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université
PARIS-SACLAY



UMR1402

INRAE, AGROPARISTECH

Functional Ecology and Ecotoxicology of Agroecosystems (ECOSYS)

Management

Pierre Benoit, director
Cyril Girardin, deputy director
Sylvie La Mantia, deputy director
Erwa Personne, deputy director

Key figures

- 52.5 researchers and teacher-researchers
- 33 PhD and post-doctoral students
- 34 engineers
- 28 technicians and administrative staff

Experimental and analysis Infrastructures

- 1 ICOS site
- 1 PRO site (AnaEE-France)
- Biochem-Env (AnaEE-France)
- PTR-MS (AnaEE-France)
- 150 m² of greenhouses, growing rooms and mesocosms
- PhAIRE (Phytotrons)
- Green Roof (Lab Recherche Environment)
- PHOCUS (PHenotyping in mesOCosms at Université Paris-Saclay)
- EnVisaGES (METYS INRAE Transfert)

Patrimonials Sites

- 42 plots (Versailles)
- Testing place Dehérai (Grignon)

Mission and objectives

Our collective project aims to support the agroecological and energy transition and to evaluate different levers of agroecology to:

- Mitigate the effects of climate change and better adapt to these effects,
- Strengthen the integration of agricultural systems into the bioeconomy of territories, particularly in the peri-urban context,
- Contribute to the One Health approach.



Pictures: number2 Lisa Gollot

Our research is focused on understanding agroecosystems functioning in connection with agricultural practices, their response to global changes, and interactions with urban and periurban environments. Our work is anchored and organized on what makes us strong. Namely the articulation of biophysically based experimentation, observation, and modeling approaches at different temporal and spatial scales. The inflections in the 2026-2030 scientific project concern a strengthening of the focus on urban and peri-urban systems, the more systematic integration of processes at different spatial scales by considering intra- and supra-parcel heterogeneities and the consideration of trophic levels in the transfer and impact of contaminants.

Research

The unit is organized into two research groups:

- Soil science and terrestrial ecotoxicology (Sol&Tox)
- Ecophysiology and physics-chemistry interactions biosphere-atmosphere (Eco&Phy)



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T Agroecosystems
& Environment

T Digital Sciences &
Systems Modelling

T Plant Science, Diversity,
Health & Biotechnology

T Territories, Governance,
Innovation in Society

Topics

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These disciplinary teams share a scientific animation around four structuring and transversal themes whose objectives are as follows:

- Theme "Managing, producing and recycling biomasses for multiple purposes"
Optimize the recycling in agroecological systems and the management of non-food biomass in the territories and strengthen the evaluations of different bioenergy sectors,
- Theme "Climate change and agroecosystems: mitigation and adaptation"
Measure and model the contribution of agroecosystems to C sequestration and the reduction of greenhouse gas emissions at different spatial and temporal scales: from microhabitat to planetary scale, from the growing season to the century,
- Theme "Exposure to and effects of contaminants in agroecosystems"
Characterize and model the fate of contaminants in agroecosystems (from the aggregate to the national scale) and the effects on certain organisms (from individuals to populations) by developing approaches based on the representation of mechanisms and aiming for certain genericity,
- Theme "Diversity from field to landscape for a resilient agroecosystem with limited impact"
Identify biodiversity (natural and cultivated) and integrate ecological processes (from plot to landscape) in a multifunctional vision of anthropized ecosystems (agricultural and urban) to organize their diversity operationally and increase their resilience by reducing their dependence on synthetic inputs and limiting their impacts.

Collaboration

The scientific environment at Paris-Saclay allows for multiple collaborations. Some of them are historic: with the INRAE-AgroParisTech research units (Agronomy, SAD-APT, BIOGER, PSAE, SAYFOOD) and MIA, today gathered on the Agro Paris-Saclay campus, but also with the INRAE units (GOE le Moulon, HYCAR Antony), the LSCE (CEA/CNRS/UVSQ/UPS Saclay) or the GEOPS and ESE research units (Orsay and Gif S/ Yvette). ECOSYS evolves within a "research ecosystem" with strong links with the CLAND convergence institute, with the interdisciplinary initiative C-BASC and its evolution within the University of Paris-Saclay and the federation of Île-de-France research (FIRE). The partnership is also rich with actors from the regional territories (Terre & Cité, Plaine de Versailles), mixed and technological networks such as the RMT Bouclage and Sol et Territoire. National and international collaborations are numerous and diverse.

Teaching

The ECOSYS unit is heavily involved in the training of the SIAFEE department (Agronomic, Forestry, Water and Environmental Sciences and Engineering) of AgroParisTech and the Graduate Schools of the University of Paris-Saclay "BIOSPHERA" (Biology, Society, Ecology & Environment, Resources, Agriculture & Food) and "Geoscience." ECOSYS is affiliated with the Ile-de-France doctoral schools ABIES (Agriculture, food, biology, environment, health) and SEIF (Environmental Sciences of Île-de-France). Around forty doctoral and post-doctoral students and around fifty internships are welcomed annually into the laboratory. At the master's level, ECOSYS is involved, among other things, in the coordination of the AETPF (Agrosociences, Environment, Territories, Landscape, Forest) as well as the CLUES (Climate, Land Use, Ecosystem Services), GSSE (Soil Management and Ecosystem Services) courses and AAE (From Agronomy to Agroecology) and in the final year of the engineers' training, the IDEA (Environmental Engineering: Water, Waste and Sustainable development), PIST (Production and Innovation in Technical Plant Systems) and Métatox (From Assessment to Management of Toxicological Risks to Ecosystem and Human Health) majors. In line with the evolution of research, the intervention of ECOSYS in the training of engineers is evolving and strengthening the functioning of ecosystems within the urban/peri-urban/rural gradients, the management of contamination and pollution, the revegetation of cities, re-functionalization of soils and evaluation of ecosystem services in a context of agroecological and energy transition. The environmental health dimension of crops, soils and air quality and terrestrial ecotoxicology is supported mainly by ECOSYS within the One Health Institute for the continuing training of decision-makers, of which AgroParisTech is a co-founding member.



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