TRAINING SCHOOL ON FRESHWATER MUSSEL ECOSYSTEM SERVICES

MUSSEL MASS - CLEARANCE RATE RELATIONSHIP

Date: 14 - 17 September 2021

Place: Czech University of Life Sciences Prague

CONFREMU - Conservation of freshwater mussels: a pan-European approach
COST CA18239

Keywords: mussel conservation, ecosystem services, clearance rate

General information

Description and rationale:

Freshwater mussels affect their surrounding ecosystems in the course of feeding, excretion, movement and other activities. One of their most studied functional roles that is also often regarded to be of benefit to humans (i.e. an ecosystem service) is biofiltration, i.e. the selective removal of a wide range of particles from the water body by suspension feeding. The process of biofiltration can be quantified using the clearance rate, which is the amount of substances removed from the water by a specific mass in a unit of time.
Clearance rates have been quantified for many freshwater mussel species and populations from numerous and diverse ecosystems across the globe. Theoretically, this large dataset should allow us to estimate how differences among study systems, such as taxonomic affiliation and biomass of the study organism, and composition and concentrations of particles under study, affect clearance rates of mussels. However, such comparisons cannot readily be drawn due to the wide range of methodologies used to generate clearance rates (of specific substances) and other relevant data in these studies.

This training school aims to establish a network of scientists across Europe, drawing on expertise from the US, to develop and provide training in a **unified and repeatable** methodology for quantifying clearance rates of freshwater mussels with a focus on mass-clearance rate relationships. Aspects that will be considered will range from the selection and sampling of study sites and organisms to the conditions and length of

acclimatisation period, details on the composition and conditions of the study systems, and the collection and analysis of data. Participants are invited to subsequently apply this training to collect data in their home institutions, which will form the basis for a concerted publication on freshwater mussel clearance rate estimations across a large geographical scale. The dataset generated within this network will allow us to assess the importance of taxonomic affiliation and environmental conditions on freshwater mussel clearance rate, and ultimately, provide a better understanding of spatial and environmental patterns in the ecosystem functions of freshwater mussels.

Our aim:

To provide training and launch a coordinated research network on spatial/temporal/methodological sources of variability in basic freshwater mussels ecosystem function estimates with the focus on mass - clearance rate equations.

Organizing team:

- Kateřina Gregarová, Felipe Escobar-Calderón, Barbora Vodáková, Karel Douda (Czech University of Life Sciences Prague, CZ)
- Alexandra Zieritz (The University of Nottingham, UK)

Course materials

Trainers:

Carla Atkinson: Assistant Professor at The University of Alabama; Department of Biological Sciences (https://bsc.ua.edu/profiles/carla-atkinson/)

- **Atkinson, C.L.**, H.M. Halvorson, K.A. Kuehn, M. Winebarger, A. Hamid, M.N. Waters. 2021. Filter-feeders have differential bottom-up impacts on green and brown food webs. ***Oecologia*** 195:187-198.
- **Atkinson, C.L.**, B.C. van Ee*, J. Pfeiffer. 2020. Evolutionary history drives stoichiometric niche variation within a single guild. ***Ecology*** 101:e3101
- **Atkinson, C.L.**, T.B. Parr, B.C. van Ee*, D.D. Knapp*, M. Winebarger, K.J. Madoni*, W.R. Haag. 2020. Scaling benthic biomass: Length-mass equations for estimating function in freshwater unionid mussel communities. ***Freshwater Science*** 39:377-390.

Guest speakers (online):

We anticipate the involvement of some invited speakers via an online lecture. Details will be announced during August.

Programme:

until 31st July 2021	before TS	registration, selection of in person or on-line mode
July-August 2021	before TS	On-line discussions and start of systematic literature review performed by participants
14-Sep-21	Day1, Prague	Presentations, breakout discussions, laboratory settings
15-Sep-21	Day2, Prague	Field sampling demonstration, job shadowing, breakout discussions
16-Sep-21	Day3, Prague	Lab-work demonstration, on-the-job coaching, breakout discussions
17-Sep-21	Day4, Prague	Lab-work demonstration, on-the-job coaching, manuscript design and data analysis (R)
September 2021 - September 2022	after TS	application of the methods learned in home locations
September 2022 - December 2022	after TS	data synthesis, manuscript preparation

Skills gained:

The participants are going to learn a range of methodologies used in functional ecology research, including mass-scaling relationships and feeding rates (**quantitative freshwater mussel sampling, clearance method settings, calculations of clearance rate**). Focus will be put on a standardised protocol for quantifying clearance rates that will be developed in the course of the training school. This protocol will subsequently be applied independently by participants in their respective home institutions to generate a standardised, comprehensive dataset on clearance rates across global freshwater mussel populations. The data sampled by the network of participants at a large geographical scale will be used to comprehensively quantify the effects of taxonomic affiliation and environmental characteristics of freshwater mussel populations on their clearance rates.

What to bring:

Essential

- ☐ Thorough understanding of the topic (see the essential reading section)
- ☐ Suitable clothing for the field sampling demonstration + lab work
- ☐ COVID-19 documentation complying with the updated regulations, which are in effect at the time of the event + face-mask (FFP2)

Optional

- ☐ Wading pants (please let us know if you will be bringing those in advance)

COVID-19: *the information may change, please check the international travel information regularly

- To help prevent spreading of the virus SARS-CoV-2 we had to implement a more stringent policy.
- For international arrivals please check Czech government website for recent updates about traveling to and from Czech republic. (https://www.mvcr.cz/mvcren/article/coronavirus-information-of-moi.aspx)
- **All necessary travel arrangements (flight tickets, accomodation, etc.) need to be booked with a covid insurance/possible cancelation. The COST funds cannot reimburse the expenses in case the Covid policy makes it impossible for participants to attend.**
- Please wear a face-mask at all enclosed areas and at places, where social distancing cannot be practiced.

Essential reading:

1. Vaughn, C.C., 2018. Ecosystem services provided by freshwater mussels. Hydrobiologia, 810(1), pp.15-27.
2. Riisgård, H. U. (2001). On measurement of filtration rates in bivalves—the stony road to reliable data: review and interpretation. Marine Ecology Progress Series, 211, 275-291.
3. Douda, K. and Čadková, Z., 2018. Water clearance efficiency indicates potential filter-feeding interactions between invasive Sinanodonta woodiana and native freshwater mussels. Biological Invasions, 20(5), pp.1093-1098.
4. Gatenby, C.M., Kreeger, D.A., Patterson, M.A., Marini, M. and Neves, R.J., 2013. Clearance rates of Villosa iris (Bivalvia: Unionidae) fed different rations of the alga Neochloris oleoabundans. Freshwater Mollusk Biology and Conservation, 16(1), pp.9-20.

*A detailed syllabus for TS will be developed and distributed to participants during August 2021.

Registration: *k.douda@gmail.com*

Registration deadline: *31st July 2021*

Contact:

Don't hesitate to contact us in case you have any additional questions on:
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