



## LORRAINE UNIVERSITÉ D'EXCELLENCE

4,486 researchers  
and professors

1,947 PhD  
students

108 scientific  
platforms and  
equipment

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# CLIMATE AND RESILIENCE DESTISOL, A TOOL FOR CHOICES IN SUSTAINABLE DEVELOPMENT

The Deepsurf research project of the LORRAINE UNIVERSITE D'EXCELLENCE has made it possible to extend the Destisol methodology co-funded by ADEME (see box bellow) and co-developed with SCE<sup>1</sup> towards forested and agricultural terrains. Initially developed to improve the consideration of soil potential at the scale of urban development projects, this tool can now be used to optimize land use planning on a national scale. A trial version of Destisol is already available on demand and will be freely accessible later this year.

Land use planning faces various socio-economic and climate challenges of utmost importance to ensure ecological transition by 2050. With this in mind, growing interest is being given to soils and their management because of the multiple ecosystem services they provide, such as: production of edible and non-edible biomass, water filtration, regulation of the global climate by carbon storage, etc. Considering that a European directive is currently being drawn up, it should then be noted that, in this field of research, the French scientific community is at the forefront of a global effort.

## An opportunity for the enforcement of Climate and Resilience law

Through the Climate and Resilience Law<sup>2</sup>, legislators wished to insist upon a functional consideration of soils and terrains as ecosystems capable of responding to major environmental changes. Until now, however, there was no acknowledged method to assess or evaluate soils' functions – which can now be done with Destisol.

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<sup>1</sup> Project led by the University of Lorraine and INRAE, partners of LORRAINE UNIVERSITE D'EXCELLENCE.

<sup>2</sup> "Artificialization is defined as the lasting alteration of all or part of the ecological functions of a piece of terrain, in particular regarding its biological, hydric, and climatic functions, as well as its agronomic potential through its occupation or use." (LOI n° 2021-1104, August 22, 2021)

## Ecosystemic services provided by soil and its cover:

- Global Climate Mitigation (through carbon storage)
- Food Supply
- Biomass Energy
- Lumber
- Biodiversity
- Water Quality
- Erosion Regulation
- Flood Regulation

**Deepsurf** is a scientific research project supported by the Lorraine Université d'Excellence (LUE) that brings together around 80 researchers, PhD students, and post-doctoral students to study the exchanges of matter and heat between the different compartments of the subsoil, the soil and the biosphere, as well as to determine the consequences of their exploitation on man and his environment in the framework of energy and ecological transitions. and his environment.

Another major contribution of the tool, at a time when reflections and projects are underway to simplify the application of "No Net Land Take" known as ZAN in France: through the assessment of soil functions, Destisol will enlighten the public stakeholders to prevent, reduce or offset the impacts of land planning on soils.

## Evaluate the functionalities of soil to inform public decision-making

The COSMOS research project<sup>3</sup>, conducted as part of the IMPACT DEEPSURF project, took place in the study area (320 km<sup>2</sup>) of Andra's permanent environmental observatory (OPE), dominated by agricultural and forestry occupations. The compilation of multiple sets of data acquired by the OPE since 2011 on the characterization of soils and their bio-physical-chemical qualities has resulted in a mapping of soil properties, in particular carbon stocks and potential. The Destisol tool allowed an initial assessment of the ecological functions and then of the ecosystem services provided by these soils according to their uses (urbanization, reforestation).

This research allows, in an operational way, the ability for soil to be considered as living and potentially functional volumes in the development process. Therefore, this promotes collaboration between development and the soil sciences.



**The Environment and Energy Management Agency** (ADEME or Ademe) is a French public industrial and commercial establishment (EPIC) that was created in 1991 and placed under the supervision of the ministries responsible for Research and Innovation, Ecological and Inclusive Transition, and Higher Education. Ademe encourages, leads, coordinates, facilitates and carries out operations to protect the environment and control energy.

[www.ademe.fr](http://www.ademe.fr)

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<sup>3</sup> LUE Andra Cofunding

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**THE LORRAINE UNIVERSITE D'EXCELLENCE** brings together eight partners around a research and training program that responds to the major economic and societal challenges of the 21<sup>st</sup> century. Confirmed to I-SITE status in 2021, the strength of its innovative strategy lies in its ability to utilize its systemic, entrepreneurial and interdisciplinary approach to issues, such as: new materials, energy, ecological and digital transitions, societal transitions, and health.

To learn more: <https://www.univ-lorraine.fr/lue/espace-presse>