

# OCEAN WARMING, OVERFISHING INCREASE METHYLMERCURY TOXIN IN FISH

Relevant for: Environment | Topic: Environmental Degradation - GHGs, Ozone Depletion and Climate Change

The amount of methylmercury in fish higher in the food chain can change due to two reasons — ocean warming and dietary shifts due to overfishing by humans. File (representation image) | Photo Credit: [AP](#)

Despite a decrease in seawater concentration of methylmercury since the late 1990s, the amount of toxin that gets accumulated in certain fish which are higher in the food chain have been found to increase. The amount of methylmercury in fish higher in the food chain can change due to two reasons — ocean warming and dietary shifts due to overfishing by humans.

Based on 30 years (1970s and 2000s) of data and ecosystem modelling, researchers have found that there has been up to 23% increase in methylmercury concentration in Atlantic cod fish in the Gulf of Maine in the northwestern Atlantic Ocean.

The increase in the methylmercury concentration in cod fish has been due to changes in diet caused by overfishing. As a result of diet change, cod fish in the 2000s relied more on larger herring and lobster, which have higher concentrations of the toxin than other prey fish consumed in the 1970s.

In contrast, there has been 33-61% reduction in methylmercury concentration in spiny dogfish fish between 1970s and 2000s. This is because, in the 1970s, spiny dogfish fish consumed more of squid and other cephalopods, which have a higher toxin concentration.

“This work showed that as a result of a change in the diet due to overfishing, there was an increase in methylmercury concentration in Atlantic cod fish while there was a decrease in the case of spiny dogfish,” says Prof. Asif Qureshi from the Department of Civil Engineering at the Indian Institute of Technology (IIT) Hyderabad and co-author of a [paper published](#) in the journal *Nature*.

Besides dietary changes, ocean warming too causes changes in the methylmercury accumulation in fish. Fish metabolism is temperature dependent. So as ocean temperature increases, fish experience higher metabolism and more energy obtained from food is spent on maintenance rather than growth, leading to more methylmercury getting concentrated in predatory fish, says Prof. Qureshi.

Based on modelling, the researchers found how seawater warming can lead to an increase in the toxin concentration in Atlantic bluefin tuna fish. The model predicts an estimated 56% increase in the toxin concentration in Atlantic bluefin tuna between 1970s and 2000s, which is also consistent with the 2017 observational data.

The model predicts that a combination of three factors — 20% reduction in methylmercury concentration in seawater, 1 degree C increase in ocean temperature and change in diet — can either increase or decrease the amount of methylmercury present in fish. In the case of Atlantic cod fish, there can be a 10% reduction in methylmercury concentration while there can be a 70% increase in the toxin in the case of spiny dogfish.

“This estimated increase in tissue MeHg [methylmercury] exceeds the modelled 22% reduction

that was achieved in the late 1990s and 2000s as a result of decreased seawater MeHg concentrations,” the researchers write.

The researchers warn that human exposure to the toxin through fish consumption is bound to increase as a result of climate change. Hence, there is a need for stronger regulations to protect ecosystem and human health.

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