

Metal contamination of aquatic environments also threatens birds on land

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Credit: Umea University

The negative impact of metals in polluted lakes on aquatic organisms may also adversely affect insectivorous birds on land. This is the conclusion of a dissertation from the Industrial Doctoral School for Research and Innovation at Umeå University. Ecologist Johan Lidman will be defending his results on 19 February at Umeå University.

Knowledge of how hazardous substances spread in and affect the environment is fundamental to developing safe environmental standards, thereby limiting the environmental damage done by pollutants. The impact of [metal](#) contamination on land and in water have traditionally been dealt with separately, often ignoring the fact that contamination can spread from water to land.

Johan Lidman's studies, which have focused on the impact of lead and zinc contamination from a decommissioned mine in northern Sweden, show that [aquatic insects](#) can transport significant amounts of metals stored during their [larval stage](#) from water to land, thereby exposing [terrestrial animals](#) that eat the insects—[birds](#), for example—to metals from [aquatic environments](#).

Until now, this transport via organisms has seldom been considered in risk assessments for terrestrial organisms and, according to Johan Lidman, earlier assessments of areas contaminated with metals may have underestimated the real risk.

"We can see that chicks and fledgelings living near polluted lakes ingest a significant amount of lead from aquatic insects. Were solely land exposure to be included, then incorrect conclusions regarding exposure sources for birds would have been drawn," says Johan Lidman of the Industrial Doctoral School for Research and Innovation and Department of Ecology and Environmental Science at Umeå University.

As well as the risk of aquatic insects exposing terrestrial birds to metals from water, Johan Lidman's dissertation demonstrates that metal contamination of lakes can also affect the food supply of [insectivorous birds](#). According to Johan, the larval stage for insects becomes longer and fewer aquatic insects hatch from more polluted lakes, which can create an imbalance between food supply and demand that leads to food shortages and a negative impact on birds.

"Even if the birds have access to other prey, my results show that to some extent the health of chicks and fledglings is affected by access to high-quality food, where nonbiting midges, mayflies and caddisflies are preferable to, for example, spiders and ants."

The studies also show that the effects of metal contamination on aquatic insects after the larval stage, during the metamorphosis to flying insects. Researchers usually only study the effects during the larval stage of aquatic insects, which is to ignore the impact during metamorphosis and ultimately underestimate the likely consequences.

"This may mean that environmental quality standards, which are usually based on studies focused on the larval stage, may be set too high and therefore fail to protect [aquatic organisms](#)."

More information: Metals take flight: Transport and effects across ecosystems.

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