

Policy Brief: Climate Change

RESEARCH INTO MICROBIAL INFLUENCES IN CLIMATE CHANGE

NBIC joins calls from the UK's Microbiology Society [1] and the American Society for Microbiology [2] to increase research into the role of microbial communities in contributing to and mitigating climate change.

Biofilms are communities of microorganisms – bacteria, archaea, fungi, protozoa and viruses – that represent the predominant lifestyle of microbial life on earth. In biofilms, microbes embed themselves in a self-produced sticky “glue” or matrix that provides protection from the external environment. This matrix increases their tolerance to environmental stresses such as temperature, dehydration, and chemical changes and enables diverse communities to act collaboratively. The prevalence of the biofilm lifestyle makes it imperative to understand how biofilm communities respond to a changing climate, and how this response will influence – and is influencing – the ecosystems in which they are embedded.

Climate change is a significant threat to human survival. Microbes represent the second largest biomass on the planet, and although each microbe is small, their collective contribution to the global climate is monumental. Microbes play a crucial role in the global carbon cycle and affect various aspects of the Earth's biogeochemical processes. They influence the cycling of carbon, nitrogen, and other nutrients in the soil, atmosphere, and aquatic ecosystems and thus the production and consumption of greenhouse gases such as carbon dioxide, methane, and nitrous oxide. Microbes are the base of all food chains, and their responses to climate change will have wide-ranging implications for biodiversity, fisheries and agriculture. They are also human, animal and plant pathogens with the potential for devastating impacts. Therefore, understanding the behaviour and properties of microbes and their biofilm communities is critical in the context of understanding and potentially mitigating the impacts of a changing climate.

Although humans are slow to respond to climate change, microbial communities can be quick to adapt in unexpected ways. To combat the threat to higher-order life on earth, we need increased collaboration across scientific disciplines, tabling of unconventional approaches, rapid translation of innovative solutions,

and robust data collection and modelling worldwide. NBIC was established to capitalise on the UK's strength in biofilms research and accelerate interactions with industry and end-users to address UK and global challenges. Alongside our colleagues in the US and UK microbiological societies, and our partners in biofilm research centres around the globe, we urge attention to be paid to the role of microbial communities to contribute to and combat climate change.

WE RECOMMEND

- Investment in biofilms and microbiomes research: increased UK investment in biofilms research is needed to understand their behaviour and properties, their impact, and their potential to mitigate climate change and regenerate habitats. The UK's strengths in microbiology, biofilms and microbiome research offer the opportunity for global leadership in this domain.
- Public Engagement: Public engagement and dialogue is crucial in raising awareness of the potential of biofilms research in mitigating climate change and promoting sustainable development. Public education and dialogue can help build support for rapid implementation of innovative solutions and the necessary policy changes to achieve net-zero emissions. This is of particularly vital importance in contested domains where disinformation has flourished.
- Representation: increased representation of the contributions of microbial ecosystems to climate modelling. Work with the science base to raise awareness of the importance of microbes at the heart of biodiversity and their contribution to the Global Biodiversity Framework.
- Collaboration and Partnerships: enhance collaboration between academia, industry, non-governmental stakeholders and policymakers to develop innovative solutions to mitigate climate change through biofilms research.

[1] [Climate change: microbes as our allies.](#)

[2] [Microbes and Climate Change: Science, People and Impacts.](#)