'Berlin Statement' to protect polar regions from pollutants

April 19 2023

Hereon researchers regularly take samples in polar regions. Credit: Hereon/Zhyiong Xie

The polar regions are exposed to an increasing load of pollutants. Under the leadership of the Helmholtz-Zentrum Hereon and the

Umweltbundesamt (UBA), experts from the European Commission, the Stockholm Convention, the Arctic Council and the Antarctic Treaty Conference, environmental sample banks, data centers and leading research institutions have now formulated the Berlin Statement. The resulting recommendations for action were recently published in the journal *Chemosphere*.

Ecological crises have an impact even in the remotest corners of the Earth. For example, the polar regions are heavily polluted by long-lived contaminants. These may be familiar chemicals, but more and more previously overlooked substances are being added. The authors of the Berlin Statement emphasize, as a result of their international workshop, that countermeasures by different actors are necessary to effectively reduce the pollution caused.

Therefore, the researchers around Prof. Ralf Ebinghaus, head of the Hereon Institute of Coastal Environmental Chemistry, developed ten recommendations for action and provided them with suggestions for concrete implementation. The Berlin Statement aims to promote screening, monitoring, risk assessment, research collaboration and open data exchange to better protect the polar environment. The consensus reached at the workshop can be summed up in two words: "Act now!"

The recommendations:

1. Raising awareness of the problem among politicians and the public

Climate change, biodiversity loss and pollution are interrelated and together pose a threat to ecosystems that is particularly severe in polar regions. To raise awareness of the problems facing the far-flung polar regions, media and educational projects must bring the issues to the

attention of citizens. The precautionary principle and strategies for monitoring, mitigating, and eliminating pollution must take indigenous and traditional knowledge into account.

2. Application of the precautionary principle

The precautionary principle is an approach that enables early decisions to protect the Arctic and Antarctic environment, e.g., actionable measures based on automated surveys at the national and international levels that incorporate levels of toxicity, longevity, and environmental mobility, individually or in combination.

3. Improving networking

To derive action from knowledge, effective networking and communication among relevant actors and stakeholders is needed. This will allow more targeted addressing of research questions needed by national and international stakeholders (e.g., European Commission, European Chemicals Agency, Stockholm Convention).

4. Better use of monitoring data

With approximately 350,000 chemicals registered, prioritization is important if the potential threat to polar ecosystems is to be the focus. International regulatory criteria should be used for this purpose, especially longevity and range. It is important that harmonized data on occurrence at both poles are regularly collected and published.

5. Updating the paradigms for the protection of the polar regions

The number of pollutants is increasing rapidly. This raises the question

of whether existing approaches to assessment and management of chemicals are still up to date. Problematically, pollutants are increasingly being detected that would not be expected at the poles according to previous assessments. Currently, more than 800 substances are considered "of potential concern to the Arctic."

6. Expansion and harmonization of monitoring

While monitoring in the Arctic is established through national and regional programs, this is not yet the case for the Antarctic, and systematic sampling and data collection needs to be developed. For the Arctic, there is an increasing need to investigate local pollutant emissions, such as oil and gas extraction and mining and industry, military installations, municipal infrastructure, transportation, research station operations, large-scale fisheries, tourism, and settlements.

7. Development of innovative screening programs

In addition to classical, targeted chemical analysis, new approaches are available that can be used to further develop pollutant monitoring. In addition to broad chemical screening, these include primarily new modeling approaches for impact assessment and machine learning for identifying new problem substances.

8. Development of environmental sample banks

Environmental sample banks are national institutions that develop and apply formal programs and standardized protocols for collecting, processing, and archiving environmental samples for future research. Their sample archives provide opportunities for retrospective viewing and assessment of temporal and geographic changes in chemical exposure over the past several decades. In the Arctic, pollution programs

are already systematically supported by environmental sample banks; this is also urgently needed for the Antarctic.

9. Ensure open access to data

Data can already be accessed today from individual established data platforms on specific topics or can be found in scientific reports or articles. However, there is a lack of centralized, comprehensive and open access to data on pollutants at the poles. In general, compared to the Arctic, there are significant data gaps in Antarctica that need to be filled.

10. Establishment of digital platforms

Digital storage of results from previously surveyed samples in long-term accessible repositories and virtual environmental sample banks offers new opportunities for subsequent analysis of data as new methods or insights into pollutants in polar regions emerge.

More information: Ralf Ebinghaus et al, Berlin statement on legacy and emerging contaminants in polar regions, *Chemosphere* (2023). DOI: 10.1016/j.chemosphere.2023.138530

Provided by Helmholtz Association of German Research Centres