Master 2 internship: Investigating the effects of managements practices on C cycling in fish ponds

Main context

The biodiversity and functioning of small and shallow waterbodies remain overlooked despite their abundance (e.g, Cael et al., 2017; Verpoorter et al., 2014) and important role in the global carbon (C) cycle (e.g. Holgerson and Raymond, 2016; Ollivier et al., 2019). In particular, it is unknown to what extent fishponds contribute to global C cycling, notably greenhouse gases (GHG) emissions, and what abiotic and biotic mechanism are involved. In addition, the nature and magnitude of GHG emissions from fishponds are likely to differ substantially among traditional management practices, i.e., supplemental feeding, fertilization with manure and liming. Characterizing the individual and combined effects management approaches is required to develop sustainable best-management practices in the context of global changes (e.g., alleviate effects of global warming). Additionally, the use of floating photovoltaic systems (FPV) is becoming more widespread globally, including on fishponds in the Dombes region to satisfy the increased energy demand and urgent need to mitigate climate change. Effects of FPV on biodiversity and biogeochemistry of fishponds are unknown. Yet, FPV are expected to increase GHG emissions from ponds, notably CH_4, by modulating both organic matter inputs to sediments and C fluxes in ponds. The magnitude of impacts is likely affected by management practices and trophic status of ponds prior to FPV implementation (e.g.,Colas et al., 2020).

Student project:

The student will specifically help to identify the effects of different management practices on GHG emissions (in particular CO_2, CH_4) and generate ecological baseline data before installation of FPV. Accordingly, the student will initially build and compile a database on ponds in the Dombes area focusing on management practices, pond morphology, water quality, owners and geographic coordinates. Specific attention will be paid to ponds where FPV installation is planned for the next years. The database will be built using GIS tools, in close collaboration with stakeholders (e.g., French office on biodiversity) and researchers working in the Dombes region (e.g., ISARA). Finally, the student will conduct field sampling of GHG concentrations and emissions, sediment and water properties (e.g., nutrients concentrations, C content) of about 50 ponds that represent the different management practices and future implementation of FPV. The biodiversity of ponds will be explored by another M2 student. Field experiments and data processing will be performed in close collaboration between both students.

Student profile

We welcome students from Ecology/Evolution masters with a strong interest in Aquatic ecology. Interest in biogeochemistry will be an asset. Other requirements are:

- a valid driving license
- good level of English
- strong organizational skills; ability to work in a team, autonomously and reliably
- basic skills in GIS software (e.g. QGIS), data management and statistical analysis with R software
- ability and willingness to organize and participate in extensive fieldwork

Organizational details

The internship will take place over a period of 6 months, from the end of February/beginning of March 2022 (preferably). It will take place at the LEHNA laboratory of the University of Lyon 1 (https://umr5023.univ-lyon1.fr/) and at Dombes ponds area for fieldworks. Supervisors will be Dr. Colas Fanny and Pr. Wissel Bjoern. The working language will be mainly English. This internship comes with a monthly stipend of approximately €600 per month. Fieldwork expenses will be covered.

Application

Applicants should send an application letter, with a statement of research interests and relevant experience and *curriculum vitae* as a single pdf to both Pr. Bjoern Wissel, bjoern.wissel@univ-lyon1.fr and Dr. Fanny Colas, fanny.colas@univ-lyon1.fr. Applications open until October 31th, 2021. Interviews will be held during november.

References

Cael, B.B., Heathcote, A.J., Seekell, D.A., 2017. The volume and mean depth of Earth's lakes. Geophys. Res. Lett. 44, 209–218. https://doi.org/10.1002/2016GL071378

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Holgerson, M.A., Raymond, P.A., 2016. Large contribution to inland water CO2 and CH4 emissions from very small ponds. Nat. Geosci. 9, 222–226. https://doi.org/10.1038/ngeo2654

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Verpoorter, C., Kutser, T., Seekell, D.A., Tranvik, L.J., 2014. A global inventory of lakes based on high-resolution satellite imagery. Geophys. Res. Lett. 41, 6396–6402. https://doi.org/10.1002/2014GL060641