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JRU 1467

Aix-Marseille
université
Initiative d'excellence

RECOVER "Risks, ECOSystems, Vulnerability, Environment, Resilience"

Management

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Research topics

- Hydrometeorological risks
- Risk and behaviour of hydraulic structures
- Decision-making support
- Continental hydro-system evolution under stress
- Mediterranean ecosystems
- Forest fires

Figures at a glance

- 75 permanent members of staff
- 15 to 20 PhD students
- 20 contract members of staff
- 50 articles in peer-reviewed journals, scientific books and book chapters, 20 articles in technical journals, 80 technical and scientific reports (annual average figures)
- 400 teaching hours per year (of which 230 for regional institutions)
- One technological research platform for Geomechanics (with a quality certification since 2013 and including a Geosynthetics Laboratory with COFRAC (French national accreditation body) accreditation since 2017)
- Two certified observation and experimental sites: Real Collobrier catchment area (OZCAR facilities—Critical zone observatory) and Font-Blanche experimental site managed by the Ecology of Mediterranean Forest research unit (AnaEE-France, ICOS).

Mission and Goals

The Joint Research Unit RECOVER (INRAE and Aix-Marseille University) has a twofold scientific mission, focusing on natural risks and ecosystem functioning. Its goals are to:

- Develop knowledge about risks related to forest fires, hydrology, hydraulic structures (such as dams and dykes), and provide decision-makers with support in those areas
- Study the water and forest ecosystem dynamics under global change as well as the challenge of ecosystem restoration, and develop tools and methods to assess the condition of the ecosystem



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Global change, risk (multi-hazard) management at local area level and compatibility with ecosystem conservation are cross-cutting themes for RECOVER. The Unit also contributes to INRAE at national level and to the "lake ecosystems" section of the French Biodiversity Agency (OFB), hosting three of their representatives. RECOVER lends significant expertise in terms of assisting public policy, especially as regards hydraulic structures. Research work is carried out both in laboratories (specialising in geomechanics, geosynthetics, forest ecology, hydrobiology, fish-farming units in a controlled environment or mesocosms) and on the ground (experimental dykes, sites of Real Collobrier, Font-Blanche, Barbentane and Saint Mitre and the Zola and Bimont dams).

Research

RECOVER studies four main topics:

- **Hydrometeorological risks:** understanding hydrological phenomena at a detailed scale (Real Collobrier Observatory); studying and modelling intense rainfall (rainfall generators, rainfall hazard mapping); local knowledge about hydrological risks (water resources and flood forecasting on ungauged basins); operational tools for hydrological risk management; and the impact of global change on hydrology risks.
- **Safety, risks and behaviour of hydraulic structures (Geomechanics, Civil Engineering, Decision-making, Risks):** understanding the physical mechanisms within geomaterials; laboratory and on-site experiments; multi-scale (from grain to structure) and multiphysics modelling and numerical simulations; functional safety; mechano-reliability modelling; methods and tools for integrated risk management in the context of decision support; structure/environment interaction; and multi-risk management of systems.



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- **Operation and rehabilitation of continental hydro-systems:** the influence of local and global factors on biodiversity; physiological responses to thermal changes; community structure–functional diversity–sensitivity to disturbances; behavioural, genetic and epigenetic responses; and tools and methods for environment quality assessment and restoration (status and functioning indicators).
- **Mediterranean ecosystems and risks:** understanding and modelling the dynamics of Mediterranean forest ecosystems amid global change; fire risk spatial assessment (fire behaviour in wildland-urban interfaces, vulnerability of ecosystems and territories, damage assessment by remote sensing and drones, integrated spatial modelling).

Partnership and Expertise

RECOVER is part of the Pytheas Institute - Earth Sciences and Astronomy Observatory (OSU) and the ECCOREV research federation. It is also a member of Aix-Marseille University's Mediterranean Institute for the Environmental Transition (ITEM) and a trusted partner of this University's Institute for Mechanical Science and Engineering (IMI). In addition, the laboratory works closely with the French Biodiversity Agency (OFB) on lake ecosystems in the framework of its national Research & Development project section.

Key international partners: Complutense University of Madrid (Spain), University of Sassari (Italy), University of Sherbrooke (Canada), University of Lisbon (Portugal), Delft University of Technology (Netherlands), Federal Institute for Materials Research and Testing (Germany), Deltares (Netherlands), University of Natural Resources and Life Sciences (Austria) and CSIRO (Australia).

RECOVER lends significant expertise at national level – particularly through a convention between INRAE and the Ministry for the Ecological Transition and Solidarity in support of public policies – and international level alike (International Commission on Large Dams, EuCOLD). Several of the Unit's researchers make regular contributions in terms of standardisation (AFNOR) and the drafting of technical guidelines (ASQUAL, French committee for dams and reservoirs).

Education

RECOVER participates in a range of academic courses in its fields of expertise, at both regional (Avignon University, Aix-Marseille University - OSU Pytheas and Faculty of Science in particular) and national level (AgroParisTech, etc.). The classes taught are at once disciplinary and thematic and concern initial and continuing education.

RECOVER belongs to two Doctoral Schools at Aix-Marseille University: Environmental Sciences (ED 251) and Engineering Sciences: mechanics, physics, micro- and nano-electronics (ED 353).



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