

## Patterns of biodiversity impact caused by hydropower-induced environmental variability. Studying littoral zone community dynamics

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**ABSTRACT:** Hydropower with reservoirs may be integral to the increase of global renewable energy production. It complements intermittent renewables like wind and solar with its ability to store water and thereby regulate power production. However, this variation in production also significantly alters variation in environmental factors affecting biodiversity. Particularly by leading to degradation of the littoral zone in reservoirs. This exemplifies how sustainability measures may come in conflict, specifically those targeting the nature and climate crisis. In order to minimize conflicts in future planning of hydropower development, we need more knowledge on what areas are the most/least affected by regulation.

The aim of my PhD project is to understand how hydropower-induced environmental variation affects lake littoral communities along biogeographic and environmental gradients. This will be achieved by upscaling biodiversity knowledge from local to regional levels to identify possible patterns of impact, focusing on Fennoscandia.

The methodology is centred on the utilization of historical and more recent species/taxon occurrence data from benthic invertebrate communities, mainly sourced from the Global Biodiversity Information Facility (GBIF). The project will 1) look at patterns of impact on benthic invertebrate communities on a regional scale (Fennoscandia), 2) link the effect of hydropower-regulation on littoral communities to lake food webs using fish stomach content- and stable isotope-data from the NTNU University Museum and collaborators (Norway), 3) perform a field-study including 6 Norwegian lakes to study community dynamics with a higher spatiotemporal resolution (Trøndelag county, Central-Norway).

The expected results from my project may contribute to the understanding of critical pressures on freshwater biodiversity and the identification of pathways for environmentally friendly hydropower production.

This PhD is one of seven PhD positions at the NTNU Sustainability project named SusHydro - *Sustainable hydropower development and reservoir management as an enabler of the renewable energy transition and an accelerator to meet the UN Sustainable Development Goals (SDGs)*. My work will be integrated with the findings from the SusHydro group, with the goal of identifying interdisciplinary solutions for improved practices and sustainable hydropower development.