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ENTPE
L'école de l'aménagement durable des territoires



UMR1369

Laboratory for Ecology of Natural and Man-impacted Hydrosystems (LEHNA)

Management

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Research topics

- Functioning of aquatic systems
- Response of biodiversity to anthropic pressure
- Genome - environment interactions
- Space-time determinants of biodiversity

Key figures

- 50 researchers and lecturer-researchers
- 24 engineers and technicians
- 6 research teams
- 4 inter-disciplinary topics
- 3 technical centres totalling 12 experimental platforms

Keywords

- Functional ecology
- Evolution
- Environment and pollution
- Aquatic systems
- Conservation

Mission and objectives

The Laboratory for Ecology of Natural and Man-impacted Hydrosystems (LEHNA) is a joint research unit run by INRAE, the Université Claude Bernard Lyon 1, ENTPE (Graduate School of Civil, Environmental and Urban Engineering) and the CNRS.

LEHNA's research goal is to identify, characterize and quantify the relationships between the processes involved in the functioning and evolution of the biodiversity found in natural and anthropized aquatic systems.



The main objectives are to:

- understand how environmental conditions affect organisms and their evolution as well as the spatial and/or temporal distribution of that biodiversity;
- understand the role played by organisms and biotic and abiotic parameters in the functioning of hydrosystems;
- promote integrated approaches combining evolutionary ecology, functional ecology and environmental sciences in order to predict the development of current environmental crises and to propose solutions.

The unit's work mainly involves:

- describing and understanding the genomic and phenotypic mechanisms associated with organisms' response to environmental changes;
- ecohydrology at the interfaces: the impacts of water and material flows on ecological processes and ecosystem services;
- conserving and restoring aquatic ecosystems and introducing nature-based solutions;
- exploring plants' and animals' past and current pathways to obtain better understanding of their dynamics and determinants.



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LEHNA Teams

- [Biodiversity and Adaptation in Aquatic Systems](#)
- [Plant Ecology and Wetlands](#)
- [Ecology, Evolution, Underground Ecosystems](#)
- [Ecophysiology, Behaviour, Conservation](#)
- [Impact of Construction and Pollutants on Aquatic Systems](#)
- [Palaeontology, Paleocology, Paleobiogeography, Evolution](#)

Glossary

- **ATIB:** Analyses et Techniques d'Inventaires de la Biodiversité
- **BEEB:** Bioévaluation des Ecosystèmes et Expertise de la Biodiversité
- **BIOENVIS:** Biodiversité, Eau, Environnement, Ville & Santé
- **CNR:** Compagnie Nationale du Rhône (concessionary of the river Rhône)
- **DRIIHM:** Interdisciplinary Research Facility on Human-Environment Interactions
- **DTAMB:** Development of Molecular Techniques and Analysis for Biodiversity
- **EAube:** Ecologie de l'Anthropocène: urbanisation, biodiversité, eau
- **EDF:** Electricité de France (electric company)
- **EVS:** Environment City Society
- **LBBE:** Laboratory of Biometry and Evolutionary Biology
- **LEM:** Microbial Ecology Laboratory
- **OHM:** Human-Environment Observatory
- **OTHU:** Field Observatory for Urban Water Management
- **ZABR:** Rhone Basin Long Term Environment Research

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Research

The unit works on aquatic systems, studying:

- the establishment of plastic, micro- and macro-evolutionary responses in the face of abiotic (temperature, hydraulic) and biotic (predation, competition) environmental constraints at various organizational levels (genome, phenotype, population, community, species);
- communities' taxonomic and functional responses to environmental constraints and variations;
- the identification of biotic and abiotic proxies and their interdependencies

Collaboration and expertise

At local level, LEHNA coordinates EUR H2O'Lyon which is a multidisciplinary, international university research school dealing with the sciences of water and aquatic systems.

LEHNA collaborates with many academic partners including Riverly (hydraulics, hydrology, ecotoxicology), Reversaal (infiltrometry and soil physics), LBBE (genomics, modelling), EVS (geography and HSS) and LEM (microbial ecology). With these partners, LEHNA makes a strong contribution to the BIOENVIS research federation for which it runs three experimental facilities: EcoAquatron, Sedaqua and DTAMB. Part of the unit contributes to the LabEx "Intelligence of Urban Worlds".

At the regional level, LEHNA co-chairs ZABR and is part of OTHU, which both bring interdisciplinary research into water. LEHNA is also heavily involved in programmes with socio-economic partners (Water Agency, CNR, EDF, etc.)

At national and international level, LEHNA collaborates with many French universities and research centres. The unit is heavily involved in several Priority Research Programmes and Equipments, including One Water, Solu-Biod, Sustainable Cities, FairCarboN, in the DRIIHM LabEx, jointly running an OHM, and has a contract with the Paul-Emile Victor Institute. LEHNA coordinates an exploratory project in the OneWater priority research programme (Aliquot project). At European level, LEHNA co-directs a doctoral Network with the University of Birmingham on the impact of microplastics on aquatic systems and is part of the Biodiversa+ European programme.

Scientific facilities

- The physical-chemical analysis technical platform analyses water (inorganic nutrients and dissolved organic carbon), sediments (physical and chemical characterization), pollutants (e.g. heavy metals, microplastics) and performs isotopic analysis.
- The biology platform combines an ecophysiology laboratory (bioenergetics, metabolism, endocrinology), a molecular biology laboratory and an imagery and optics laboratory for identifying organisms.
- The field experimentation and measurement platform includes a hydraulic canal, experimental areas, both outdoor (artificial lakes and rivers) and indoor (air-conditioned chambers) and centralizes various instrumentation and field sampling facilities.

Teaching

LEHNA is very involved in teaching. For example, staff members run or jointly run the international Master's in "Integrated Watershed Sciences" at EUR H2O'Lyon, as well as the BEEB, EAube and Environmental Genomics courses (GE), the ATIB professional undergraduate degree and the "Sciences de la Biodiversité" degree at Université Lyon 1.



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