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Keywords

Groundwater invertebrates

Spatio-temporal dynamics

Dispersal

Bioindicators

River-groundwater exchanges

Thematics involved

Community ecology

Molecular ecology

Hydrobiology

Departments involved

AQUA

ECODIV

Units involved

USC Ecodiv-Rouen

UR EABX

USC LEHNA

UMR BIOGECO

Partners

UMR M2C - CNRS / University of

Rouen Normandie

SEPANSO Aquitaine

Diversity and spatio-temporal dynamics of groundwater fauna to assess both exchanges between groundwater and rivers and the biological quality of the aquifers

Backgrounds and challenges

Groundwater systems are critical ecosystems comprising both some of the rarest habitats on the planet and aquatic invertebrates specifically adapted to these environments, named stygobitic fauna. This fauna interacts more or less with surface ecosystems depending hydrogeological conditions. While they are certainly impacted by the effects of human activities and the global change like surface ecosystems, taxonomic and ecological knowledge of the environments and their fauna is extremely dispersed in France and around the world. They are not part of any management or conservation plan.



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Objectives

SOUTERRE proposes:

- i. To identify the assemblages of the stygobitic fauna in Normandy groundwater and to determine biotic and abiotic factors that shape these assemblages,
- ii. To use this fauna as bioindicators of the biological quality and vulnerability of groundwater systems by testing on data collected in both Normandy and New Aquitaine regions,
- iii. To understand the spatio-temporal dynamics of stygobitic species between subterranean and surface ecosystems,
- iv. To understand the current dispersal of individuals (i.e. gene flow) between populations in Normandy and past dispersal events (i.e. since the Pleistocene) at national and European scales,
- v. To initiate experiments using environmental DNA in future sampling protocols for groundwater studies.

Approaches

A sampling of several sites with different characteristics is currently carried out monthly in 2025 to inventory and characterize both groundwater fauna communities and biotic and abiotic factors that shape species assemblages. Also, this monitoring will allow to test whether these assemblages are constant over seasons or whether they vary according to different weather conditions (e.g. meteorological forcing).

The sampling is carried out by filtering water with a pump (i.e. 300L of water), Surber nets and plankton nets in order to capture all taxonomic groups regardless of their size: from copepods (i.e. size of the order of mm) to amphipods (i.e. size of the order of cm).

Moreover, these data will be used to propose bioindicators for groundwater systems.

Molecular analyses will be also carried out for both a species of the genus *Proasellus* and a species of the genus *Niphargus* to study and compare gene flows and possible genetic structure of populations in Normandy between two species that have different dispersal abilities. At a larger scale and in collaboration with other research units in Europe (e.g. Slovenia), phylogeographic approaches will be used to study post-glacial colonization or re-colonization events of both species.