

Aquatic fungi: Forgotten conservation targets

May 19 2022, by Ivan Jarić



Arthrotrrys oligospora. Credit: H. Masigol

They are always there, dwelling in the water, where they play a key role in food webs, in cycling of nutrients, matter and energy, and water purification. However, as happens with organisms that tend to be inconspicuous and often invisible to the naked eye, society mostly neglects them, and forgets their huge importance in providing support and stability of aquatic ecosystems. What is even more problematic, we also forget that they are exposed to a wide range of threats from human activities. Without proper conservation measures, their populations can decline and go extinct just like all of the other, more conspicuous aquatic organisms, with unforeseen consequences for marine and freshwater ecosystems. This was the object of a study by an international team led by researchers from the Biology Center of the Czech Academy of Sciences, as well as from the Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB) in Germany, and the University of Coimbra in Portugal.

In their paper, published recently in the journal *Frontiers in Ecology and the Environment*, the authors have addressed the problem of a lack of attention towards aquatic [fungi](#) as potential [conservation](#) targets. "So far, IUCN Red List of Threatened Species includes assessments for only a small number of fungi, and all of those assessed also comprise only terrestrial macrofungi," states Mariyana Vatova, one of the lead authors of the study. "What complicates such assessments is that many groups of aquatic fungi are poorly studied, and many species are yet to be discovered and described."

Another problem is that rare studies that were focused on conservation threats to aquatic fungi were almost exclusively limited to risks from the release of fungicides. "However, many other pollutants can affect fungi and their delicate networks, such as pharmaceuticals, metals, microplastics, and nutrient pollution," says Hans-Peter Grossart from IGB, another author of the study. "What is even more worrying is that we know almost nothing about the other threats that they are likely

facing. Some of the major threats for aquatic fungi include habitat modification and degradation, biological invasions, and climate change."



Aspergillus aculeatus. Credit: H. Masigol

Fungi declines can lead to a total loss of their key functions in the ecosystem

Such threats can lead not only to species extinctions in aquatic fungal communities, but also to [population declines](#) and even to a total loss of their key functions in the ecosystem, which can ultimately produce cascading effects in aquatic [food webs](#). "Unfortunately, due to large gaps in our current knowledge, many such cases are likely to go undetected and remain hidden," explains Ivan Jarić from the Biology Center of the Czech Academy of Sciences. "Such cryptic losses of ecosystem functions can aggravate the situation further, by hindering our ability to implement timely and effective conservation measures."

The study argues that the conservation of aquatic fungi has not received the necessary attention, and that it needs to be urgently recognized as a management priority and incorporated into aquatic conservation frameworks. "All such management efforts should aim to both protect fungal diversity, and to maintain their key ecosystem functions," suggests Susana C. Gonçalves from the University of Coimbra in Portugal, another author of the study, who is also a member of the IUCN SSC Fungal Conservation Committee. "Effective conservation can probably be most effectively achieved through the concept of ecosystem conservation."

Some of the promising management measures suggested in the study include reduction and ban of import of nutrients and contaminants, controlling introduction pathways of aquatic invasive alien species, renaturation of water bodies, restoration of key habitats, maintaining ecologically relevant hydrological regimes, adopting strict policies, and developing and applying new, standardized fungal bioassays. The authors however emphasize that all such measures should be streamlined to considering the particularities of fungi.

More information: Mariyana Vatoval et al, Aquatic fungi: largely neglected targets for conservation, *Frontiers in Ecology and the Environment* (2022). [DOI: 10.1002/fee.2495](https://doi.org/10.1002/fee.2495)

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