A global trophic network collapse in intensive farmland landscapes ? Lessons from 22 years biodiversity monitoring in a LTER study site

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Abstract

Data from long-term research and monitoring of populations, communities and ecosystems have played an important role in the development of ecological ideas and theories. They now, also playing a critical role in making the impacts of human activities on ecosystems visible and tangible. Agricultural intensification and expansion are among the human activities that have caused the main losses of global biodiversity. The LTER Zone Atelier Plaine & Val de Sèvre covers 450 km2, including 450 farms and 13 000 agricultural fields. In this long-term ecological research site, farmland biodiversity (e.g. weeds, insects, mammals and birds), ecosystem functions (pollination, biological control), land use and farming practices have been monitored since 1994. In this study we explore the opportunities of these long-term datasets to track and understand the temporal changes in farmland biodiversity at the population (i. flagship bird species), community and ecosystem functioning levels. We show very strong temporal changes, especially a global decline of biodiversity at every trophic stage. We further analyse changes in regard to local practices (e.g., pesticide use or nitrogen input) versus landscape –scale changes (e.g., grasslands decline). We found that slope of decline varied according to the guilds: a higher being observed in flagship birds than in weeds for example. We finally discuss each of these temporal trends and highlight possible management strategies that could be taken into account to overcome this biodiversity loss.

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