

# Leaving microbes out of climate change conversation has major consequences, experts warn

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Sea ice in Antarctica showing a brown layer of ice algae. These microbes thrive in sea ice 'houses' and are the beginning of many food webs, which branches out to feed all larger lifeforms. The melting sea ice has a downstream effect on ice algae, which means a diminished food web and greater risk of starving ocean

life. Credit: Rick Cavicchioli, UNSW Sydney

More than 30 microbiologists from 9 countries have issued a warning to humanity—they are calling for the world to stop ignoring an 'unseen majority' in Earth's biodiversity and ecosystem when addressing climate change.

'Scientist's warning to humanity: microorganisms and [climate change](#)' was published today in the journal *Nature Reviews Microbiology*. Professor Rick Cavicchioli, microbiologist at the School of Biotechnology and Biomolecular Sciences at UNSW Sydney, has led the global effort.

With their statement, the researchers are hoping to raise awareness both for how [microbes](#) can influence climate change and how they will be impacted by it—calling for including microbes in [climate change research](#), increasing the use of research involving [innovative technologies](#), and improving education in classrooms.

"Micro-organisms, which include bacteria and viruses, are the lifeforms that you don't see on the conservation websites," says Professor Cavicchioli.

"They support the existence of all higher lifeforms and are critically important in regulating climate change.

"However, they are rarely the focus of climate change studies and not considered in policy development."

Professor Cavicchioli calls microbes the 'unseen majority' of lifeforms on earth, playing critical functions in animal and [human health](#),

agriculture, the global food web and industry.

For example, the Census of Marine Life estimates that 90% of the ocean's total biomass is microbial. In our oceans, marine lifeforms called phytoplankton take light energy from the sun and remove [carbon dioxide](#) from the atmosphere as much as plants. The tiny phytoplankton form the beginning of the ocean food web, feeding krill populations that then feed fish, sea birds and large mammals such as whales.

Sea ice algae thrive in sea ice 'houses'. If global warming trends continue, the melting sea ice has a downstream effect on the sea ice algae, which means a diminished ocean food web.

"Climate change is literally starving ocean life," says Professor Cavicchioli.

Beyond the ocean, microbes are also critical to terrestrial environments, agriculture and disease.

"In terrestrial environments, microbes release a range of important greenhouse gases to the atmosphere (carbon dioxide, methane and nitrous oxide), and climate change is causing these emissions to increase," Professor Cavicchioli says.

"Farming ruminant animals releases vast quantities of methane from the microbes living in their rumen—so decisions about global farming practices need to consider these consequences.

"And lastly, climate change worsens the impact of pathogenic microbes on animals (including humans) and plants—that's because climate change is stressing native life, making it easier for pathogens to cause disease.

"Climate change also expands the number and geographic range of vectors (such as mosquitos) that carry pathogens. The end result is the increased spread of disease, and serious threats to global food supplies."

## **Greater commitment to microbe-based research needed**

In their statement, the scientists call on researchers, institutions and governments to commit to greater microbial recognition to mitigate climate change.

"The statement emphasises the need to investigate microbial responses to climate change and to include microbe-based research during the development of policy and management decisions," says Professor Cavicchioli.

Additionally, climate change research that links [biological processes](#) to global geophysical and climate processes should have a much bigger focus on microbial processes.

"This goes to the heart of [climate](#) change, so if micro-organisms aren't considered effectively it means models cannot be generated properly and predictions could be inaccurate," says Professor Cavicchioli.

"Decisions that are made now impact on humans and other forms of life, so if you don't take into account the microbial world, you're missing a very big component of the equation."

Professor Cavicchioli says that microbiologists are also working on developing resources that will be made available for teachers to educate students on the importance of microbes.

"If that literacy is there, that means people will have a much better capacity to engage with things to do with microbiology and understand the ramifications and importance of microbes."

**More information:** Scientists' warning to humanity: microorganisms and climate change, *Nature Reviews Microbiology* (2019). [DOI: 10.1038/s41579-019-0222-5](https://doi.org/10.1038/s41579-019-0222-5) , [www.nature.com/articles/s41579-019-0222-5](https://www.nature.com/articles/s41579-019-0222-5)

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