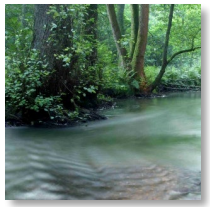

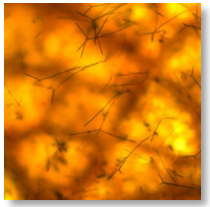
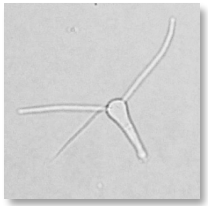

Monitoring Strategies and Tools to address knowledge gaps on aquatic Fungal biodiversity

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MOSTFUN
Monitoring strategies for aquatic fungi biodiversity

2024-2027

Goal: Prepare inclusion of aquatic fungi into routine biodiversity monitoring programs

Ecosystem processes

Ecosystem services

Metabolics , pharmaceuticals

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Monitoring strategies for aquatic fungi biodiversity

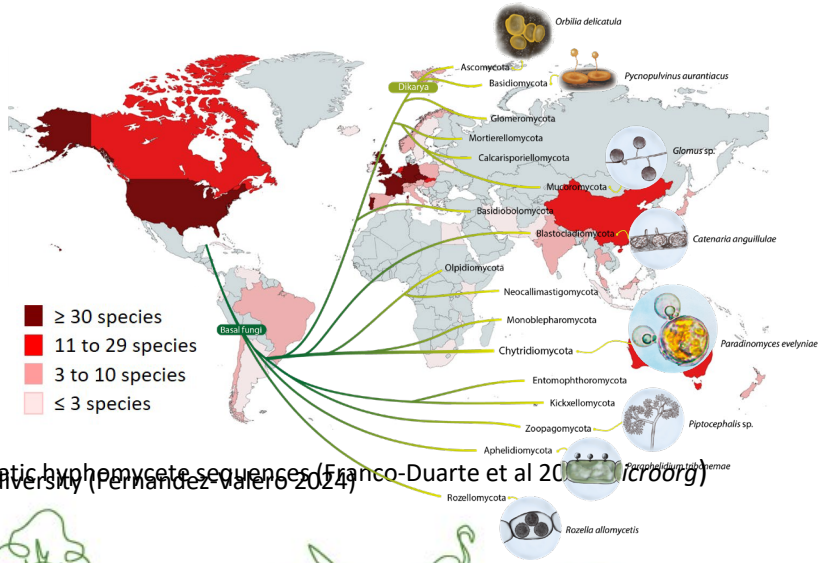
2024-2027

Knowledge on total number of species, biogeography, ranges of individual species, traits, etc., is very incomplete and patchy

> estimated species richness:
several thousand to 1,000,000
(Calabon et al 2022 *Fung Divers*; Jones et al 2019 *Fung Divers*)

> known species richness:
ca. 3800 freshwater and 1900 marine fungi species
(Jones et al 2019 *Fung Divers* and Garzoli et al 2018 *Fung Ecol*)

> most species are not known and/or insufficiently sequenced.
(Franco-Duarte et al 2022 *Microorg)*



Fungal diversity (Fernández-Valero 2024)

Aquatic hyphomycete sequences (Franco-Duarte et al 20[illegible] *Microorg)*

Project summary

- MoSTFun is a pan-European initiative that brings together the complementary expertise of 8 European partners and a representative of the IUCN Species Survival Commission to envision **AF monitoring in all aquatic ecosystems in Europe** (excl. open sea), across a large latitudinal range, while also disseminating the project to global partners and audiences. By bringing together the main EU long-term monitoring initiatives, available databases, remote sensing data and archival DNA resources MoSTFun consortium will develop the most efficient strategy that maximizes existing resources with a cost-efficient approach.
- Freezers, archives, and data-repositories are untapped sources of samples and data that are waiting the MoSTFun way to be capitalized. We will rely on the most advanced and cutting-edge -omics technologies to infer data and patterns on AF diversity and drivers from **existing frozen DNA archives (various case studies); we will also mine biodiversity and genetic databases** (e.g. GlobalFungi, GBIF, NCBI) to understand the potential of the resources already available to unravel AF diversity from different sources.
- Through the MoSTFun **case studies**, we will also contribute to closing the gaps of existing knowledge on AF diversity, including **undersampled areas** such as those of glaciers, estuarine and coastal areas.
- Main patterns of AF biodiversity and drivers across space and time will be evaluated by **integrating satellite and near-sensing data into modeling approaches**, in order to develop pipelines for data integration that models **Essential Biodiversity Variables**.
- Special attention will be also dedicated to **optimize and harmonize the most efficient methods and strategies** to obtain data of AF diversity, including information on planetary health issues, such as those posed by the emergence of antifungal resistance genes in the environment.
- MoSTFun will leverage the **network of stakeholders, practitioners, scientists and decision-makers** to envision the implementation of AF monitoring in Europe, by co-developing guidelines, strategies and best practices to integrate AF monitoring into existing monitoring programmes and initiatives.

MOSTFUN
Monitoring strategies for aquatic fungi biodiversity

2024-2027

Goal: Prepare inclusion of aquatic fungi into routine biodiversity monitoring programs

WP1: Collaborate with existing biodiversity monitoring programs

- Stakeholders network
- Diggint into freezers
- Digging into digital-freezers

MOSTFUN
Monitoring strategies for aquatic fungi biodiversity

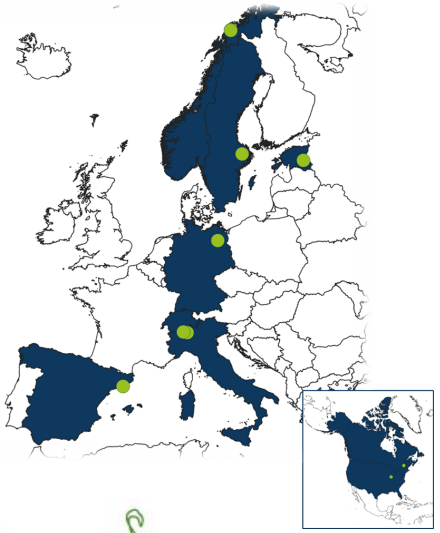
2024-2027

Goal: Prepare inclusion of aquatic fungi into routine biodiversity monitoring programs

WP1: Collaborate with existing biodiversity monitoring programs

WP2: Sampling in understudied ecosystems **(Leader: CSIC)**

- **Estuaries and coastal areas**
- Glaciers (citizen science)



MOSTFUN
Monitoring strategies for aquatic fungi biodiversity

2024-2027

Goal: Prepare inclusion of aquatic fungi into routine biodiversity monitoring programs

WP1: Collaborate with existing biodiversity monitoring programs

WP2: Sampling in understudied ecosystems **(Leader: CSIC)**

WP3: Integrative approaches

- Genetic composition
- Species populations
- Species traits
- Community composition
- Ecosystem function
- Ecosystem structure

- EO and GIS data
- Modelling
- Remote signals of AF in algal blooms
- Novel EBVs (Essential Biodiversity Variables)

MOSTFUN
Monitoring strategies for aquatic fungi biodiversity

2024-2027

Goal: Prepare inclusion of aquatic fungi into routine biodiversity monitoring programs

WP1: Collaborate with existing biodiversity monitoring programs

WP2: Sampling in understudied ecosystems **(Leader: CSIC)**

WP3: Integrative approaches

WP4: Optimize methods in the field and the lab

- Best substrates, locations and timing
- Optimisation of sequencing analyses
- Metagenomics of AFR genes

MOSTFUN
Monitoring strategies for aquatic fungi biodiversity

2024-2027

Goal: Prepare inclusion of aquatic fungi into routine biodiversity monitoring programs

WP1: Collaborate with existing biodiversity monitoring programs

WP2: Sampling in understudied ecosystems **(Leader: CSIC)**

WP3: Integrative approaches

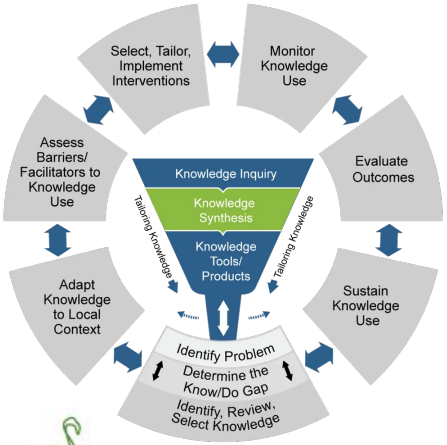
WP4: Optimize methods in the field and the lab

WP5: Investing in the future

GEO BON
Group on Earth Observations
Biodiversity Observation Network

- Stakeholder engagement
- Knowledge-to-Action hub

Knowledge2Action-Hub for aquatic fungi



Final remarks

We need to develop knowledge in all facets of aquatic fungi biodiversity

We need to reduce the geographic bias in this knowledge

Both of this can be achieved by better coordination across regions, backgounds, methods, habitats, cultural and political context, etc.

Using existing concepts and approaches helps acceptance and uptake by stakeholders, and saves time

MOSTFUN
Monitoring strategies for aquatic fungi biodiversity

Thank you for your attention

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