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Science for Environment Policy

# Lake Como contaminated with chemicals banned in the 1970s

**Research has found evidence for recent contamination of Lake Como, northern Italy, with chemicals banned in the EU since the 1970s.** Levels of DDT and PCBs in sediment, aquatic microorganisms and fish were examined. The results suggest glacial meltwater as a source for renewed DDT contamination and show recent contamination of fish above safe levels. The findings demonstrate the need for continued monitoring of persistent organic pollutants in European waters.

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**Source:** Bettinetti, R., Quadroni, S., Boggio, E. & Galassi, S. (2016) Recent DDT and PCB contamination in the sediment and biota of the Como Bay (Lake Como, Italy). *Science of the Total Environment* 542: (404–410). DOI:10.1016/j.scitotenv.2015.10.099.

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**DDT, a pesticide, and PCBs, once used in electronic devices, are considered toxic chemicals. They can persist in the environment for long periods and accumulate in food chains.** The use of DDT and PCBs in the EU was banned in 1978 (Directive 79/117/EEC) and 1983 (Directive 76/769/EEC), respectively.

The bans have been largely effective, and their presence in the environment has been steadily decreasing. However, recent concentrations of DDT and PCBs have been surprisingly high in some southern Alpine lakes. The presence of these banned chemicals presents a renewed risk to the flora and fauna in such lakes, as well as to the humans who exploit these lakes for food.

New research has examined levels of PCBs and DDT in one such lake, Lake Como, in northern Italy. The researchers took sediment samples and 'cores' (collected from the bottom of the lake using a drill, capturing the layers of sediment laid down year after year) in 2009. The cores were used to construct a timeline of PCB and DDT contamination in Lake Como, spanning the last 20–25 years.

The concentrations of six PCBs and three forms of DDT were analysed in all samples. Core samples showed a reasonably steady decline in PCBs between 1970 to 2009, dropping from a combined total close to 200 nanograms per gram of dry sediment (ng/g dry weight (d.w.)) in the earliest (1970–75) sediments to around 90 ng/g d.w. in the 2009 sediments.

There was a noticeable increase, close to 300 ng/g d.w., around 2000–2002, which the authors attribute to three flood events in the lake, which overflowed in the city of Como, likely the source of this PCB 'peak'. Levels of DDT, however, never declined, instead remaining relatively constant over time.

The persistence of DDT in the lake is best explained, the authors say, by glacial release. DDT, previously used for fruit tree pest control in the valleys below glaciers, was carried up-mountain in the air and fell on glaciers trapped in snow. As a warming climate causes glaciers to retreat, the trapped contaminants are released back into the environment in melt water, flowing through rivers and streams and accumulating in lakes.

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Samples of zooplankton (small aquatic organisms) were also collected in 2009 and samples of the Agone fish (*Alosa agone*) — which preys on zooplankton and is commonly eaten in the area — were taken between 2006 and 2009.

The human consumption limit for PCBs and DDT in Italy (according to the Italian Ministry of Health) is 125 and 100 ng/g wet weight (w.w.), respectively.

Agone in all years were contaminated with both PCBs and DDT. DDT remained below safe limits for human consumption in all years. However, while PCB levels were typically well below the safe limit in most years, in 2009 levels were nearly double the safe limit. Levels of both PCBs and DDT in zooplankton were both lower than those in Agone, indicating that these chemicals are being 'bioaccumulated'.

The results show how historically banned chemicals can persist in, and be released into other parts of, the environment by unexpected mechanisms, posing a risk to both human health and the environment. While the findings are specific for Lake Como, they may represent processes occurring in other southern alpine lakes and water systems, and demonstrate the need for continued monitoring of persistent organic compounds in European waters.



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