

6.2 AAA - ATLANTIC ANTHROPOGENIC LANDSCAPE PROJECT

AAA-Platform is a platform proposed by the French regional observatory structures OSUR, OSUNA and IUEM, in coordination with the national Research Infrastructures OZCAR and RZA (LTSER France). It comes from 20 years of interdisciplinary research on well-instrumented sites with more than 1 000 scientists involved.

AAA-Platform proposes an integrative vision of typical Western France regional Social-Ecological systems, coupling its natural features, economic activities, social organizations and dynamics, to contribute to future transformations towards sustainability. It builds new capacities to balance exploitation and conservation, and to treat risks and their management, from local to regional scales within national and European areas.

To cover the major regional environments and interfaces (continent/ocean, urban/rural, subsurface/surface), the AAA-Platform is founded on existing and complementary LTER Master, Regular and Satellite sites. They represent the different terrestrial, transitional and marine landscape structures, features and dynamics that shape this intensive anthropogenic region, and their related social-ecological issues. All these LTER sites involve end-users and policy makers seeking for advanced understanding of social and ecological interactions and the definition, validation and promotion of sustainable policies.

OBJECTIVES OF THE AAA-PLATFORM AND FUTURE PROSPECTS



The objective of the proposed platform structure is to provide an internationally open, attractive and recognized scientific observatory of human/nature interactions. Through its representativeness of environmental issues of Atlantic terrestrial and marine landscapes and the complementarity of its LTER sites, the AAA-Platform is a unique showcase for decision makers to help them in defining regional decision frameworks and sustainable policies, and to promote technical and social innovation as well as science education.

The AAA-Platform embraces regional social-ecological dimensions whose diversity of landscape use and planning covers a unique set of interconnected aquatic and terrestrial systems. It concentrates financial supports and cofunding from the European Union, the State, the Brittany and Pays de la Loire Regions and local institutions to improve and maintain high density of sensors, equipment and social studies that are crucial for better understanding human/nature interactions and train the next generation of scientists to work at these interfaces in inter- and trans-disciplinary approaches.

SOCIO-ECOLOGICAL ISSUES

AAA provides interdisciplinary scientific showcases towards new balances between exploitation and conservation efforts enabled by terrestrial and marine landscape structures and dynamics.

The main issues addressed in the AAA-Platform are three-folds :

- Influence of past and current societies (e.g. land uses, land managements, perception) on landscape structure and dynamics;
- Influence of landscape structure and dynamics on the environment (e.g. biodiversity, water/soil quality and quantity, urban climate), ecosystem services and resilience
- Long-term retroactions of natural and anthropogenic environmental changes on human activities at sea and on land

The AAA-Platform focuses on agricultural and urban landscapes activities and management that have advantages and drawbacks on ecosystem services of Atlantic regions. Main social-ecological issues concern the idea of (re)balancing human activities with the maintenance or restoration of water quality and quantity, the preservation of terrestrial and aquatic biodiversity, and the human health (affected by, e.g., pollutants, urban heat island). Terrestrial and marine landscapes are altogether a proxy, a resource – e.g. soils are non-renewable at the human time-scale – and a means to supply many services. The two last decades of monitoring enable us to envision significant breakthroughs on physical, ecological and biogeochemical processes and, moving beyond, to consider their interactions with decisions, strategies and management policies in a systemic way.

The AAA-Platform provides an exceptional gradient of the anthropogenic pressures and biological resources by considering a wide diversity of (i) agricultural and urban landscapes : from open fields to dense bocage; from organic or extensive dairy to intensive confined livestock productions, from mineral to vegetated cities, (ii) marine landscapes (from poorly to highly populated coastal zones, from rocky to sandy shores, from unprotected to protected marine areas) and (iii) land-sea continuums (from small to large rivers, from short to long, meandrous to more linear estuaries, from semi-enclosed to open coastal areas).

This diversity and the complementarity of the land-sea-atmosphere scientists working in the platform represent a unique opportunity for comparative studies and/or the testing of hypotheses concerning the functioning and evolution of social-ecological systems along these gradients.

6.3 LTER OBSERVATORIES

The Environment *Lab* consortium is leading nationally (SOERE) and internationally (LTER) certified environmental experimental sites within Brittany which cover a wide range of geological, hydrogeomorphic, ecological characteristics and human-induced pressures.

These long-term monitoring sites provide long term series (i.e. more than 25 years) of high frequency (i.e. second to seasons) main environmental variables related to the monitoring of surface and groundwater quality and quantity, terrestrial and aquatic biodiversity of the continental critical zone of Brittany. The management of these sites, i.e. collection of data and their analyses, is routinely realized by a strong team of technicians (i.e. 120 man-month). Environmental data are collected and available for the scientific community on dedicated websites. These long term environmental sites well-integrated within their socio-economic context represent living laboratories where new tools can be tested. The long-term original quantitative data sets on a wide range of parameters (e.g. geology, soil structure, topography, discharge, water quality, land cover, land use, animal and plant biodiversity, aerial and remote sensing imagery, micro-meteorology...) represent also a strong attractant tool for interdisciplinary researches and models. Furthermore, they may represent ideal sites for experimental scenario testing (e.g. agricultural practices, circular economy, urban agriculture, urban water management, ...).

SOERE H+ <https://osur.univ-rennes1.fr/page/ore-h>

The first goal of the H⁺ observatory is to **maintain and coordinate a network of experimental sites** capable of providing data - including chronicles or data on long term experiments - relevant to the understanding of the water cycle and of the motion of solute elements in aquifers

The **coupling between measurements, theories, and models**, is a fundamental goal of the H⁺ observatory. Modeling at all scales is an essential prediction tool. The Observatory aims at creating a long term relation between research teams interested in theoretical, numerical, and experimental aspects of transport in heterogeneous media

The H⁺ observatory also aims at maintaining a **partnership between basic research, university/continuous training, and professional expertise**(consulting agencies, water management services). The H⁺ sites host students and professionals for traineeships on the exploitation of water resources and the prevention of environmental risks



SOERE AgrHyS

[http://www6.rennes.inra.fr/umrsas/Outils-et-dispositifs/Dispositifs/ORE-AgrHyS;](http://www6.rennes.inra.fr/umrsas/Outils-et-dispositifs/Dispositifs/ORE-AgrHyS)

The Environmental Research Observatory (ERO) AgrHyS focuses on the response times of changing Agro-Hydro-Systems for hydro-chemical fluxes.

An Agro-Hydro System is defined as a catchment influenced by agricultural activity.



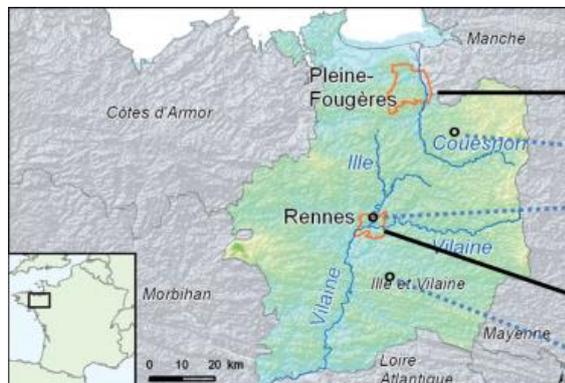
This type of catchment is constrained globally by two kinds of forage:

- The farming activity which induces:
 - Changes in spatial structures (plot's size and shape, buffer zones, wetland transformation, spatial organization of crops and farming)
 - Modifications in input flux either water fluxes (irrigation), or organic and mineral fluxes (fertilization, pesticides...)
- The climate as for any ecosystem, with:
 - A short term huge variability
 - Long term trends related to global changes

Zone Atelier Armorique

<https://osur.univ-rennes1.fr/za-armorique/page.php?116>

The Zone Atelier Armorique is a research facility accredited by the National Center for Scientific Research (CNRS) which conducts interdisciplinary research on the environment and anthroposystems in relation to societal issues. This research is carried out in the long term in partnership with local actors and is oriented towards assistance to public action.



Site atelier « agricole » (depuis 1993)

Observatoire « Les tourbières de Landemerais » (IR OZCAR – Tourbières)

Observatoire Biodiversité de la Ville de Rennes

Site atelier « urbain » (depuis 2011)

Observatoire « Ille et Vilaine Sud »

It covers the whole Ile et Vilaine area south of the Mont St Michel. It includes 3 types of ecosystems: hedgerow landscapes, wetlands and urban ecosystem and carries out research on 3 themes :

- Landscaping, public policies and landscape dynamics
- Relationships between spatio-temporal dynamics of the landscape and biodiversity
- Influence of the spatio-temporal dynamic of the landscape on ecosystem processes

Petits fleuves côtiers <https://www6.inra.fr/ore-pfc>

The problematic of the Research Observatory on Diadromous Fish in the Coastal Rivers (ORE DiaPFC) is to study the evolution of highly migratory fish populations under the effect of environmental changes (climate change



and changes related to agriculture) that affect these streams.

ORE DiaPFC is focused on amphihaline fish (salmon, trout, eel, shad, lamprey ...). These species, very weakened by the action of the man, are an emblematic component of the biodiversity of the coastal rivers. The latter are now the main refuges for these fish, which have considerably regressed on larger river hydrosystems.

Paimpont biological station

The Biological Station Paimpont is a field station of the University of Rennes 1, dedicated to teaching, research and transmission of scientific culture.

The exceptional natural setting of the Station, with its woods, moors, ponds, and rivers, offers all the diversity necessary for the basic teachings of Field Biology.

Added to this are opportunities for analysis, data processing and access to the Internet and networks of actors in these rural and peri-urban areas; this guarantees the efficiency of the multidisciplinary lessons of the Environment, based on multiscalar analysis and the co-construction of integrated management projects of various natural resources (water, soil, biodiversity, habitats, ...).



Along with the LTER observatories, the biological station is one of the place where our student experiment land-uses and ecosystem analysis. They belong to our experiment teaching approach.