

UNIVERSITY OF EASTERN FINLAND

UEF WATER

Science-based management of water resources and aquatic environments

Catchment point of view binding science and scientists together in Water RC

Our mission and vision

To advance and connect water-related research, innovation, and business at the University of Eastern Finland.



Why Water Related Research ??

The clean water and the access to clean aquatic environments is one of the major global challenges in the future



Local reports indicate that tens of thousands of dead fish began washing ashore on Wednesday.
Image: Pekka Niiranen / Yle

https://www.epa.gov/greatlakes#1



To provide tools to society

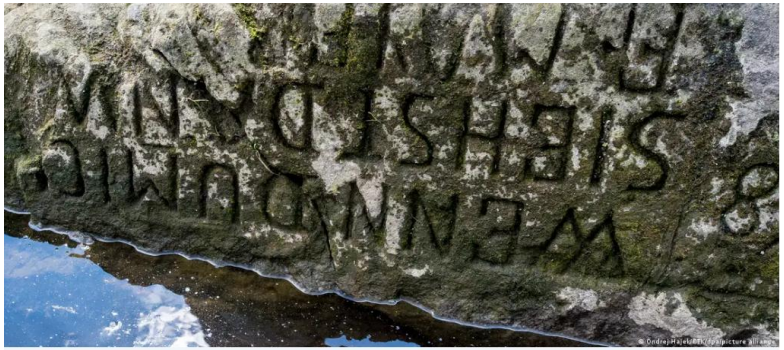
..to understand aquatic ecosystems
..to monitor the aquatic environments
..to prevent pollution
..to conserve endangered species
..to point out the problems in early phase
..to clean the polluted sites
..to manage water resources
..to provide clean and safe drinking water

HISTORY | GERMANY

Hunger stones: The history behind 'if you see me, weep'

Brenda Haas
08/14/2026

Centuries-old hunger stones are emerging as Europe's rivers recede. Among the most famous is the Decin hunger stone in the Elbe River with its cryptic message.



s Decin hunger stone, with its cryptic inscription, dates back to 1904 *Image: Ondrej Hajek/CTK/dpa/picture alliance*

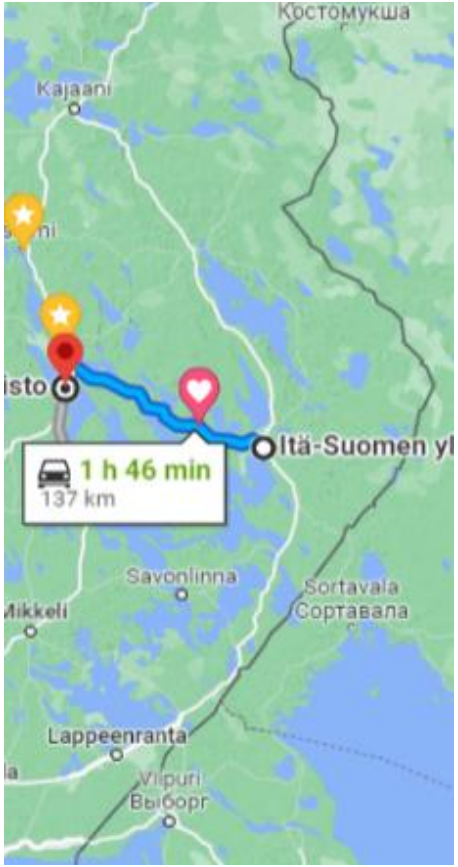
https://www.dw.com/en/hunger-stones-the-history-behind-if-you-see-me-weep/a-78345729

Joensuu

- Aquatic ecology
- Aquatic ecotoxicology
- Aquatic molecular biology & genetics
- Fish biology and fisheries research
- Aquatic food webs
- Global water cycle
- Sustainable wastewater treatment
- Water law and policy
- Governance for sustainable use of aquatic resources, managing the social-ecological resilience of waters

Kuopio

- Water treatment technologies
- New materials for physico-chemical water treatment
- Nature-based approaches for wastewater treatment
- State-of-art facility for analysis of emerging pollutants
- Measuring device development
- Applied aquatic science: hydroponics, aquaponics, crayfish plague studies



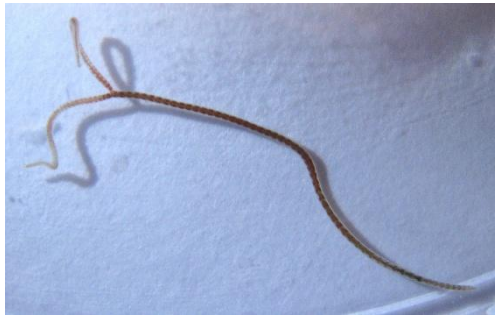
In both campuses:
Ecotoxicology, microplastics research, greenhouse gases, carbon and nitrogen flows in aquatic systems, modelling, and social sciences and business, carbon accumulating wetlands

18 PIs (Prof., Assoc. Prof., or Research Director), over 80 researchers

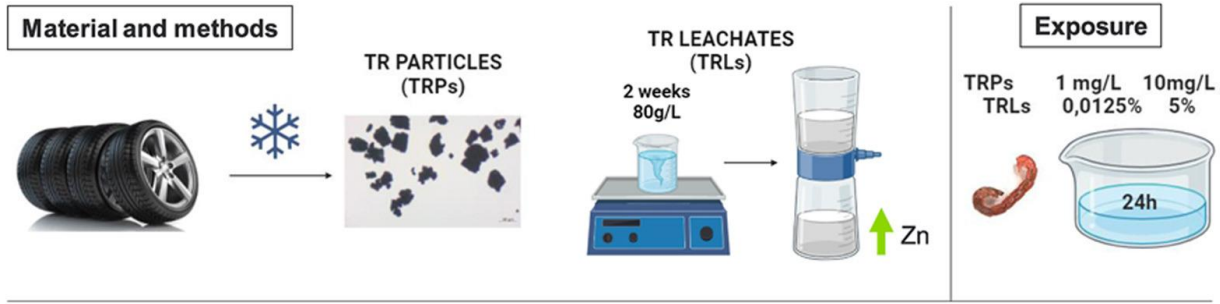
Micro- & nanoplastics in the environment

Tire Rubber Particles?

Results suggested a **minimal effect** of micro rubber on the aquatic sediment dwellers *L. variegatus* and *C. riparius*



Carrasco-Navarro V., et al. 2022: *Archives Environ. Contam. Toxicol.* 82: 180-190



Caballero-Carretero P., et al. 2024: *Environmental Pollution* 342: 123111

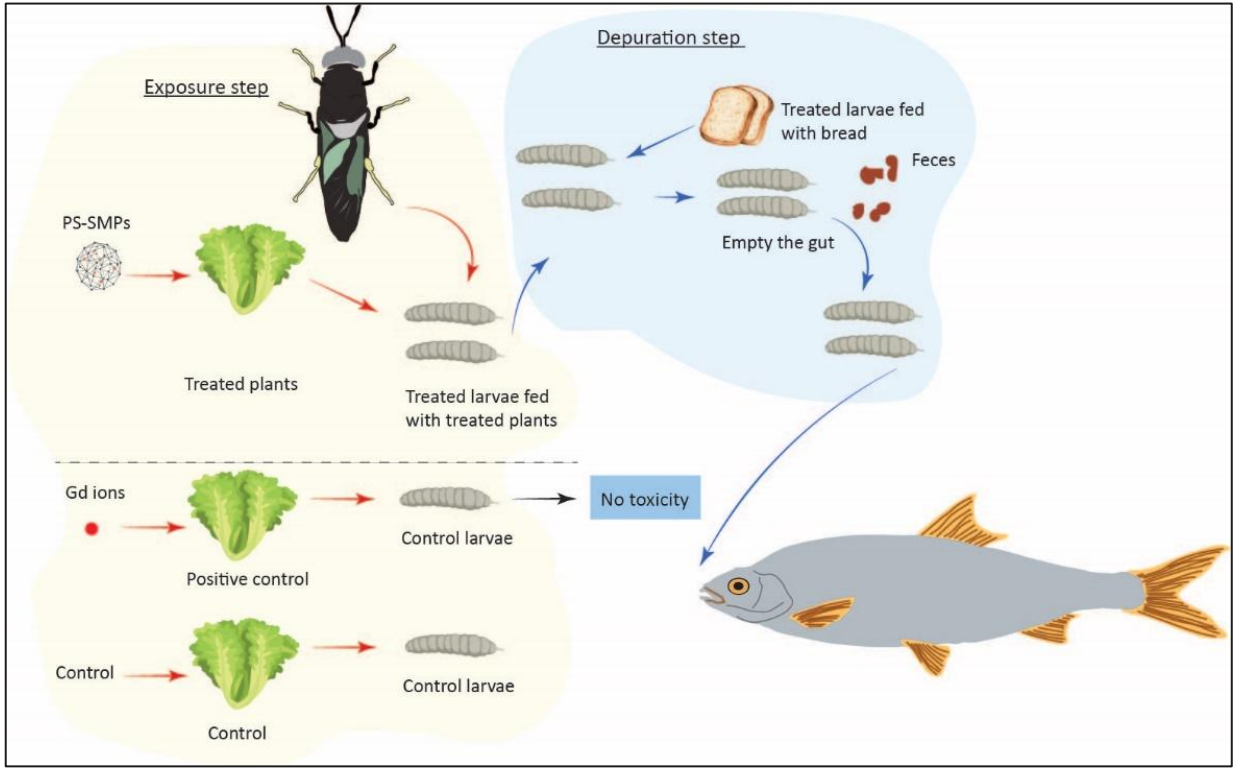
Tire particles disturb the stress response pathways.

Leachates of tire particles are more toxic than tire particles.

Micro- & nanoplastics in the environment

Exposure:

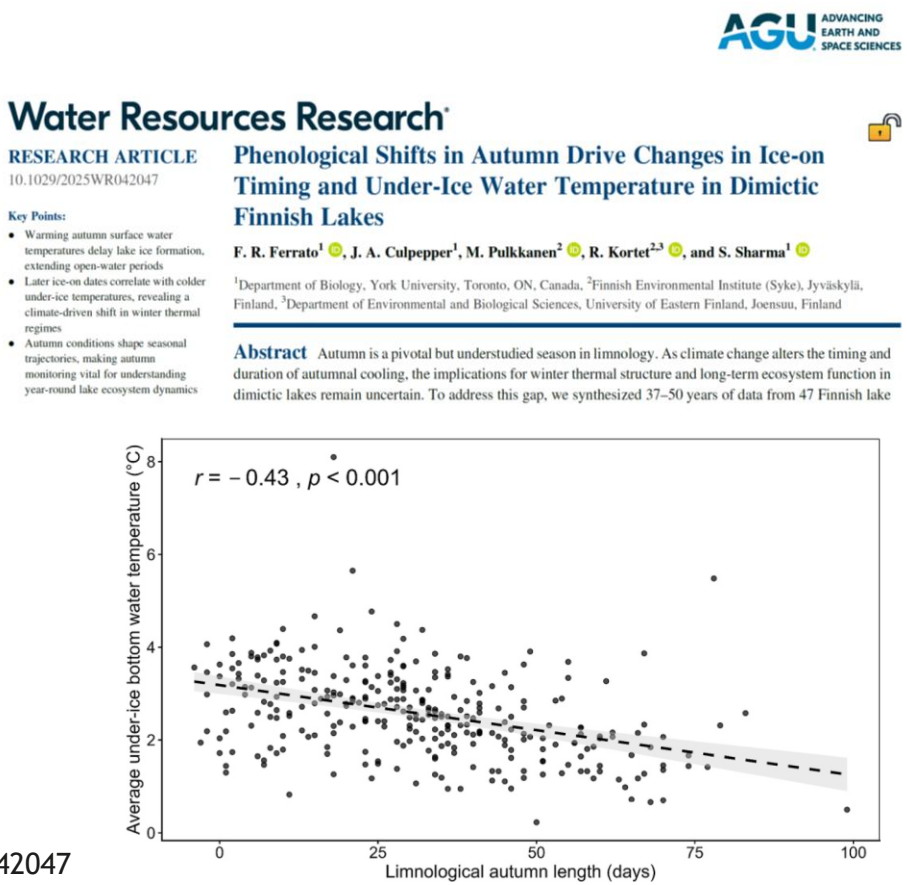
- Lettuce exposed to labelled PS & PVC-SMPs for 14 days
- Black soldier larvae were fed with the treated lettuce
- Treated larvae were used to feed fish
- PS & PVC-SMPs were found in lettuce, larvae and fish



Abdolahpur Monikh F., et al. 2022: *Nano Today* 46:101611. https://doi.org/10.1016/j.nantod.2022.101611

Impacts of climate change on lake ecosystems

- Northern dimictic lakes face increasing stress from warming.
- The role of of autumn conditions on wintertime thermal structure in dimictic Finnish lakes (long time series from 47 lake sites).
- Warming autumns and delayed ice on dates. Notable correlation between later ice on formation date and colder under-ice bottom water temperatures.
- Stronger autumn winds, higher autumn shortwave radiation, and lakes with larger areas were linked to colder under-ice water temperatures.



AGU ADVANCING EARTH AND SPACE SCIENCES

Water Resources Research

RESEARCH ARTICLE
10.1029/2025WR042047

Phenological Shifts in Autumn Drive Changes in Ice-on Timing and Under-Ice Water Temperature in Dimictic Finnish Lakes

Key Points:
- Warming autumn surface water temperatures delay lake ice formation, extending open-water periods
- Later ice-on dates correlate with colder under-ice temperatures, revealing a climate-driven shift in winter thermal regimes
- Autumn conditions shape seasonal trajectories, making autumn monitoring vital for understanding year-round lake ecosystem dynamics

F. R. Ferrato[1], J. A. Culpepper[1], M. Pulkkanen[2], R. Kortet[2,3], and S. Sharma[1]

[1]Department of Biology, York University, Toronto, ON, Canada, [2]Finnish Environmental Institute (Syke), Jyväskylä, Finland, [3]Department of Environmental and Biological Sciences, University of Eastern Finland, Joensuu, Finland

Abstract Autumn is a pivotal but understudied season in limnology. As climate change alters the timing and duration of autumnal cooling, the implications for winter thermal structure and long-term ecosystem function in dimictic lakes remain uncertain. To address this gap, we synthesized 37–50 years of data from 47 Finnish lake

Ferrato F.R., et al. 2026: *Water Resources Research* 62:e2025WR042047

Saprolegniosis research

- Two doctoral projects (collaboration with Luke and Finnish Food Authority) investigate strains of *Saprolegnia parasitica*, the harmful oomycete causing saprolegniosis, using lab-scale cultivation and whole-genome sequencing.
- eDNA) samples help to better understand the factors driving outbreaks and the dynamics of epidemics in aquaculture environments.
- Clear genetic differences and significant variation in virulence between strains, highlighting the need to control the spread of particularly harmful strains in fish transfers, as aquaculture facilities may act as sources of infection for wild fish.



Kuva: Luke

Ice-fishing competitions as a large-scale field experiment

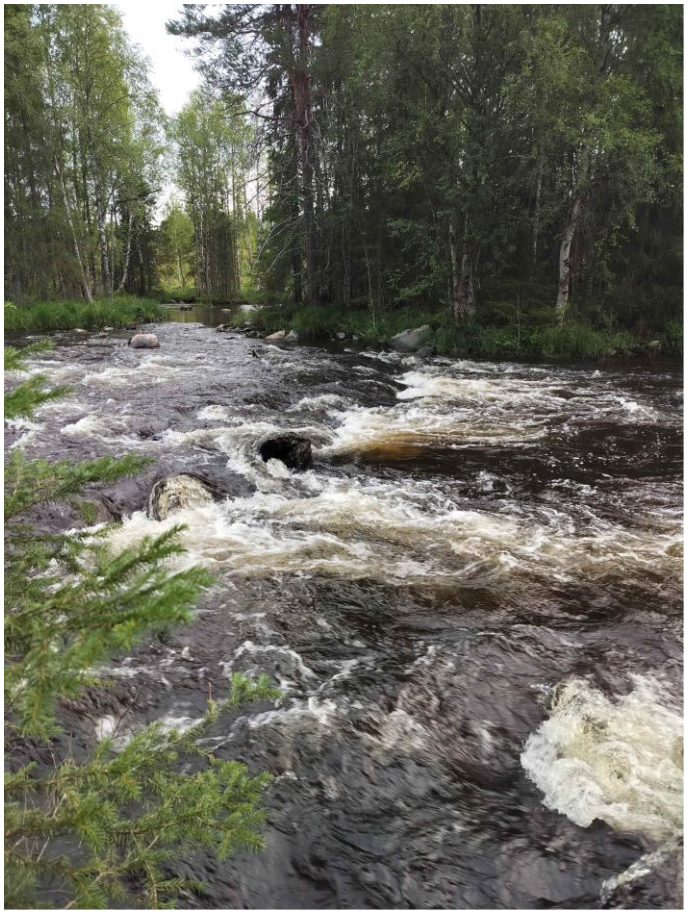
- People base food acquisition decisions on both personal experience and observing others; this study examined how social information guides these choices.
- In a large international field study (Max Planck Institute & UEF), 74 experienced ice fishers in Eastern Finland were monitored using GPS and head-mounted cameras.
- Detailed movement and location data were used to build computational models explaining decision-making processes.



Schakowski, A., et al. 2026: *Science* 391:6784

Small dams and restoration of rivers

- The Nousu Programme has removed migration barriers and restored rivers since 2020, combining public and private funding and attracting significant international support (e.g. Open Rivers Programme).
- The UEF-led Katko project evaluates the economic impacts of restoration options to support negotiations between ministries, owners, and funders.
- Early results (e.g. Hiitolanjoki) are promising; policy changes at the EU and national level may further support restoration efforts.
- The programme is complemented by new policy ideas (e.g. scrapping incentives for small barriers) and high-profile cases like Palokki, which highlights complex environmental, economic, and governance challenges.




Thank you!
www.uef.fi/water
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