TURN DOWN THE HEAT

One Woman's Quest to Understand Climate Change.

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The smooth ice was like a clear window into the black abyss of the deep Siberian lake. Sergey Zimov, a Russian scientist studying Ice Age methane trapped in the Earth, turned again to the young American graduate student, motioning her forward. "I want to show you something important Katya," he said. Fueled by a rush of adrenaline, Katey Walter Anthony continued to shuffle slowly across the frozen surface until Sergey stopped. "Looking down through the ice was like looking up at the night sky – but instead of stars, clusters of bubbles streamed up," recalls Katey. It was a moment that would change everything for the Arctic researcher and future National Geographic Explorer.

Raised near California's Sierra Nevada mountains, Katey was drawn to the quiet serenity of remote lakes. Friends were hardly surprised when, as a PhD student, she jumped at the opportunity to study in Siberia. She had suspected that ancient methane was randomly leaking from beneath Arctic lakes, but what Zimov showed her changed her understanding of how melting permafrost is affecting global climate change. Turns out it was not random at all. Permafrost, a thick frozen layer of ground found primarily in polar regions, contains twice as much carbon as the atmosphere. As ice melts from global warming, Arctic lakes form and become natural digesters that turn soil microbes into methane – a much more potent greenhouse gas than carbon dioxide. Understanding the implications of thawing permafrost and the impact of melting Arctic lakes leaking methane has become critical to understanding climate change.

The Arctic is warming twice as fast as the rest of the planet and Katey's research has helped to reveal that Arctic lakes are emitting five times more methane than previously thought. Emissions from these lakes, also known as thermokarst lakes, are expected to peak by 2050, and it takes just one year for these powerful greenhouse gases to mix into our global atmosphere. As Katey explains, "We estimate that up to 10% of the projected global warming this century could come from thawing permafrost, and that affects the entire Earth. What happens in the Arctic does not stay in the Arctic."

The scope and perils of our global climate crisis are well documented. In 2020 alone, wildfires ravaged the Brazilian Amazon and the country of Australia, the most active Atlantic hurricane season in history was documented, disastrous flooding surged in China, and global temperatures soared while Arctic sea ice measurements shrank to alarming lows. Burning fossil fuels for energy may have started during the Industrial Revolution, but over half of all human-caused carbon emissions have been produced since 1988. The question is no longer whether the Arctic is melting, but rather how fast.

Greenhouse gas has been trapped in Arctic permafrost since the last Ice Age, including frozen methane bubbles like those depicted here. When the ice thaws, ancient carbon is released into the atmosphere - further accelerating global warming. © Jasper Gibson

Katey studies methane in Alaska's thermokarst lakes. Her research indicates that Arctic lakes are emitting as much as five times more methane than scientists previously thought. © Jasper Gibson

NASA has reported that while many models predict the Arctic Ocean will become ice-free for at least part of the year before 2100, other models predict that it will happen much quicker – within the next fifty years. Either way, the consequences would be devastating for natural ecosystems; most polar bears, for example, could become extinct from the wild by the end of this century.

While the Earth has always experienced natural cycles of warming and cooling, in evolutionary terms, Katey explains that "a four-degree increase in temperature would occur over 8,000 years; now that same temperature rise is happening in less than 100 years as a result of fossil fuel induced carbon emissions." She goes on to recall, "Places I used to cross-country ski a decade ago are now swamps and sinkholes. The Arctic is literally melting before our eyes."

Although Katey recognizes how this may paint a grim picture of the future, she is quick to say that people need to spend more time connecting with nature rather than living in fear. "By getting outside, the impact on our health and our relationship with the natural environment will improve. Regaining this connection with nature is one of the most important things we can do. When our hearts are in it, that will guide our future decisions to do the right thing."

Over the course of her career, Katey has witnessed the Arctic melting first hand, creating swamps and sinkholes including where one of her research cabins is located. © National Geographic Creative Works

Are there decisions we can make right now to help? Katey emphasizes that we can reduce our own carbon emissions by conserving energy at home and work. “When we invest in energy-saving technology, it will save us money in the long-term while immediately reducing our carbon footprint– it’s a win-win,” she says. For example, Katey prints copies of maps and data from her field research, and notes that companies like Epson have introduced heat-free technology printers with low power consumption. Less energy use means less fossils fuels which means less carbon emissions going into the atmosphere. “Our choices really do matter in work and in life. And when businesses and people make smart decisions about what technology we use, that will also make a positive difference for our environment.”

The young California girl who once found solace in remote Sierra lakes has found passion and purpose in understanding how remote Arctic lakes could hold one of the keys to helping protect our planet for future generations.

Katey uses heat-free technology with low power consumption, and she encourages individuals and businesses to do the same. © Jasper Gibson

A lifelong attraction to remote lakes has led Katey to the forefront of climate change research in the Arctic. © Jasper Gibson