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UR1468

Reduce, Reuse, Recover Wastewater Resources (REVERSAAL)

Management

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Research topics

- Urban wastewater
- Ecotechnologies
- Bioeconomy

Key figures

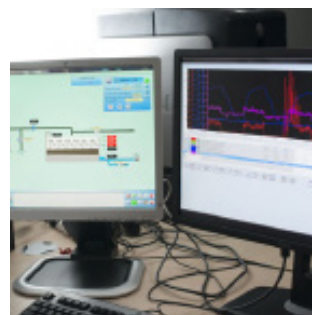
- 4 directors of research
- 20 engineers and technicians
- 7 research supervisors
- 12 PhD and post-docs
- 2 experimental facilities

Keywords

- Urban wastewater
- Water Resource Recovery facility
- Nature-based solutions
- Modelling and decision-support tools

Mission and objectives

The research unit "Reduce, Reuse, Recover Wastewater Resources" (REVERSAAL) aims at improving knowledge and understanding of the treatment and recovery processes of urban water, i.e. wastewater, urban runoff and sewage sludge. The context for this research is the development of the circular economy, and the growing importance of nature-based solutions for resilient cities.



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The main objectives are to:

- improve knowledge and make recommendations for the design, sizing, operation and optimization of processes and pathways;
- develop methods, innovative experimental and digital tools and decision support tools transferable to public and private sector operational stakeholders;
- anticipate the water treatment plant of the future, capable of producing resources (re-used water, production of energy and matter) from wastewater.

The unit's work mainly involves:

- conceptualization of the wastewater of the future with innovative, efficient, well-adapted and intelligent technologies;
- developing and optimizing biodiversity-friendly processes that contribute to the circular economy;
- developing nature-based solutions (NBS) to improve water management in urban areas.



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Research



Reduce emissions to the environment

- Measure, model and control transfers and transformations of pollutants from effluents and sludge in treatment processes and pathways;
- Evaluate, develop, optimize new processes;
- Adapt design and operation.



Reuse the treated effluent

- Develop and manage processes and pathways to produce water adapted to different uses;
- Develop decentralized approaches to the management of urban water for resilient cities.



Recover resources – Energy, nutrients, metals

- Improve knowledge of the composition of organic matter and its capacity to produce energy;
- Maximize the recovery and production of energy via processes;
- Develop recovery processes.



Digital innovations

- Integrate innovative communicating monitoring and regulation sensors using a Low-Tech approach;
- Improve data reliability, optimize their use (FAIR approach) and develop strategies to optimize process performance;
- Develop decision-support tools for design and manage processes and pathways.

Collaboration and expertise

Local

REVERSAAL has established a joint research team in environmental engineering (RESEED) with the INSA Lyon DEEP laboratory (research on waste, water, environment, pollution). The Rhone Mediterranean Corsica Water Agency and the Métropole de Lyon have supported the unit's research activities for a long time. The unit also contributes to regional organizations (AXELERA, GRAIE, GIS EEDEMS, BIOENVIS research federation, IMU Labex).

National

REVERSAAL collaborates with several national research teams (PROSE, G-Eau, LGC, EPOC, OPAAL, ITAP, LBE, TBI, etc.). It also has historical support from government agencies (OFB, Adour Garonne and Loire Bretagne Water Agencies, AFD) and from the MTES (French Ministry for the Ecological Transition). It carries out research with private companies, particularly with help from Carnot Eau & Environnement. It shares its results and its expertise with associations and networks (Geofcan, ASTEE, EPNAC, pS-Eau). Several unit members are involved in the BETTER metaprogramme and in INRAE's REUSE programme.

International

REVERSAAL works with recognized international research teams (universities of Ghent, Aarhus, Montana and North Carolina, UFZ, BOKU, CEIT, ICRA, etc.). It works with African and Asian countries (Senegal, Tunisia, India) and private companies (VINCI, SUEZ, SAUR, IRIS INSTRUMENTS, ECOBIRD, OPURE, PREMIER TECH AQUA, CORTELAB, etc.) that work in mainland France, its overseas territories (DOM) and other countries. The unit has been working for more than 10 years in the DOM and today its activities are spreading to the Caribbean.

REVERSAAL devotes a quarter of its time to supporting public policies by providing technical expertise to urban wastewater treatment plants (Directory for water and biodiversity, DEB – MTES), studying drainage issues in the DOM (OFB project) and running the national EPNAC network.

Education and training

REVERSAAL provides 50 hours of teaching per year on wastewater treatment and recovery in both initial and continuous education. It contributes to training around ten trainee students (Master's) per year.



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