



Welcome to the public defence of my doctoral thesis titled:
“Microbial metacommunities in subarctic streams”

in OP-Pohjola auditorium (L6), Linnanmaa Campus on
26th January 2024 at 12:00

Jacqueline Malazarte, M.Sc.

Opponent: Prof. Janne Soininen, University of Helsinki

Custos: Docent Kaisa-Leena Huttunen, Finnish
Environment Institute (SYKE)

The event can also be followed through this zoom link:

<https://oulu.zoom.us/j/66350195160>

**Cocktails will be served right after the defence.*

Bacterial communities: the hidden diversity of northern rivers

The composition, richness and temporal persistence of bacterial communities varies in stream network location, depending on whether it is on the upstream or the downstream portions of the network. According to the doctoral research, the diversity of the bacterial communities was highest in the small, upstream sites and decreased sharply towards the downstream. The bacteria's habitat also has an effect: the temporal variation of the bacterial species present in the water column was greatest in the upstream locations and lowest in the downstream, while the temporal variation of the biofilm community living on the rocks at the bottom of the river increased from the top streams towards the main bed.

The core species of the bacterial communities were found to be abundant in almost all places and at all times, but by far the majority of the bacteria observed both on the surfaces of the stones and in the water column were very rare, appearing only in some of the research locations or times. As a whole, the natural river network hides a great diversity of bacteria and microbes in general, invisible to the naked eye. Microbes are responsible for different functions such as food for other organisms, decomposition and nutrient cycling and thus, play a key role in all ecosystems, both in water and on land. The rapid development of DNA sequencing technologies has opened up new possibilities for measuring and understanding the great diversity of microbes. Biodiversity is known to be connected to the functioning of ecosystems, so knowing the factors affecting the composition of microbial communities is important in terms of conservation, restoration, and protection.

The doctoral research investigated the diversity of bacterial communities in northern streams in relation to their location in the river network. The research was based on the assumption that the bacterial communities of small headwater streams are strongly dependent on the bacterial communities of the surrounding soil ecosystem, but this soil-water interaction weakens as the size of the river increases. The main research themes of the dissertation were i) the diversity of bacterial communities in different parts of the river network and in different seasons, ii) the effect of the river network location on the temporal variation of bacterial communities, and iii) the differences in the temporal and local variation of common and rare bacteria. The studies were based on a dataset collected from 2018–2020 from Riisijoki, located in Riisitunturi National Park in Northeast Finland, which includes samples from 13 research sites in several seasons.

The dissertation emphasizes the importance of time series in research. The effects of human activities on ecosystems can only be detected if the temporal and spatial variation of the biological communities in the natural environment is reliably known. In the next step, it would be essential to repeat similar studies in river networks changed by human activity.

