

## How are earth's ecology and climate impacted by transboundary pollution?

### Alert!

#### **We have some breaking news from WPHO. Team GoNorth! needs your help.**

If you watch the news, it can seem like the earth's climate is going crazy. Some places are experiencing droughts, others floods. More hurricanes and tornadoes are causing more damage. Sea levels are rising, and the ozone layer is shrinking.

These climate changes are especially noticeable in Nunavut, where Team GoNorth! is traveling. The pace of change up there is more dramatic than anywhere else on the planet. And it's troubling news for the Inuit, the native people who call the Arctic home, and for the animals with which they share the Arctic ecosystems.

One animal that lives there is the polar bear. These huge carnivores spend most of their lives at the edge of the sea ice that covers the Arctic Ocean. Here, they hunt for seals and other marine mammals. In the past five years, however, the sea ice on the Arctic Ocean is vanishing. And fast! For polar bears, that's as if their kitchen were suddenly disappearing—complete with fridge, stove, and larder.

Like all Arctic animals, the polar bear has evolved with special adaptations that help it survive the extreme Arctic weather conditions. For example, polar bears have sharp claws to give them traction on the ice; they have black skin and a coat of clear hollow hairs to absorb and contain heat generated by the sun's rays, and an extremely thick layer of fat—blubber—that protects them from the cold.

Today this fat layer has become a problem of sorts for polar bears. That's because many chemical pollutants bind themselves to fat—in other words, they get stored in fat tissue. These chemicals make it to the Arctic in the first place as *transboundary* pollutants, so named because they travel long distances on the air and in the water from their source in places like the United States, Europe, and Southeast Asia. Once these pollutants reach the Arctic and are ingested by the animals that live there, they move into the animals' fat cells and stay there. Polar bears gobble up these animals—and their poisons, too. And once it is in their bodies they even pass it on to the next generation through the mother's milk! So what? So this: These chemicals cause health problems including birth defects, immune deficiencies, and even cancer.

So why don't people just stop using these chemicals? Good idea! But that's going to take some work. These chemicals are all around you! Couches, chairs, computers, even pillows are sprayed with them to make them more fireproof. People soak their lawns with them to kill "weeds." We even put them in our toilet paper to make it white! Now look outside. Even if the air looks clean, it's not. Smog—the chemicals, smoke, and soot from cars, trucks, and factories—isn't just in big cities anymore. It's everywhere around us.

That's bad news for polar bears. But it's also bad news for all of us! Remember that crazy climate? It just so happens that the same pollutants that are poisoning polar bears are also changing the climate. They're called *climate forcers*, because while they don't stick around for long, they have a big impact on climate while they're here: Some of them eat away the ozone layer, which protects

us from harmful ultraviolet light from the sun. Some of them turn into greenhouse gases in the atmosphere that trap heat next to the earth's surface. And some of them create climate chaos just by making the snow dirty so it melts faster.

All this sounds pretty depressing, but there's good news too. Twenty years ago, the nations of the world came together to try to put an end to some of the worst of these chemicals and stop transboundary pollution in its tracks. They signed a treaty, the Montreal Protocol, agreeing that they would ban the substances and find alternatives. And it's working. The amount of these chemicals in our atmosphere is going down.

And remember, by getting rid of them, we save the planet twice: Once by protecting our own bodies as well as animals from their health impacts, and once by reducing global climate change.

So if it worked for the Montreal Protocol, it can work with other dangerous transboundary pollution, too.

The question is, *how do we do it?* And that's where you come in! Team GoNorth! reports that they urgently need your help with three things: One is to sort out how transboundary pollution such as smog and other chemicals contributes to climate change and what can be done to reduce it. Second, we need you to explore the special ways that Arctic animals have adapted to the climate—and climate change up here threatens not just Arctic ecosystems, but the entire world. And finally, based on your analysis of past efforts to rid the world of toxins, we need you to come up with methods for eliminating climate forcers so that we can answer the important question of how we can have an immediate and meaningful impact on climate change.

Good luck, explorers! We look forward to reporting your findings right here on WPHO.