

Department of Industrial Engineering
University of Padua

LASA research group

The Environmental Systems Analysis Lab (LASA) is based in the Department of Industrial Engineering of the University of Padua (Italy) and is coordinated by Prof. Luca Palmeri.

Researchers at LASA investigate the impact of human activities on ecosystems and identify sustainable management strategies for the environment. Their focus is on aquatic ecosystems and water quality. Research activities are based both on **field monitoring** and **mathematical modelling**.

The staff of LASA includes modellers and field-laboratory technicians with varied scientific backgrounds (physicists, biologists, engineers). LASA is equipped with high-performance computers, chemical laboratory facilities for the analysis of water and other environmental media, and modern instrumentation for field sampling.

LASA has been regularly involved in several **European research projects** over the past years and carries out **scientific consulting** for public institutions and private enterprises working with environmental management, particularly of water bodies, such as the Veneto Region, national/local environmental protection agencies and Land Reclamation Consortia.



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DIPARTIMENTO DI INGEGNERIA INDUSTRIALE

LASA

Laboratorio di Analisi
dei Sistemi Ambientali

Environmental Systems Analysis Lab

*Environmental monitoring and
ecological modelling and management*

Contacts

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Wetlands

LASA has carried out design, monitoring and modelling of constructed and reconstructed wetlands since the pioneering work in Italy of its former coordinator, Prof. Giuseppe Bendoricchio, and co-workers in the 1990's.

LASA activities include:

- **design of wetlands** for water treatment and diffuse pollution control
- **technical feasibility studies** for the creation of multifunctional wetlands (for water treatment, flood control, irrigation, biodiversity conservation, recreational purposes, etc.)
- **monitoring** of wetland processes (experimental measurement of water residence time, abatement of pollutants and bacteria, evolution of artificially-introduced vegetation)
- **economic valuation of ecosystem services** provided by wetlands

(The picture shows the Cà di Mezzo constructed wetland at Codevigo (PD), a LASA case study)

Environmental monitoring

LASA researchers carry out environmental monitoring of **surface water bodies**, such as channels, streams, rivers, lakes, lagoons, wetlands and coastal seas.

Sampling activities are personalized depending on the case study and can be supported by the automatic sampling devices available at LASA (ISCO, SIGMA, ENDRESS HAUSER, etc.). The main **physical-chemical parameters** characterizing water are **measured on field** using specialized equipment, such as multiparameter probes p4 WTW and IDRONAUT. The **chemical analysis laboratory** of LASA in Padova can assess the **concentration of nutrients, metals and pollutants** contained in water and other media (vegetation, sediments, etc.).

Current research projects and activities

European projects: WSTORE2 (dealing with integrated water resources management in coastal zones; www.wstore2.eu), LIFE VIMINE (demonstrating an integrated approach to the conservation of salt marshes in the Venice lagoon; www.lifevimine.eu). Both are LIFE projects.

Monitoring activities: water quality of the channels managed by local Land Reclamation Consortia (Consorzi di Bonifica Adige Euganeo, Acque Risorgive, Bacchiglione), water quality in the natural area of Vallevicchia, near Caorle (VE).

Research collaboration with Osmotech srl (atmospheric dispersion modelling).

Teaching activities: course in Modelling and Control of Environmental Systems, course in Environmental Impact and Life Cycle Assessment (both for Master Students in Environmental Engineering at the University of Padova)

Some past research projects and activities

European projects: MAST 2, JEP TEMPUS, STD 3, TMR – Wetland Ecology and Technology, EUROCAT (FP5), ELME (FP6), INCOFISH (FP6), KnowSeas (FP7), TRAP (INTERREG IV C, as subcontractor).

Monitoring activities: water quality of Palude della Rosa (Venice lagoon), Adige river, Revine lakes.

Wetlands case studies: Castelnuovo Bariano (RO), Ca' di Mezzo (PD), Monselice (PD), Lazzaretto Nuovo island (VE), Noale and Salzano wetlands; wetland system of Vallevicchia di Caorle; former Cuccobello quarry (Mirano, VE); Vigonza constructed wetlands for water treatment (WWTP).

Ecological modelling

LASA carries out **modelling of ecological processes** to assess **ecosystem status** and evaluate **sustainable management scenarios**. LASA also carries out advanced **statistical analysis of ecological time series**.

LASA has constructed models for:

- Nutrients loads generated in river basins
- Water quality of rivers, transitional water bodies, coastal zones and the sea
- Point pollution, diffuse pollution and their control
- Water treatment processes in wetlands
- Primary production and eutrophication
- Integrated systems for decision support in environmental management
- Aquatic food webs: sustainable fishery policies, pollutants bioaccumulation, climate change impacts
- Ecotoxicological processes
 - Ecosystem services
 - Environmental impact assessment
 - Atmospheric dispersion of pollutants and odour emission



LIFE
VIMINE



LASA coordinates the European project **LIFE VIMINE** (2013 - 2017), total budget € 2,024,295.

The project aims to define and implement an integrated management approach to protect from erosion the salt marshes (*barene*) of the Northern Venice Lagoon. Key actions of LIFE VIMINE include soil-bioengineering works, participation activities and economic valuation of ecosystem services.

More info: www.lifevimine.eu