

# Network of Leading European AQUAtic MesoCOSM Facilities Connecting Mountains to Oceans from the Arctic to the Mediterranean

## Reporting

### Project Information

#### AQUACOSM

Grant agreement ID: 731065

[Project website](#) 

#### Status

Ongoing project


**Funded under**  
H2020-EU.1.4.1.2.

**Overall budget**  
€ 9 999 806,57

**EU contribution**  
€ 9 999 804,75

**Start date**  
1 January 2017

**End date**  
31 August 2021

**Coordinated by**  
FORSCHUNGSVERBUND  
BERLIN EV  
 Germany

## Periodic Reporting for period 2 - AQUACOSM (Network of Leading European AQUAtic MesoCOSM Facilities Connecting Mountains to Oceans from the Arctic to the Mediterranean)

**Reporting period:** 2018-07-01 to 2019-12-31

### Summary of the context and overall objectives of the project



Aquatic ecosystems around the world are under increasing pressure due to eutrophication, pollution, increased temperatures, droughts and other climate change related conditions strongly influenced by the growing human population. On the other side, humans severely depend on aquatic systems for

the growing human population. On the other side, humans severely depend on aquatic systems for drinking water, food production, recreation and other ecosystem services. The threats to the world's aquatic resources have never before been so obvious. Our knowledge about complex aquatic ecosystems is insufficient to produce accurate predictions for effectively managing and mitigating negative impacts on our future marine and freshwater ecosystems.

It is important to understand cause-effect relationships when assessing consequences of environmental change for developing accurate mitigation measures. At the ecosystem scale, cause-effect relationships are best studied experimentally in the field, using comparable units of enclosed water bodies that represent subsets of aquatic ecosystems, called mesocosms. Mesocosms combine the strength of modern experimental design and the realism offered by whole-lake experiments and field investigations.

AQUACOSM fills a global void by creating an integrated freshwater and marine research infrastructure network of mesocosm facilities integrating 2 SMEs and 19 institutions that run 37 leading mesocosm facilities from mountain lakes, to rivers, estuaries and ocean sites, from the Mediterranean to the Arctic. This provides the international research community with a unique infrastructure enabling leading research on aquatic ecology.

AQUACOSM is having a significant impact on European aquatic ecology by offering >11500

Transnational Access days to infrastructures for external users around the world, train young scientist and increase the interaction with industry, managers and the society at large.

AQUACOSM specific objectives are to:

- Strengthen the European network of mesocosm facilities as an integrated infrastructure providing unique research opportunities for the international science community.
- Support European research communities by sharing existing networked facilities, and capacity building by education and developing Standard Operation Protocols.
- Enhance the Technology Readiness Levels (TRL) of mesocosm facilities by increasing the performance of sensors and mesocosm related technologies for sustainable long-term use.
- Improve the joint use of mesocosms within and outside the AQUACOSM consortium.
- Improve cooperation with other Research Infrastructures (RI) to foster synergies and propose a roadmap for European mesocosm RIs in dialogue with stakeholders.
- Seek long-term sustainability based on science priorities and economic innovation opportunities.

## Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

During the first 36 months AQUACOSM has successfully

- and effectively established and is consolidating the first European network of internationally leading mesocosm facilities closely integrating marine, brackish and freshwater sites.
- created a web portal ([www.aquacosm.eu](http://www.aquacosm.eu)) that allows information flow and management of an online application process for Transnational Access (TA) provision to these facilities. The use for announcements of collaborative activities with facilities outside AQUACOSM – increasing the use of this portal.
- created a related open-virtual global network portal for aquatic mesocosms: [www.mesocosm.eu](http://www.mesocosm.eu)
- opened their facilities for TA in 2018 & 2019 to participants from all continents. The 2nd and 3rd Call for TA in 2019 - 2020 demonstrated that the AQUACOSM TA program is well-established and appreciated among the scientific community and is gaining recognition with SMEs. We expect to provide the full quota of 11500 person-days until 2020, and will thus be among the more successful

provide the full quota of 11500 person days until 2020, and will thus be among the more successful RIs in providing physical access to our facilities.

- developed standard operation procedures (SOPs) on data collection, data quality and assurances and processing, ([www.aquacosm.eu](http://www.aquacosm.eu)).
- AQUACOSM has developed a Database Management Plan adhering to the H2020 Open Research Data Pilot, and Guidelines for database management, including controlled vocabulary and a Mesocosm Metadata Catalogue for TA users.
- compiled a collection of SOPs for essential methodology in aquatic science including assessments of, Phytoplankton, Zooplankton, Periphyton, Water Chemistry, High Frequency Measurements, QA & QC, and Microbial Plankton
- created and tested two prototypes for a standardised free floating mesocosm that shall withstand moderate wave and ice action. A final model of these is under construction. At the end of the AQUACOSM project they will be available for a wider use, including in the follow-up project AQUACOSM-plus (Apr 2020- Mar 2024). The final reasonably affordable design applicable for lakes or coastal systems will be published to promote international standardization.
- contributed to the education of students of diverse training levels, both, focusing on early career researchers in a dedicated mesocosm summer school as well as on a broader group of university students and the general public.
- finalized and tested (semi)-autonomous measuring systems AQUABOX and LAMP.
- has successfully conducted the first Joint Mesocosm Experiment with the participation of several partners investigating the effects of brownification along salinity gradients currently planning joint efforts to test the effects of brownification along a gradient from the Arctic to the Mediterranean in 2020.

## Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far)

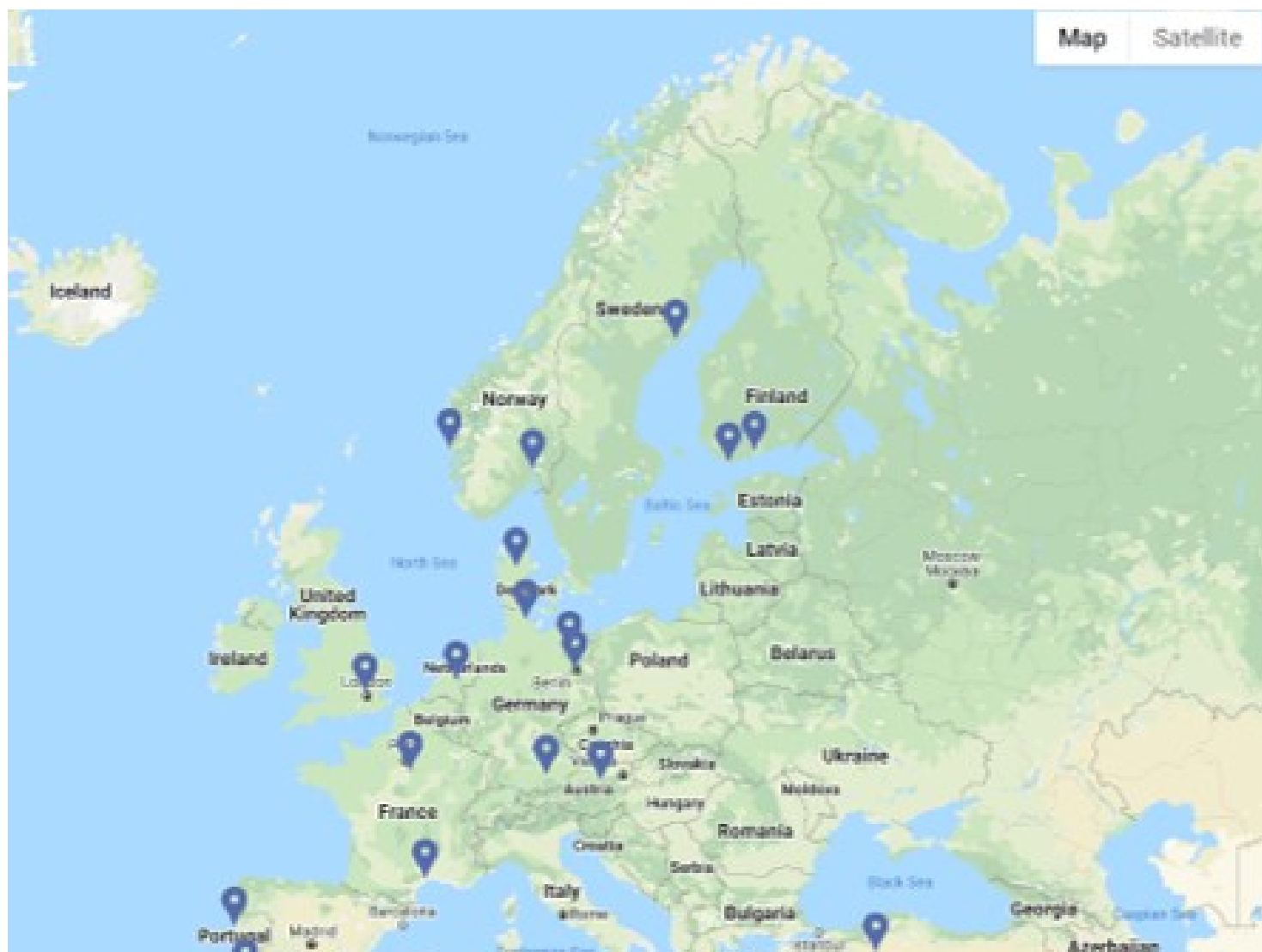
The establishment of AQUACOSM in 2017 represents the first close international collaboration between a range of freshwater and marine mesocosm facilities mostly operating independently before. This new collaboration has resulted in the first cross salinity gradient comparative experiments being performed in 2019 + 2020. These will include the first standardised experiment across these salinity gradients as well as across the entire latitudinal stretch of the EU, from south-east Mediterranean to the Arctic. The planning of these Joint Research Activities has sparked interest in groups outside AQUACOSM. Thus, we have established a momentum of wider collaboration beyond the AQUACOSM project itself that we expect will be expanding considerably supported by a readily sustainable tool, the virtual network at [www.mesocosm.eu](http://www.mesocosm.eu). This has also resulted in more formal global collaborations in the follow-up project AQUACOSM-plus.

During the first 36 months several activities have resulted in a series of documents to promote standardisation between mesocosm facilities (e.g. Best Practice approaches SOPs for data handling as well as analytical and experimental procedures –building on the strongholds from the former different disciplines). These span all environments, and include input from outside the AQUACOSM community. In addition, several activities have started to increase quality and abilities of technical approaches and instrumentation, e.g. high-frequency in situ measurements. These activities are expected to result in effective tools moving tomorrow's mesocosm science significantly beyond the

current state of the art, before the end of the project.

present state of the art also before the end of the project.

After 36 months ca. 100 Transnational Access projects have been completed, from which a large number of peer-reviewed publications is “in the pipeline”, i.e. the first now under review. Other peer-reviewed publications from the project have recently been finalized: [www.aquacosm.eu/project-information/publications/](http://www.aquacosm.eu/project-information/publications/)



Map of the AQUACSOM partner facilities

**Last update:** 6 June 2020  
**Record number:** 242517