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# MESOAQUA: Network of leading MESOCosm facilities to advance the studies of future AQUATIC ecosystems from the Arctic to the Mediterranean

In marine ecology there is an urgent need to understand the functioning of the plankton food web in the ocean, its response to and effect on climate change, its response to pollution and environmental toxins, and its role in producing food for commercially important species at higher trophic level. This requires access for European scientists to tools allowing experimental approaches to near-natural pelagic (open-water) systems. As such, the MESOAQUA project is working to create a virtual transnational pelagic mesocosm centre linking mesocosm labs from the Arctic to the Mediterranean.

## ● WHY DO WE NEED MESOCOSM SEAWATER ENCLOSURES ?

Understanding how the marine plankton (lower part of the ocean’s pelagic food web) functions is very important so that scientists can better comprehend the ocean’s biogeochemical cycles. These cycles have a profound impact on climate change and the lower section of the food web produces food for commercially valuable fish stocks. It is therefore crucial to gain a better understanding of the lower pelagic food web so that other issues, such as global climate change and bioremediation can be properly addressed.

Small-scale aquatic ecology laboratory experiments have the advantage of being easy to replicate, but too small to reveal whole ecosystem interactions. Field studies on the

other hand, are directly relevant to the natural environment, but offers little chance of experimental manipulation and replication of comparable units. Mesocosm – enclosures allowing controlled manipulations and monitoring of defined water bodies – experiments combine the best of both types of experiment by allowing hypothesis-driven, experimental research in replicated and controllable ecosystems that are still close to natural. While only 30 years old, the mesocosm approach has quickly become an important tool for aquatic ecosystem research. Yet because it has not been in use very long, mesocosm research lacks the infrastructure and integration in standard science curricula of more traditional techniques.

## ● ADDRESSING THE NEED FOR INFRASTRUCTURE

To tackle this serious shortcoming, MESOAQUA will establish a network of mesocosm facilities that will serve to strengthen experimental ecology as a key part of European marine science. As mesocosm research is generally costly and necessitate a strong infrastructure, MESOAQUA is working to make access to existing sites easier. This will allow more researchers to take advantage of the existing facilities. Moreover, researchers will be able to share information on experiments in different aquatic areas across Europe. In addition, there will be a series of workshops and other events to bring researchers together to share information and best practices. Communication is vital to bring attention to this field, in part to communicate between research centres but also to communicate to the wider public the benefits mesocosm research brings. Studies using mesocosms are intensive cooperative and cross-discipline efforts over time that often stimulates spinoff of new and prosperous cross

institutional science. All of this together will help unify mesocosm research across Europe and to further strengthen it’s international leadership in this field.



Moreover, MESOAQUA is developing unique technological solutions . This includes developing systems that can handle extreme situations and be used in Arctic research as well as be used to study key questions such as the effect of Ocean Acidification on the oceans, the largest ecosystems on Earth.

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Work is also being done towards the creation of offshore mesocosm facilities. Such an undertaking requires extensive research and development and will eventually provide researchers with more information on the future oceans and other aquatic systems.

The overall aim of MESOAQUA is to give researchers top-quality transnational access to mesocosm facilities so that the highest number of people can have access to the best technology in Europe. Research centres across Europe will also be able to share information and best practices so that mesocosm research can help researchers tackle key issues such as climate change.



**Project acronym:** MESOAQUA

**Funding scheme (FP7):** Integrated Activities (IA)

**EU financial contribution:** €3.5 million

**EU project officer:** Agnès Robin

**Duration:** 48 months

**Start date:** 1 January 2009

**Completion date:** 31 December 2012

**Partners:**

Universitetet i Bergen (NO)

Leibniz-Institut für Meereswissenschaften an der Universität Kiel (DE)

Centre National de la Recherche Scientifique (FR)

Hellenic Centre for Marine Research (GR)

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**Project webpage:** <http://mesoaqua.eu> and <http://mesocosm.eu>