Peer Community In Ecology

The influence of water phosphorus and nitrogen loads on stream macroinvertebrate community stoichiometry

Huihuang Chen *based on peer reviews by* ***Jun Zuo***, ***Thomas Guillemaud*** *and 1 anonymous reviewer*

Miriam Beck, Elise Billoir, Philippe Usseglio-Polatera, Albin Meyer, Edwige Gautreau, Michael Danger (2024) Effects of water nutrient concentrations on stream macroinvertebrate community stoichiometry: a large-scale study. bioRxiv, ver. 2, peer-reviewed and recommended by Peer Community in Ecology.
https://doi.org/10.1101/2024.02.01.574823

Submitted: 06 February 2024, Recommended: 24 May 2024

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Chen, H. (2024) The influence of water phosphorus and nitrogen loads on stream macroinvertebrate community stoichiometry. *Peer Community in Ecology*, 100677. 10.24072/pci.ecology.100677

Published: 24 May 2024

The manuscript by Beck et al. (2024) investigates the effects of water phosphorus and nitrogen loads on stream macroinvertebrate community stoichiometry across France. Utilizing data from over 1300 standardized sampling events, this research finds that community stoichiometry is significantly influenced by water phosphorus concentration, with the strongest effects at low nitrogen levels.

The results demonstrate that the assumptions of Ecological Stoichiometry Theory apply at the community level for at least two dominant taxa and across a broad spatial scale, with probable implications for nutrient cycling and ecosystem functionality.

This manuscript contributes to ecological theory, particularly by extending Ecological Stoichiometry Theory to include community-level interactions, clarifying the impact of nutrient concentrations on community structure and function, and informing nutrient management and conservation strategies.

In summary, this study not only addresses a gap in community-level stoichiometric research but also delivers crucial empirical support for advancing ecological science and promoting environmental stewardship.

References:

Beck M, Billoir E, Usseglio-Polatera P, Meyer A, Gautreau E and Danger M (2024) Effects of water nutrient concentrations on stream macroinvertebrate community stoichiometry: a large-scale study. bioRxiv, 2024.02.01.574823, ver. 2 peer-reviewed and recommended by Peer Community in Ecology. https://doi.org/10.1101/2024.02.01.574823

Reviews

Evaluation round #2

Reviewed by anonymous reviewer 1, 13 May 2024

I have carefully reviewed the revised version of this manuscript. The authors have addressed the concerns. The revisions have clarified the methodology and strengthened the results section. The responses to the reviewers' questions are comprehensive and demonstrate a clear understanding of the feedback provided. The authors have made significant improvements of this manuscript.

Reviewed by Jun Zuo, 13 May 2024

I am generally happy with the way the authors have dealt with the issues of content raised by myself and the other reviewers. The manuscript is much improved, and I think that it is acceptable for publication in its present form.

Evaluation round #1

DOI or URL of the preprint: https://doi.org/10.1101/2024.02.01.574823
Version of the preprint: 1

Authors' reply, 11 May 2024

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Decision by Huihuang Chen, posted 26 March 2024, validated 28 March 2024

According to the opinions of the two reviewers, I suggest publishing after minor revisions.

Reviewed by Thomas Guillemaud, 20 February 2024

Data with metadata and script are accessible, a readme file is present. The script is well commented and understandable. It runs well on the data and produce the same results as in the article.

1- Can we get the data and script from the links indicated in the submission form or from the article itself? Yes

2- Is there a readme file. Yes

3- Are there metadata for the data and comments for the scripts? Yes

4- Are the readme, and data files understandable by a normal reader? Yes

5- Do the scripts run on the data? Yes

6- Are the results the same as in the paper? Yes

The Email exchange I had with the authors is in the attached pdf file

Download the review

Reviewed by anonymous reviewer 1, 18 March 2024

The authors focus on the relationships between phosphorus concentration and macroinvertebrate community stoichiometry. The is a good question in freshwater systems. The authors used a large scale dataset to explore the relationships between nutrient and macroinvertebrate community stoichiometry. The statistical analysis and figures can meet the hypothesis.

1. The authors can specify where the knowledge gap is and organize the introduction part better. The authors can specify where the knowledge gap is.
2. How to explain the different trend between different groups.
3. line 132, NO32- should be NO3-.
4. The authors said the community stoichiometry was calculated based on log transformed abundance multiplied by stoichiometry value. I think the log transformation should be done after the abundance multiplied by the stoichiometry value.
5. In all scatter plot figures, the authors should add information about the sample size, the r value and P value.
6. As the community stoichiometry was mainly related to the community abundance, the authors should add figures about the community abundance and the functional feeding groups.
7. The authors should also add information about the dynamics of total carbon, total nitrogen, and total phosphorus in water.
8. I think to think about relationship between water stoichiometry and community stoichiometry maybe better.

Reviewed by Jun Zuo, 21 March 2024

Beck et al. used data from large-scale field sampling of sites varying in nutrient levels, which were helpful to reveal the link between the community stoichiometry and nutrient. There are several points that needs to be clarify.

A taxon with fast growth rate in P-enriched is not equal to one with high body %P. The water P would directly affect the phytoplankton (primary producer), rather than consumers, e.g. stream macroinvertebrates. The macroinvertebrates might prefer to preying the taxa with similar stoichiometry. In this manner, are there no linear relationship between water P and macroinvertebrates? As the author stated that although they can have a relatively high body phosphorus content (Cross et al., 2003; González et al., 2011), their prey are stoichiometrically more stable than the resources of primary consumers making prey identity probably more important. (Line 381-384)

It is better to show the R2 and P value in all multiple linear models.

Line 132-134 The nitrate concentration in stream water can be higher than 25 mg/L. I really doubt this data. In my opinion, the total nitrogen concentration is often less than 10 mg/L.

Line 159-160 Author selected taxa for which the stoichiometric information was available. Which taxa? Is there a database or a reference for specific taxa stoichiometric information?

Line 174-180 an affinity > 0.5 is arbitrary. What is the reasoning behind this threshold?