

Venice Lagoon case study

The Venice Lagoon, located in the Northern Adriatic Sea, is a complex transitional ecosystem under pressure from human and global environmental factors. With a total surface of approximately 550 km² and mean depth of 1 metre, this system contains a diverse range of habitats including navigable and minor channels, salt marshes, tidal flats and islands. Like all shallow water transitional areas, the Venice Lagoon is a constantly evolving environment, where the exchanges at the tidal inlets drive changes in biology, chemistry and physical structure. As both a site of historical interest and environmental importance, thoughtful management of the Venice Lagoon is needed amidst changing conditions driven by climate change, pollution, invasive species and other global pressures.

CERTO in the Venice Lagoon

CERTO has advanced water quality monitoring in the Venice Lagoon by developing customized satellite-derived products and indicators tailored to this unique ecosystem.

In situ data collected during the project validated new indicators of chlorophyll-a concentrations and phytoplankton bloom timing and intensity. These CERTO tools help meet the needs of local stakeholders and support EU environmental policy objectives, including ecological assessments for the Water Framework Directive and Marine Strategy Framework Directive reporting.

Specifically, two key CERTO indicators were developed - the chlorophyll-a 90th percentile as an indicator of peak phytoplankton biomass, and phytoplankton bloom phenology related to bloom frequency and intensity.

The project also contributes to knowledge of suspended sediment transport at the lagoon-sea inlets, a critical process for safeguarding lagoon morphology and functionality. Moreover, CERTO supports monitoring activities for Good Environmental Status assessment, and improves eutrophication indices and phytoplankton phenology tracking, considering spatio-temporal variability in environmental and human-induced parameters.

Benefits

For regulatory authorities:

- Easy access to statistical analysis and monitoring tools utilising novel ocean colour data
- High resolution satellite-based products and indicators complementing *in situ* monitoring
- Ability to integrate existing data sets to develop maps and alert systems for hazardous conditions such as eutrophication
- Improved understanding of lagoon conditions to inform management

For local residents:

- Protection of lagoon ecosystem health
- Sustainable management for tourism and the local economy
- Access to information on water quality status



What is CERTO?

CERTO (Copernicus Evolution - Research for harmonised and Transitional water Observation) is an EU Horizon-2020 project that aims to improve water quality monitoring in transitional waters in support of EU directives. The project brings together industry, monitoring agencies, and scientists to develop innovative indicators that can be applied to coastal, transitional, and inland waters. By integrating *in situ* sampling, satellite data, and historical records, CERTO advances water quality data collection and interpretation across diverse aquatic environments.

Advancing water quality monitoring

The CERTO project has advanced water quality monitoring through innovative use of water colour data from the Copernicus satellites. By categorising water types based on optical signatures, CERTO has improved water quality assessment. This approach, currently being used across six European estuaries, has the potential to extend globally, creating a comprehensive network of water monitoring.

CERTO is progressing water quality monitoring by providing a prototype that can offer near-real-time data. It meets the immediate needs of researchers and stakeholders while enriching the pool of assessment tools with new indicators for more accurate and precise evaluations. CERTO contributes to scientific inquiry through shared insights in publications, continually informing and enhancing practices in water quality monitoring.



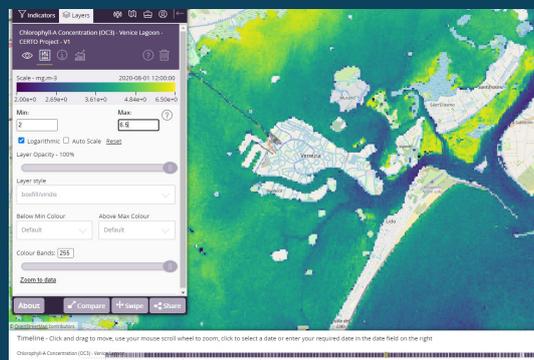
Sentinel 2 satellite image of the Venice Lagoon.

The CERTO data portal

CERTO has created a prototype system, designed to integrate seamlessly with existing Copernicus services. This innovative system demonstrates the potential to enhance and expand Copernicus services and their broader impact.

CERTO data can be accessed through a dedicated data visualisation portal, providing information and crucial insights into water quality. This offers data in an easy to access format.

Whether you're conducting scholarly research, supporting environmental initiatives, or seeking knowledge about the state of local water systems, the portal is a valuable resource that enables active participation in water quality monitoring and conservation efforts.



The CERTO data visualisation portal:
<https://engage.certo-project.org/venice/>



www.certo-project.org

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