

Master thesis at the BOKU IHG, working group RHEOPHYLAX and TU Graz, SPSC

The sound of rivers – a trigger for riverine biota?

The master thesis will be conducted in the frame of the FWF project “The sound of rivers – a trigger for riverine biota?”. One aim of this project is to assess the sound characteristics and the distribution of sound waves in rivers. Specifically, with this master thesis we want to assess [i] river- and habitat type-specific soundscapes, [ii] discharge specific soundscapes and [iii] if and how far/how long in advance significant flow variation in upstream river reaches can be measured or quantified based on acoustic signature changes downstream.

Aims of the thesis:

- Record underwater soundscapes (e.g. sound level, amplitude, acoustic frequency and diversity) in different rivers types and discharge situations.
- Identify soundscape characteristics of smaller alpine streams (riffle pool type) and larger alpine rivers (riffle-run type, e.g. Salzach).
- Identification of the main soundscape aspects associated with discharge fluctuations.
- Measurements of various physical parameters during flood-events, which might act as an early warning mechanism for riverine biota.
- Field measurements include the use of: hydrophone, microphone, geophone, pressure sensor, flow velocity and discharge.

Specific questions and issues:

- Are sound-characteristics river-type dependent?
- Can mesohabitats (pool, riffles etc.) be identified by soundscapes?
- Which specific sound-characteristics are changing regarding discharge variations in different river types?
- How far downstream are high-flow events detectable on the basis of soundscapes (of the water column and within the sediment) regarding different distances to the source (e.g. a hydropower-plant)?
- Compilation and discussion of results including international literature

Preliminary Time frame:

Literature research and planning should start as soon as possible . Field work will take place from February to April (depending on the weather and discharge conditions). Data analyses should be finished by June/July of 2021.

Duties and responsibilities:

- Comprehensive literature research
- Participation in the field work in spring 2021 to record soundscape characteristics
- Post-analysis of the recorded data
- Data management and analyzes

Requirements:

- Interest in outdoor sampling activities
- Solid background on audio signal analysis
- Basic knowledge on sound transmission mechanisms and analysis
- Solid knowledge in post-analysis of various physical measurements with a focus on acoustic data

We offer:

- Thorough guidance and space for self-responsibilities
- Insights into applied and innovative research
- Financial compensation for field activities

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