Plankton community structure and functioning under climate change – the mixoplankton dimension

Aditee Mitra[1*]

[1]School of Earth and Environmental Sciences, Cardiff University, Park Place, Cardiff CF10 3AT
[*]E-mail: MitraA2@Cardiff.ac.uk

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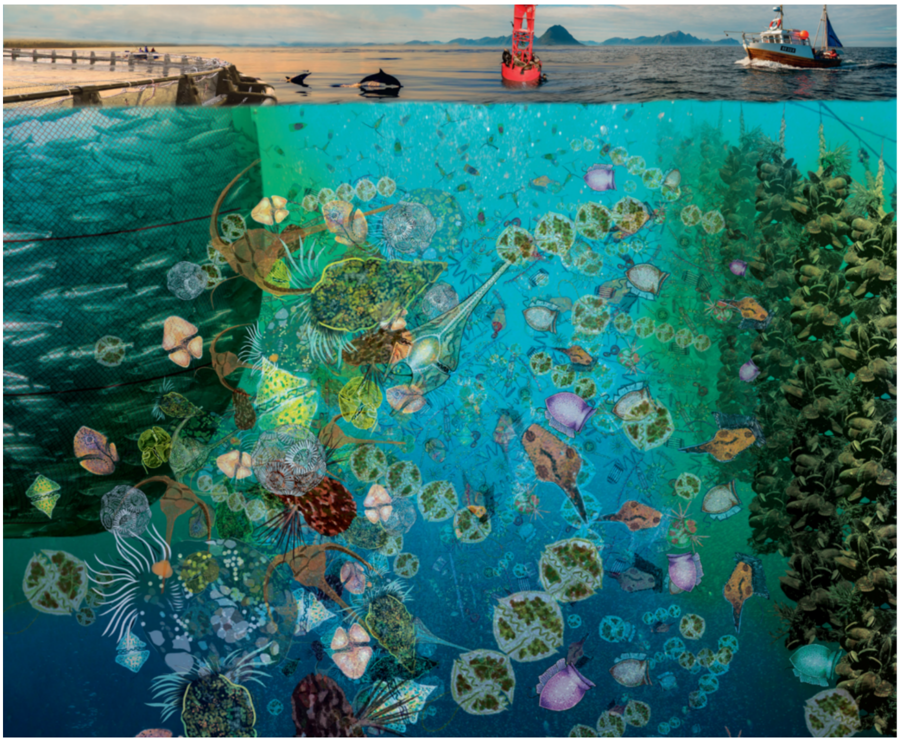
Marine open water ecology has historically been thought to function like land-based systems with phytoplankton 'plants' producing food that is consumed by zooplankton 'animals', so supporting higher trophic levels. After over a century of marine research, this plant/animal dichotomy is now being challenged. It is now recognised that mixoplankton – single celled organisms that photosynthesise and ingest prey – are major players in the plankton community (Glibert & Mitra, 2022; Mitra *et al*., 2023). Mixoplankton contribute to both primary and secondary production simultaneously within the same cell, exploiting phototrophy and phagotrophy synergistically. Under climate change scenarios, this trophic strategy provides mixoplankton with an advantage over phytoplankton and zooplankton with positive, or conversely negative, implications for ecosystem functioning (Leles *et al*., 2021). For example, bacterivory by mixoplankton communities could act as a conduit for energy and nutrients to higher trophic levels in oceans predicted to become increasingly oligotrophic and dominated by prokaryote phytoplankton (Mitra & Flynn, 2023). In contrast, water column stabilisation, rising temperatures, increased nutrients, and changing pH could lead to more harmful and/or ecosystem disruptive mixoplankton bloom events in nearshore waters (Flynn & Mitra, 2023). This talk will consider how the mixoplankton paradigm forces us to re-evaluate the structure and functioning of marine plankton communities, and also how we conduct our research. It will provide an overview of what is known and where the challenges lay for mixoplankton science in this UN Ocean Decade.

Figure



Mixoplankton – marine organisms that break the rules. Figure modified from EU Research article.

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