Recent changes in bird communities in relation to the dynamics of farming systems and landscapes in marshlands

DYNAMIC

BIOSEFAIR Metaprogram

Project summary: 2024 – 2026

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Spatial scales, ranging from the farm to the landscape, are recognised as being particularly important to consider in the context of agroecological transitions and the reconciliation of agricultural production with biodiversity conservation. However, few studies have examined the joint evolution of agricultural systems and biodiversity at these scales. This project aims to explore, within the agroecosystems of the Marais Poitevin, how bird communities have evolved over more than a decade at three sites, particularly in relation to changes in agricultural systems. These sites, each covering approximately 1,000 ha, feature varying proportions of grassland and crops (100% grassland, 50-50 grassland–crops, and 100% crops). They have already been monitored during two periods (2010–2012 and 2022–2023) for their bird populations and the cropping and livestock systems implemented by around thirty farmers. The DYNAMIC project aimed to:

- supplement the ecological data required to analyse variations in bird communities, particularly in relation to changes in water levels;
- update the mapping of crop rotations and semi-natural features;
- propose a method for analysing the joint variations in landscape, agricultural and bird community components.

Analysis of crop rotation data and the semi-natural components of the landscape reveals a high degree of stability in the agricultural landscapes across the three monitored sites between the two periods. Given the soil and climate constraints at the various sites and existing regulations, grasslands exhibit a high degree of stability (due to the hydromorphic nature of the soils). Conversely, climatic constraints and soil characteristics limit the scope for crop diversification within the cultivated area. Crop rotations remain dominated by durum wheat, sunflowers and maize, with a high degree of uniformity in the practices applied across the different crops.

Specific studies were carried out to model water levels in the floodplains of the three sites for the two periods under study. Using satellite imagery, a digital terrain model and direct field surveys, it was possible to identify the flooded areas and water levels in the fields for the year 2025. However, according to climate changes (distribution and intensity of rainfall) do not allow the DTM to be extrapolated for previous years.

For both periods analysed, bird communities show a high degree of structure across the three sites. The ‘grassland’ site features communities dominated by waterbirds and species specialising in grassland habitats. The ‘mixed’ site hosts communities specialising in open agricultural habitats and grassland species, with a heterogeneous internal structure. The ‘crops’ site is predominantly home to species specialising in open agricultural habitats.

Detailed results

Characterisation and quantification of the intensity of agricultural and landscape changes

The 2024 crop rotations (i.e. the plant species cultivated in each field, and natural hay meadows versus pasture) and landscape features (i.e. linear features such as hedgerows, reed beds or bramble thickets, parks and gardens, isolated trees, fences demarcating livestock plots, woods/copse, overhead power or telephone lines, linear channels, etc.) were mapped using GIS via orthophotos and subsequently supplemented and verified through field visits.

Changes that may have occurred in the areas over the 12-year period and which are likely to affect bird use of the sites were investigated, in particular the characterisation and quantification of changes in water level management within the hydraulic units located at the three sites.

Given that the introduction of water management regulations in the Marais Poitevin may have had an impact on bird use of the sites, particularly species dependent on wetlands, the way in which water is managed at the three sites was examined. Water levels in the floodplains of the three sites for the two periods studied were modelled. Using satellite imagery, a digital terrain model and on-site surveys, it was possible to identify the flooded areas and water levels within the fields for the year 2025. Climate changes (distribution and intensity of rainfall) do not allow the DTM to be extrapolated for previous years.
Analysis of crop rotation data and the semi-natural components of the landscape revealed a high degree of stability in the agricultural landscapes across the three monitored sites between the two periods under review. Discussions with the Chamber of Agriculture of Vendée and the Marais Poitevin Public Establishment highlighted that this stability is the result of the soil and climate constraints at the various sites and existing regulations. Grasslands show a high degree of stability given the hydromorphic nature of the soils. However, the timing of interventions on these areas is earlier due to the very marked climate change in the study area. Mowing is also carried out over a shorter period.

Climatic constraints and soil conditions limit the scope for crop diversification in the cultivated area. Crop rotations continue to be dominated by durum wheat, sunflowers and maize. Over the past three years, soft wheat has been replaced by durum wheat (due to greater flexibility in sowing dates and price). Since 2015, protein crops (lentils and chickpeas) have been expanding in crop rotations, however, this expansion has coincided with a sharp decline in the area under seed alfalfa.

There is a high degree of uniformity in the practices applied across the various crops. This uniformity, already present between 2010 and 2012, has been reinforced by the disappearance of a variety of storage organisations, both in the supply to farms (seed, plant protection products, fertilisers, etc.) and in collection, leading to the standardisation of practices. The reduction in competition among supply organisations limits the choice of varieties and inputs (such as plant protection products), leading to a standardisation of cultivation practices and restricting the diversity of supply chains. A major development concerns the expansion of hoeing in summer crops.

Changes in bird communities in relation to the dynamics of agricultural systems and landscapes

Data were collected over three consecutive years (2022–23–24) to compare them with the three other years (2010–11–12) of the FarmBird programme. The bird data covered 30 point counts per site.

At present, the first dataset (from the FarmBird project, 2010–11–12) is currently being analysed, and the second dataset will be analysed next.

Scientific findings

Following these two years of research, it appears that changes in agricultural systems within the area have been relatively limited over the past 10 years. Bird communities are strongly site-specific, with many waterbirds at the grassland site; specialised communities in the agricultural areas at the ‘crops’ site; and more diverse communities at the ‘mixed’ site, with significant intra-site heterogeneity.

Given the organisation of production systems according to soil type and the hydromorphological characteristics of the plots, as well as the distribution of semi-natural features across the three sites, the concept of intensity between sites does not appear relevant in our case.

Whilst the term ‘intensity’ of agricultural systems is often highlighted, it needs to be clarified in order to make it more practical for reconciling biodiversity conservation with production activities. It seems appropriate to approach this concept of intensity from an ecological perspective by 1) conducting a series of interviews with ecologists (both scientists and practitioners), 2) analysing how this concept of intensity is used in the literature on the relationship between agriculture and birds (indicators, magnitude, spatial and temporal scale) and 3) discussing the results of this analysis with ecologists and ornithologists.