

The SedNet third award-winning poster highlights how mercury moves across ecosystems

Mercury contamination: an old story, an open question

Mercury remains one of the most critical contaminants in freshwater ecosystems. Today, around 50% of European surface water bodies fail to achieve good chemical status due to mercury concentrations. But where does this pollutant actually accumulate? The answer lies in sediments, which act not only as a sink for mercury, but also as the ideal environment for its transformation into methylmercury, the most toxic and bioavailable form.

This is where our SedNet award-winning study begins. In the Toce River (Northern Italy), legacy mercury contamination is still present in sediments at low concentrations, while levels in the water column are often below detection limits. Yet, this apparent absence in water does not mean the risk has disappeared. In fact, benthic invertebrates play a crucial role in transferring mercury from sediments into the aquatic food web. Through bioaccumulation and biomagnification, concentrations increase progressively from prey to predator, leading to mercury levels in fish that exceed the Environmental Quality Standard for biota.

The story, however, does not end in the aquatic environment. When aquatic insects emerge as flying adults, they become a direct pathway for mercury transfer into the terrestrial ecosystem. Results show clear evidence of mercury bioaccumulation in insectivorous birds living near the river, including signs of maternal transfer from adult females to their offspring. Further research is now needed to determine the extent to which this exposure may cause adverse effects on wildlife.

A key takeaway

Starting from sediments, mercury exposure can cascade across ecosystem boundaries, affecting both aquatic and terrestrial organisms. This study highlights the importance of integrating sediments into a One Health perspective of ecosystem management, moving beyond a water-only approach to contamination assessment.

Learn more!

This research is carried out by Water Research Institute, Italian National Research Council (CNR-IRSA, Brugherio, Italy) within the research programs of the International Commission for the Protection of the Italian-Swiss Waters (CIPAIIS). To explore the research context, publications and ongoing activities, visit www.cipais.org or contact Laura Marziali (laura.marziali@irsa.cnr.it)