



NEW RESEARCH PROJECT

Climate Change and POPs

Climate change is one of the largest challenges to humankind. Climate change is expected to influence the levels of persistent organic pollutants (POPs) found in the environment, their long-range transport, and toxic effects.

Climate change and releases of POPs

In a changing climate, several factors could result in an increase in the releases of POPs into the environment. For example, it is anticipated that the range of vector-borne diseases like malaria will increase – this could lead to a greater use of persistent organic pesticides. It is also expected that many areas will experience less rainfall; a drier climate could lead to an increase of wild fires and thus higher emissions of dioxins and furans. Measures taken to reduce the release of greenhouse gases could also mitigate the releases of unintentionally produced POPs. On the other hand, greater use of biomass for energy production is resulting in higher POPs releases as compared with those produced by fossil fuels, in particular natural gas. Current data suggest that a warmer climate would result in secondary releases of POPs from soil, water bodies or ice and lead to higher levels in air. A study of aquatic organisms in Alpine lakes found an increase in POPs which could be the result of pollutants being released from the melting glaciers.

Climate change and the environmental fate of POPs

The potential impact of climate change on the behavior of POPs in the environment is complex. Climate change will affect many aspects of the environment – temperatures, precipitation patterns, snow and ice cover, and the salinity of the oceans, as examples. These changes will alter the partitioning of POPs among environmental compartments (air, water, soil, sediments, snow and ice). Higher temperatures, for example, can result in more POPs evaporating from the soil into the air, while heavier rainfall can lead to greater surface deposition of airborne POPs and increased run-off of pollutants. These and other factors would then influence the transfer, redistribution and uptake of POPs, along with the overall levels that can be found in different parts of the globe.



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More about Climate Change and POPs

Climate change and exposure to POPs

Increase in the levels of POPs found in air and water due to releases from melting ice and snow, combined with possibly higher emissions would expose organisms to higher levels of POPs either directly or through the food chain, resulting in greater adverse impacts to the humans and the ecosystems. For example, it is possible that increases in the intensity and frequency of storm events could lead to more acute episodes of chemical contamination of water bodies and surrounding watersheds.

Climate change and the toxic effects of POPs

The addition of climate change to the mix of physical, chemical and biological stressors already affecting ecosystems may enhance the sensitivity of some organisms to certain pollutants. Some species may be especially vulnerable to climate-pollutant interactions, such as those living at the edge of their physiological tolerance range where the capacity to adapt to environmental changes is limited. Exposures to POPs in combination with other factors, such as the expanding range of disease vectors and immune suppression, could also have a detrimental effect on certain organisms, the food web and biodiversity.

Examples of potential negative impacts include reduced ability to survive or tolerate changes in environmental factors such as temperature, as the exposure to low concentrations of certain chemicals may induce additional stresses on the organism. In addition, some data suggest that higher temperatures can increase the sensitivity of wildlife to exposures to certain pollutants.



The Research Project

The objective of the Stockholm Convention is to protect human health and the environment from POPs.



For this to be achieved under a changed climate, it will be important that knowledge of the potential impacts of climate change on the releases, transport, distribution and toxicity of POPs is incorporated into the decision-making process.

A systematic review of the literature will provide Parties a better understanding of the influence of climate change on POPs and enable this aspect to be adequately reflected in the assessment of current and new POPs.

Objectives:

Provide an overview of how climate change may affect the impacts of POPs on human health and the environment to give the scientific community and policy makers a better understanding of the effects of climate change on releases, environmental distribution and toxicity of current and new POPs.

Approach:

The study is being conducted with partners from various institutions including the Arctic Monitoring and Assessment Programme (AMAP), Environment Canada, Fisheries and Oceans Canada, the Swiss Federal Institute of Technology, University of Bern, University of Texas, Laval University (Canada), University of Concepción (Chile), International POPs Elimination Network (IPEN), and other institutions. Project activities include:

- Review the available literature on the impact of climate change on the releases , environmental fate, exposure, and toxic effects of POPs and other POPs-like chemicals;
- Use available data to model the environmental fate and distribution of POPs under a changed climate; and
- Summarise the available data, create a synthesis, and provide policy recommendations.

Expected outcomes:

The synthesis report will

- Summarise the latest information on the potential impacts of a changed climate on the behaviour of POPs in the environment, including long-range transport, accumulation levels, and effects on living organisms and biodiversity; and
- Provide policy recommendations for Parties to strengthen their programmes and help achieve the objectives of the Stockholm Convention.