



Abstract

Harmful cyanobacterial blooms pose an increasing threat to freshwater security worldwide. Eutrophication and climate change are exacerbating the impacts of harmful freshwater cyanobacterial blooms on strategic ecosystem services, such as drinking water resource supply or irrigation. While understanding the vulnerability of these key services is essential for human well-being, we still know little on how cyanobacterial blooms can harm biodiversity and its services beyond the aquatic ecosystem boundary.

The overarching aim of the CyaNoServices Project is to secure freshwater supporting services for biodiversity threatened by harmful cyanobacteria across ecosystem boundaries, with an emphasis on insect biodiversity and the multiple key ecosystem services that they provide to wildlife and human well-being (pollination, pest control, energy transfer), and that are increasingly at risk across the globe.

To this end, the Consortium proposes an interdisciplinary approach involving a diverse group of ecologists, water managers, and entrepreneurs across bioregions in Europe (Sweden, Denmark, Spain) and South America (Brazil).

The project is organized into four Work Packages (WPs), which aim:

- to understand the largely overlooked link between cyanobacterial bloom occurrence and cross-ecosystem freshwater support to insect biodiversity and their services across climates (WP1);
- to identify specific mechanisms that underlie the above linkages found in real-world landscapes (WP2);
- to enable quantifying the threat of harmful cyanobacteria to ecosystem services beyond the aquatic boundary (WP3); and
- to integrate stakeholders for strategic activity planning and co-design of solutions to manage threatened ecosystem services (WP4).

As part of WP1, we will conduct field surveys of water bodies across Continental, Mediterranean, and Tropical bioregions to generalize our findings as well as to build predictions under different climate scenarios. Moreover, as part of WP2, outdoor and laboratory experiments will be conducted to unravel the single factors and mechanisms that affect the interaction between harmful cyanobacterial blooms and insect biodiversity.

A Consortium workshop will be organized to generate indicators of freshwater ecosystem service delivery (WP3). Finally, as part of WP4, we will use a novel interdisciplinary approach including state-of-the-art digital technology, to engage the stakeholders since the start of the project, seeking their feedback and accounting for their practical views and experience.

We will transfer the knowledge about impacts, mechanisms and indicators gained in the other work packages, as well as co-design together with them management solutions for the control of cyanobacterial blooms to increase security of freshwater ecosystem service delivery.

Results from CyaNoServices will be generalized across climatic regions, and this knowledge will contribute to disentangling the effect of deteriorating freshwater resources and habitat quality for global declines in insect diversity and their ecosystem services, with direct impact to key economic activities and stakeholders. Understanding the relationship between cyanobacterial bloom occurrence and the ecosystem services proposed here would allow identifying reliable indicators for freshwater service support, which is crucial not only for stakeholders but also for current policies and mandatory monitoring schemes, such as the EU Water Framework Directive.



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- UNIVERSIDADE FEDERAL DO RIO GRANDE DO NORTE - BRAZIL
- HALMSTAD UNIVERSITY - SWEDEN

► Funding organisations

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