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Landscape scale monitoring of biodiversity: the value of socio-ecological system long term research studies

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There is accumulating evidence worldwide of the negative impacts of agricultural intensification, resulting in biodiversity decline and environmental threats; hence the reduction of ecosystem functioning and partial loss of ecosystem services. In the context of global change and the relative uncertainty of scenarios, the future of intensive farming systems may appear challenging: new systems are required to take account of changing economic and environmental aims (low reliance on chemicals, biodiversity conservation, health) and must be adapted to changes in land use and climate, as well as being acceptable to all stakeholders. This ultimately calls for research infrastructures that operate at territory scale, involve stakeholders, and investigate biodiversity and ecosystem services in systemic approaches, such as Socio-Ecological Systems (SES) which explores ecosystem research and socio-ecological research on anthroposystem.

We present here such a research infrastructure, the LTER “Zone Atelier Plaine & Val de Sèvre”, a large study area (450 km²) collecting data continuously since 1994, and aiming at identifying effective solutions for integrating agricultural development and conservation of biodiversity at the landscape scale. Three main objectives are targeted in the LTER. The first considers intensive monitoring of landscape structures (e.g. land use of 19 000 fields recorded annually), all biodiversity components (plants, insects, spiders, mammals and birds). The second objective concerns the experimental investigation of some ecosystem services within the agro-ecological framework, with experimental manipulation of pollination and biological control, confronted to crop production and socio-economic value of farming. The third aim is directly targeted to stakeholders, through dissemination of research, citizen science as well as intervention research. In this latter category, we investigate whether crop allocation at the landscape scale can be changed without public funding, in order to increase the proportion of grasslands, a common good that should be collectively managed to maximize ecosystem services.