority project AuLand).

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