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# The evolution of Kervidy-Naizin catchment observations: from hydrological to interdisciplinary research on landscape agro-ecosystems

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The first experimental catchments have been dedicated to hydrological processes studies in pristine sites or sites characterized by minor anthropization, covered typically by forests or extensive pastures (e.g. Hubbard Brook Experimental Forest, USA; Plynlimon catchment, UK or Krycklan catchment, Sweden). Water quality issues appeared in catchment studies in the 1960s, when long term environmental impacts due to human activity started to be identified, and scientists realized the complexity involved in environmental degradation and recovery.
We present here an overview of the researches conducted over 50 years on the Kervidy-Naizin catchment, part of the AgrHyS Environmental and Hydrological Observatory (Fovet et al., 2018). This overview has been recently published in a special issue dedicated to long term hydrological observatories (Gascuel-Odoux et al., 2018).
Kervidy-Naizin catchment was firstly dedicated to the understanding of hydrological and biogeochemical catchment responses to agricultural activities, in particular to intensive animal farming systems. The complexity of this question relies on the combination of internal evolutions (landscape structure and management, agricultural activities, and consequently of long and slow evolution of soil and groundwater composition themselves) and external global changes (climate, anthropogenic pressures), and on the interactions of various processes towards a continuum of atmosphere-vegetation-soils-water. Such interactions require collaborative work of many scientists from diverse institutes to tackle properly the issue.
We review how the scientific knowledge and technologies together with the social demand made the scientific questions to evolve, in this case, toward more integrated issues. We identified 10 steps in this evolution, starting with a water quality issue (nitrate pollution), integrating the atmospheric phase of nitrogen cycle, then the linkage with other macronutrient cycles (carbon, phosphorus) and finally the biotic soil and aquatic components. For each step, original approaches recruited to tackle the new environmental issue are identified: from digital mapping and remote sensing towards automatic monitoring & data analysis techniques or agro-hydrological modelling. Such an evolution led to involve more disciplines to answer integrated questions related to landscape biogeochemical cycles, soil ecology, and finally the functioning of the “critical zone”.
Different future issues are then proposed: more catchment inter-comparison, multi-elemental, multi-spatial and temporal scales studies; designing new agroecosystems and landscapes based on their functions and services.

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Gascuel-Odoux, C., Fovet, O., Gruau, G., Ruiz, L., 2018. Evolution of scientific questions over 50 years in the Kervidy-Naizin catchment: from catchment hydrology to integrated studies of biogeochemical cycles and agroecosystems in a rural landscape. Cuadernos de Investigación Geográfica, special issue, 44, 535-555.