

Salinization of river and lake ecosystems: A research agenda for a global threat

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Salt precipitation in the Soldevila stream in Sallent (Barcelona). Credit: Jordi Badia / Montsalat

The increasing salinity in freshwater habitats—rivers, lakes, wetlands, etc.— is a global threat to the conservation of biodiversity and the

natural habitats of the world. Human activities such as mining and intensive agriculture, as well as the rise of the sea level caused by the climate change, are placing the concentration of salt in continental waters up to the highest levels to date. Salt pollution alters the natural habitat causing the loss of species, dispersal of invasive organisms and the alteration of the cycle of nutrients, for instance. Also, it has another inconvenient: it damages the ecosystem services that provide society with lakes, streams and basins. Despite the evidence of the dramatic effects of salinization, there is not enough scientific knowledge to predict the consequences on freshwater ecosystems.

A scientific team in which ten countries took part, has joined efforts to analyze the current knowledge on this topic and set a guideline to improve the understanding of the effect of salt in water ecosystems worldwide. The paper has been published in the journal *Trends in Ecology & Evolution*. Its first author is the postdoctoral researcher David Cunillera-Montcusí, and one of the co-authors is the Serra Hunter lecturer Miguel Cañedo-Argüelles, both members of the Freshwater Ecology, Hydrology and Management Research Group (FEHM) of the Faculty of Biology of the University of Barcelona. The article counts on the participation of the teams from the University of Vic—Central University of Catalonia, the Catalan Institution for Research and Advanced Studies (ICREA), and the National Museum of Natural Sciences (MNCN-CSIC), among other institutions.

Specifically, the team proposes a research agenda for the international scientific community that tackles the most urgent needs from a global, regional, local and temporary perspective, with new approaches covering specifically the main shortages in this field of research.

The dangers of water salinization in the environment

According to the authors, globally, the current knowledge on salinization

is unequal depending on the geographical area (for instance, the effect of salt applied to the roads in order to prevent ice formation has not been studied in Europe while it has been largely studied in North America). Moreover, the most forgotten areas of Africa and South America, where the salinization factors are increasing, have not studied the topic yet. In general, a great part of the current works ignores the small [freshwater habitats](#) such as ponds, which are important ecosystems in the regional biodiversity.

There is a lack of information on the effects of the different types of salts in the water environment, as well as about its environmental impact at a regional and landscape scale, and in processes at an ecosystem scale (greenhouse gas emissions, nutrient removal, etc.). Also, most of the studies focus on water invertebrates, while there is still a lack of knowledge on the effect of salinization on microorganisms that drive the cycle of nutrients and are at the top of the water food pyramid (fish, reptiles and amphibians).

"Within the study, we worked on a research agenda with the most urgent gaps to fill and proposed several ways to tackle them from several perspectives. For each perspective we mention three main focuses and suggest experiments, methods and aspects that will foster new studies to advance in this field," says David Cunillera-Montcusí, principal author of the study and postdoctoral researcher at the FEHM of the University of Barcelona.

"The global tendency of lakes and streams is a great challenge for freshwater biodiversity, the functioning of ecosystems and human societies that depend on them," says Miguel Cañedo-Argüelles, Serra Hunter professor at the Department of Evolutionary Biology, Ecology and Environmental Sciences of the UB and member of FEHM and the Water Research Institute (IdRA) of the University of Barcelona.

"To address this challenge, we need a joint effort of the scientific community, practitioners, local communities and policy makers," says ICREA researcher Sandra Bruçet, from the University of Vic—Central University of Catalonia. Miguel Matias, researcher at MNC-CSIC, concludes that "with the collaborative effort of the international team of scientists that published the review paper, we want to promote this global effort in order to advance towards this direction and raise interest for this global problem that will lead us to a saltier world with many salinized lakes and rivers, and for which we must prepare."

More information: David Cunillera-Montcusí et al, Freshwater salinisation: a research agenda for a saltier world, *Trends in Ecology & Evolution* (2022). [DOI: 10.1016/j.tree.2021.12.005](https://doi.org/10.1016/j.tree.2021.12.005)

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