



## The Arctic's hidden players: Impact

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### Problem

The Arctic's glaciers, ice sheets, and snow are more than frozen wastelands—they are the planet's climate regulators. These icy ecosystems store freshwater, lock away greenhouse gases, and preserve Earth's climate history. Hidden beneath the ice, microbes silently control the cycling of carbon and nutrients, shaping the health of our planet.

With increase in global temperature, the climatic trends of the Arctic is shifting towards warmer winters. Over the years, the Arctic has seen a rise in precipitation events during winter.

In response, the Arctic is becoming biologically active during winter and its productivity can strongly affect the emissions and storage of nutrients. These processes might further amplify the activity of the spring microbes and its ecological significance.

### Key messages

- The melting of icy habitats impacts life globally
- Microbes are adapting and resisting the change

### Summary point

The Arctic's frozen ecosystems are undergoing a quiet but profound shift. Once thought to be dormant in winter, these habitats show signs of microbial activity during the coldest months.

This hidden biological awakening may accelerate carbon cycling, influence nutrient flows, and intensify microbial activity in spring, amplifying ecological changes across seasons.

However, the impact of winter microbial processes are still missing from most environmental policies. Recognizing and including them could open new opportunities to understand annual biogeochemical cycles.

Here's what can be done to leverage the Arctic microbes in climate studies:

Develop research programs to monitor microbial activity and its effect on nutrient cycling during winter in Arctic

### Notes

Microbes play a fundamental role in stabilizing the climate crisis