

Science for Environment Policy

Risk-averse behaviour may improve farmland biodiversity

'Bet-hedging' behaviour among farmers, who diversify land use to avoid investing in a single land use that might fail, can boost farmland biodiversity, a new study suggests. However, because historical data show this is not the most frequent strategy used by farmers, balancing environmental and economic concerns in agriculture may still require public policy instruments, such as subsidies or taxes.

Agricultural intensification has reduced farmland biodiversity, especially through degradation of habitats. More sustainable [land use](#) is needed to address this problem, which means considering biodiversity alongside economic concerns.

This study suggests that investigating and understanding the behaviour of individuals is useful to establish efficient management of agricultural landscapes. It uses the concept of risk aversion, which is the preference for a certain, but low, payoff, rather than a higher, but uncertain, payoff. In agriculture, a risk-averse farmer might develop a variety of agricultural activities in order to hedge his or her bets and reduce the risk of investing in a single activity that might fail.

This study examined how risk aversion might affect the ecological and economic elements of agriculture. Eight levels of risk aversion were used. Their impacts on biodiversity (in terms of the Farmland Bird Index), the economic value of the land (in terms of income per hectare) and the diversification of land use (in terms of the habitat heterogeneity index) were simulated from 2013 to 2050. Data on bird abundances, land use distributions and incomes at a local level were used for the analysis.

The results indicated that a strong risk aversion strategy, as expected, reduced the expected income, but decreased its variability. This strategy was also beneficial to biodiversity: to mitigate economic risk, a strong risk-averse strategy led to diverse land use. This creates a variety of habitats and available resources, allowing many bird species to co-exist. This diversification produces a more stable ecological community, providing a greater array of ecosystem services. However, strong risk aversion did not have a beneficial effect on income, which reduced over time.

However, the research showed that the estimated average risk aversion level is low. This is consistent with the land specialisation trends over past decades and the current decline of birds in agricultural landscapes. Moreover, the results exhibited strong local variations in the impacts of risk-averse behaviour on ecological performance: strong risk aversion does not systematically improve farmland bird biodiversity in all the regions, suggesting that other factors play a part in establishing local bird communities.

In the light of the results, the researchers suggest that public policies, such as taxes and subsidies, are necessary to manage biodiversity whilst also mitigating economic losses and reducing regional disparities. These policies should encourage risk aversion as a means to foster land use diversity and subsequent biodiversity, but within the context of other local drivers.



30 May 2013

Issue 330

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Source: Mouysset, L., Doyen, L. & Jiguet, F. (2013) How does economic risk aversion affect biodiversity? *Ecological Applications* 23(1): 96-109. DOI: 10.1890/11-1887.1

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To cite this article/service: "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

