ENVIRONMENTAL CONTAMINANTS IN THE ARCTIC

Elsie M. Sunderland
EFFECTS OF CLIMATE CHANGE ARE MOST SEVERE IN POLAR REGIONS

- Warming 2 x Global Average
- Melting Permafrost
- Loss of Sea Ice
- Vulnerable Human Populations
- Riverine Mercury Inputs to the Arctic Ocean
- Increasing Freshwater Discharges to the Oceans

Zhang et al., 2015
BIOACCUMULATIVE CONTAMINANTS IN MARINE FOOD WEBS EXACERBATE CLIMATE THREAT

- Neurocognitive deficits
- Endocrine disruption
- Impaired immune function

Concentrations are $\times 10^6 - 10^7$ water

Chemical concentration (i.e., methylmercury)

Top predators

Big fish

Small fish

Plankton

Water
CLIMATE DRIVEN SHIFTS IN ECOSYSTEMS CAN INCREASE CONTAMINANT EXPOSURES

Modeled effect of seawater temperature increase on Methylmercury in Atlantic Cod (*Gadus morhua*)

Qureshi et al., 2013
IMPACTS ON THREE COMMUNITIES:

1. Faroe Islands
2. Nuuk, Greenland
3. Labrador, Canada

PI: Philippe Grandjean
IMMUNOTOXICITY DUE TO LIFETIME EXPOSURE TO OCEAN POLLUTANTS

Children from the Faroe Islands

50% Reduction in antibody concentrations for each doubling of PFASs

Grandjean et al., 2012

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Grandjean et al., 2012
Blood sample for exposure biomarkers and vaccine antibodies

NUUK, GREENLAND

First sample shipment
Modeled North Atlantic seawater PFOS (pg/L)

Year 2000

Year 2010

Zhang et al., 2015
Hydroelectric Development throughout the Canadian North

Flooding causes a pulse in methylmercury, methane and carbon.

Schartup et al., PNAS, 2015
GLOBAL ACTIONS HAVE RESULTED IN PRESENT LEVELS OF ENVIRONMENTAL CONTAMINANTS IN THE ARCTIC

Global actions are needed to reduce them.

“The Island and the Whales”

https://vimeo.com/112625935