Legacy and Emerging Pollutants From Land to the Arctic Ocean

Dr. Rainer Lohmann, Professor
Graduate School of Oceanography
University of Rhode Island

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Abstract: Some of the most notorious organic contaminants in the world are persistent and bioaccumulative, including polychlorinated biphenyls (PCBs), organochlorine pesticides (such as DDT), and per- and polyfluorinated alkyl substances (PFAS). These man-made chemicals pose risk to humans near production and contaminated sites, but also in the Arctic region.

Research highlights that the fate of these chemicals differ based on their physico-chemistry: PFAS are soluble in water and enter the oceans predominantly by atmospheric transport. However, there are first signs that PFAS are entering the Arctic oceans by water masses as well. PCBs, in contrast, are hydrophobic and are transported mostly in the atmosphere. Both PCBs and PFAS bioaccumulate in marine biota, but pathways and tissue distributions differ. Within Europe, fish consumption is estimated to account for 70-80% of human PFAS uptake. In the US, new regulation by the US EPA limits PFAS to trace levels in drinking water, while the EU is debating a total ban of PFAS based on the concept of essential uses only. These developments call for a concerted effort to limit production of harmful chemicals, and limit their use to those instances, for which no suitable alternatives can be found.

Bio: Dr. Rainer Lohmann is a Professor at the University of Rhode Island's Graduate School of Oceanography. He obtained a degree in Chemical Engineering and a Doctorate in Environmental Science. He is Director of the URI-led Superfund Research Program Center on the Sources, Transport, Exposure and Effects of PFAS (STEEP). His research focuses on the detection, bioaccumulation, transport and fate of anthropogenic pollutants in the environment, often relying on passive samplers in the process. Since 2000, he has published > 200 publications and book chapters. Dr. Lohmann was a member of the U.S. EPA's Board of Scientific Counselors (2017-2023), and serves as Editor of Environmental Toxicology and Chemistry. He was awarded a Fulbright Fellowship as part of the Fulbright Arctic Initiative III in 2020, and an Alexander-von-Humboldt Fellowship in 2011.