

Hazardous chemicals, fresh water

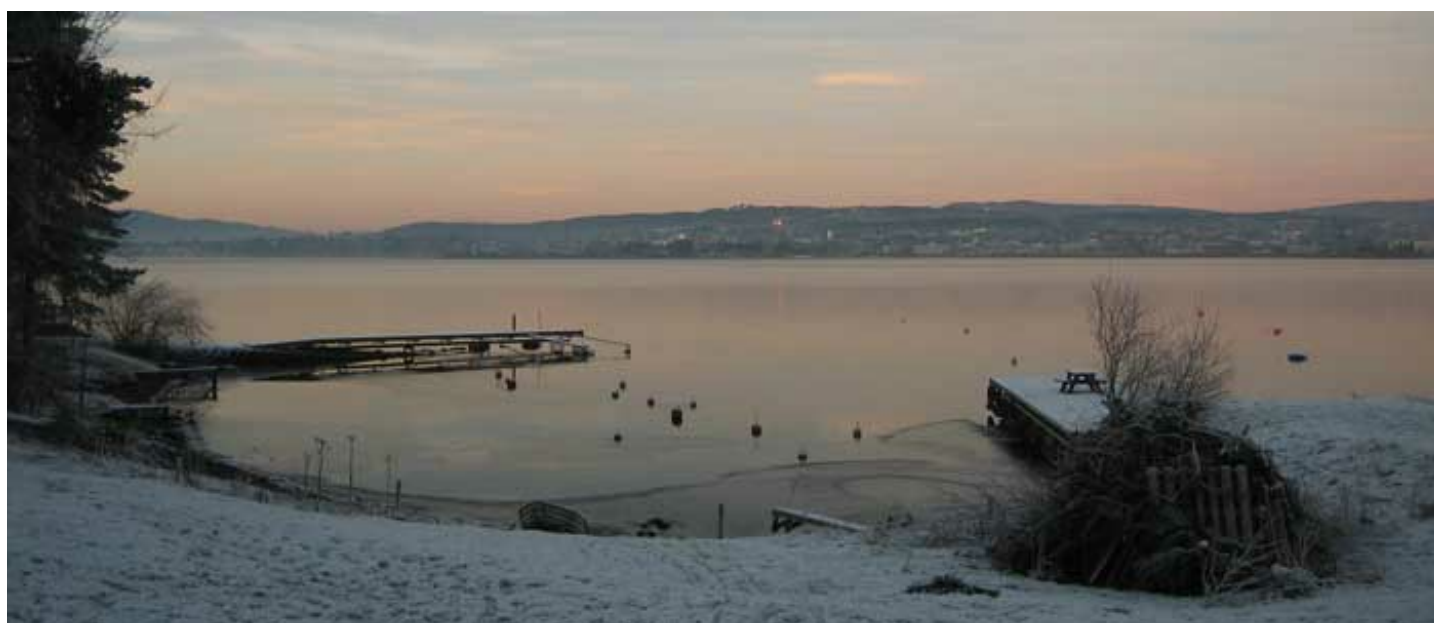
Innholdsfortegnelse

1) Metals in lakes

Hazardous chemicals, fresh water

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Long-range transboundary pollution and local inputs result in the deposition of heavy metals and persistent organic pollutants into lakes. High levels of mercury have been found in fish. Therefore, the Norwegian Food Safety Authority has issued general advice about the consumption of fresh water fish throughout the country.



Lake Mjøsa. Photo: Sindre Wimberger, Flickr.com

STATE

Heavy metals and persistent organic pollutants in lakes

Norwegian lakes have elevated levels of lead, cadmium and mercury. Of these, mercury is the dominant metal found in fish.

Many lakes have been examined for well-known persistent organic pollutants such as PCBs, DDT and dioxins. In recent years the levels of brominated flame retardants, PFAS, chlorinated paraffins and Bisphenol A have been surveyed as well. Some lakes have high levels of PCBs and brominated flame retardants. These are mainly influenced by local point sources. However, most Norwegian lakes have low levels of persistent organic pollutants.

IMPACT

Mercury in fish results in consumption warnings

Due to high levels of mercury in fresh water fish, the Norwegian Food Safety Authority has introduced nationwide advice against consumption of pike, perch over 25 centimetres long and large trout and char (over one kilo). Pregnant and nursing mothers should not consume such kinds of fish at all. Other people should not eat them more than once a month. Heavy metals such as lead and cadmium are not easily transferred from sediments to the food chain, thus posing smaller risk for human consumption.

Environmental monitoring has shown that in some lakes, such as the mainland lake Mjøsa and Ellasjøen situated at Bjørnøya, concentrations of persistent organic pollutants increase in animals at the top of the food chain. Trout in both Mjøsa and Ellasjøen have high levels of PCBs. In Mjøsa, elevated levels of brominated flame retardants and chlorinated paraffins have also been detected.

DRIVING FORCES

Long-range transportation and local sources

Hazardous chemicals in Norwegian lakes are introduced through air currents or local sources. The advice against consumption caused by mercury is mostly due to long-range transported inputs. In contrast to most Norwegian lakes, Mjøsa has been influenced by local point sources which have discharged mercury, PCBs and brominated flame retardants into the lake.

The high levels of hazardous chemicals in Ellasjøen are mainly due to excrements from seabirds that have caught contaminated fish at sea. In addition, heavy precipitation over Ellasjøen is also considered a reason for the high levels of hazardous chemicals detected in the lake.

PRESSURE

Lower inputs of lead, no reduction in mercury

The long-range transportation of lead has decreased. This is due to a reduction in the use of leaded petrol. There is however little evidence of a drop in inputs of mercury. Analyses of mercury content in perch fish show a 63 per cent increase between 1991 and 2008.

Inputs of PCBs, mercury and brominated flame retardants from local point sources into Mjøsa have stopped. But due to the nature of these substances, it will take considerable time before these hazardous chemicals are reduced in the food chain.

1. Metals in lakes

Published 23.07.2010 by the Norwegian Environment Agency

Lake sediments in large parts of Southern Norway are polluted by lead, mercury and cadmium. The overall human and environmental risk caused by these metals are considered low, however due to the detection of high concentrations of mercury the Norwegian Food Safety Authority has issued a nationwide advice against the consumption of some fresh water fish.



Perch. Photo: Wikimedia Commons

STATE

Southern parts of Norway most polluted

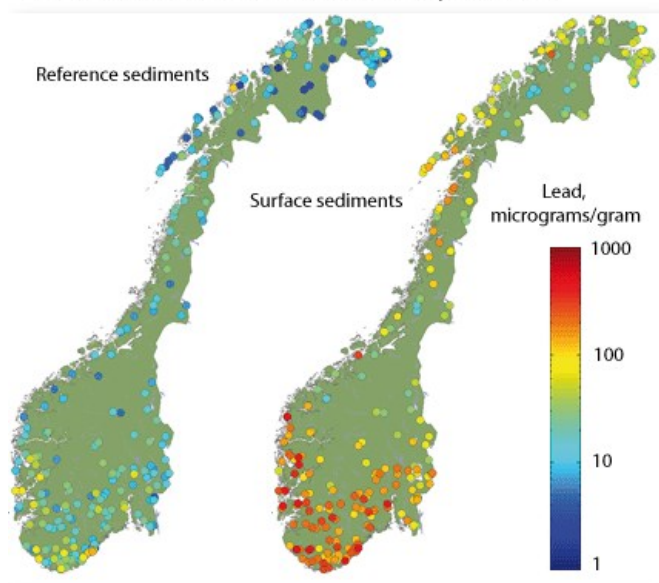
Metals such as lead, mercury and cadmium are transported to Norwegian lakes with air and precipitation. With time the metals will sink to the bottom of the lake where they can be found in the sediment layers. These sediments are therefore an important historical archive which reflects trends in emissions at different time periods.

A nationwide survey of sediments in 274 lakes has documented that lake sediments are polluted by lead, mercury and cadmium. This statement is based on a comparison of metal levels in sediment layers dated before the Industrial Revolution and sediment from the present time.

Decline in lead pollution, levels of mercury unchanged

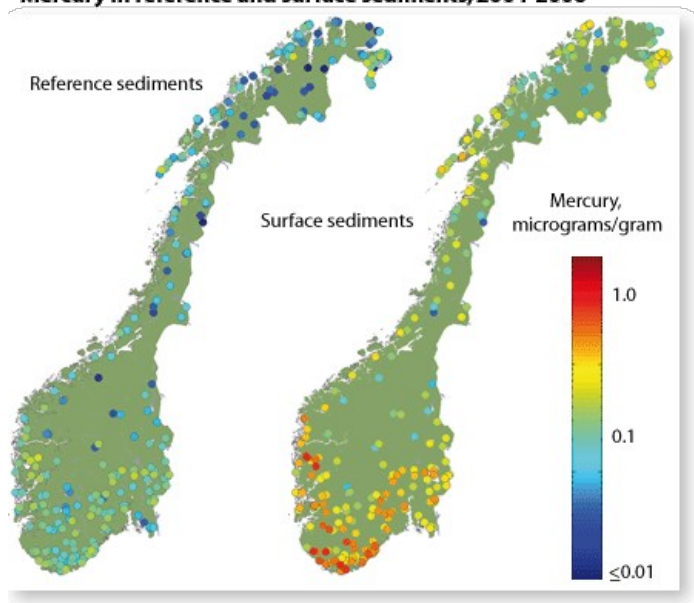
Lead levels in lake sediments have declined during the last decades but is still the metal found in highest concentrations. When it comes to mercury no change has been detected since 1995.

Lead in reference and surface sediments, 2004-2006



Source: Norwegian institute for water research, 2008
www.environment.no

Mercury in reference and surface sediments, 2004-2006



Source: Norwegian institute for water research, 2008
www.environment.no

Higher pollution levels in the South

Levels of most pollutants are generally lower in northern parts of Norway. However, several lakes in Sør-Varanger, close to the Russian border, are significantly polluted by copper and nickel.

IMPACT

Small threat to humans and animals

Since the levels of metals in lake sediments are comparatively low, the risk of harmful substances entering the food chain is small. Humans and animals are therefore not in immediate danger. However, one exception is mercury, which is able to transform to methyl mercury and then can be taken up by organisms.

Advice against consumption

Due to the detection of high concentrations of mercury the Norwegian Food Safety Authority has issued a nationwide advice against the consumption of fresh water fish. The warning concerns pike and perch larger than 25 cm. and big trout and char (>1 kg). Pregnant women and breastfeeding mothers should avoid eating such fish. Others should not eat such fish more than once a month.

DRIVING FORCES

Gradual reduction of emissions

Emissions of metals to the atmosphere take place when we burn coal and oil or incinerate waste. Manufacturing of iron and cement is another pollution source. Anthropogenic emissions of metals were generally insignificant before the Industrial Revolution, although lead emissions from German mining activities during the 18th century may have affected lakes in the southern parts of Norway.

Emissions of metals increased dramatically after the Industrial Revolution, especially from the Second World War and up to the 1970s. In the past 20-30 years European manufacturers have installed fume treatment facilities, and this has led to a gradual decrease in air pollution levels.

PRESSURE

Long-range pollution the most important source

Long-range air pollution is the main reason for the pollution of in lake sediments in Norway. Most long-range pollution is deposited in coastal areas and in Southern Norway, which is also where the sediments are most polluted. High levels of copper, nickel, cobalt and chromium pollution have also been registered in localities close to smelters and metallurgical industry.

Zinc and cadmium levels are highest in South and Southeastern Norway. This is probably a result of pollution from industrial activity in Eastern Europe. Emissions from local manufacturing have raised pollution levels in Arendal and Karmøy. Several lakes in Sør-Varanger in Finnmark are significantly polluted by copper and nickel emitted from Russian smelters.

RESPONSE

Use of unleaded petrol has improved the situation

Measures to reduce the use of leaded petrol has led to significant reductions in emissions. Road transport is the main source of lead pollution in Europe. Even though more and more unleaded petrol is being used, all types of petrol still contain small amounts of lead, which is naturally present in crude oil. Nevertheless, lead levels have decreased over the last twenty years.

In recent decades the installation of fume treatment facilities has led to a gradual decrease in metal pollution to air.