



Policy brief

Protecting biodiversity strengthens food security - scenarios and policy pathways for Europe's food systems

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Key messages

- **Biodiversity** contributes to all four pillars of food security—availability, stability, affordability, and utilisation—and is therefore a **key driver of long-term food security in Europe**.
- **Business-as-usual trajectories for agri-food and climate policies result in the greatest biodiversity loss**, undermining Europe's food security. A **transition in agricultural practices**, combined with ambitious climate change mitigation efforts, can reduce pressures on biodiversity.
- A **pathway delivering on food security, biodiversity, and climate** requires nuanced analysis of trade-offs, moving beyond the perceived tension between productivity and sustainability.
- **Holistic food policy across governance levels** is needed to maximise synergies and co-benefits across policy objectives while identifying and addressing potential trade-offs.
- The post-2027 programming period for EU policies and funds provides an **opportunity to align agricultural subsidies more closely with nature conservation and restoration targets**, with mechanisms to ensure coherence at national and European levels.
- **Farmers should be supported in adopting biodiversity-friendly practices** that strengthen food-system resilience through targeted measures under the Common Agriculture Policy, complemented by improved access to knowledge, advice, and training.

Introduction

Agriculture, biodiversity, and climate change are interconnected. **Biodiversity underpins agricultural production** by providing a range of essential ecosystem services. Conversely, **agricultural practices can contribute to biodiversity conservation or loss**, undermining the ecological processes upon which agricultural production depends and **hence threatening food security**. This interrelationship calls for nuanced and integrated policy approaches that consider the co-benefits and trade-offs within the agriculture-biodiversity-climate nexus to promote shared positive outcomes and prevent unintended consequences.

European union policies are at a critical juncture, offering an opportunity to advance towards a more systemic approach. **The ongoing negotiations on the post-2027 Common Agricultural Policy (CAP)**, particularly regarding mechanisms for farmer remuneration for sustainable practices and farm stewardship, **alongside the design of national restoration plans, provide opportunities to reconsider the rationale underpinning policy interventions.**

The **ECO-READY Horizon Europe project** aims to ensure a sustainable and resilient food supply in the face of the climate and biodiversity crises, delivering scientific evidence on the policy pathways to be pursued. This policy brief provides recommendations to advance greater coherence across agriculture, biodiversity, and food policies and thus strengthen food security in the EU.

Business-as-usual agrifood and climate policies result in the greatest biodiversity loss

ECO-READY uses scenario modelling to project possible pathways towards a sustainable and resilient European food system. The modelling framework combines the MAGNET model with a biodiversity module, based on the Mean Species Abundance (MSA) indicator, allowing to analyse biodiversity outcomes alongside agriculture and food security indicators under three alternative socioeconomic scenarios for 2025–2050:

- **Green Transition: a sustainability-oriented future** within the 1.5 °C global warming limit and with agricultural systems operating within ecological boundaries underpinned by Nature-based Solutions and agroecology, robust land-use regulations, and a shift to more plant-based diets.
- **Middle Road: the continuation of current trends** with some, slow and moderate, progress towards climate goals and less input-dependent agriculture in the long-term.
- **Rocky Road: a fragmented world** with weak international cooperation and limited environmental ambition, characterised by unambitious and ineffective climate and land-use regulation policies, unstable agricultural production, and high consumption of animal products.

The scenarios represent contrasting pathways for economic development, agricultural production, dietary patterns, trade, and environmental governance. They build on the Intergovernmental Panel on Climate Change (IPCC) Shared Socioeconomic Pathways, which describe alternative global socioeconomic futures, and were further refined through a co-design process with the 10 ECO-READY Living Labs to reflect different assumptions regarding socioeconomic development, agricultural productivity, policy choices, and consumer behaviour.

Modelling results indicate that **biodiversity loss is projected to continue under all scenarios**, although the magnitude differs depending on the development pathway chosen for the future of agriculture. This illustrates the role of agriculture and land use as key drivers of biodiversity loss. The Middle Road scenario, representing the continuation of current trends, leads to the greatest loss of biodiversity, confirming that **business-as-usual policies do not represent a neutral baseline for biodiversity** but the least favourable pathway. Yet, agricultural practices alone cannot explain the difference between the scenarios—higher greenhouse gas emissions also cause significant biodiversity loss. Therefore, ambitious decarbonisation and climate policies are also critical for limiting biodiversity loss, calling for a systemic approach across agriculture, biodiversity, and climate.

Birds and mammals are more sensitive to scenario choice than vascular plants (table 1). This greater sensitivity reflects the stronger response of vertebrate communities to pastureland expansion and agricultural intensification, highlighting the relevance of agricultural land-use management for implementing EU biodiversity legislation and reaching restoration objectives.

The continuation of current agrifood practices, combined with continued climate trajectories, therefore leads to the least sustainable future for Europe's food system. Given the importance of biodiversity for agricultural production and resilience, **a transitional shift towards more nature-friendly agricultural practices is paramount to ensure long-term food security.**

Organic farming and agroecology stand out as systemic sustainable approaches that benefit biodiversity together with sustainable practices such as crop diversification, crop rotation, mixed cropping, or intercropping that reinforce yields and production resilience.

Taxonomic group	Green Transition	Middle Road	Rocky Road
Vascular plants	5%	13%	10%
Birds and mammals	14%	34%	25%
All taxa (combined)	7%	17%	13%

Table 1: EU27 aggregate MSA loss by scenario and taxonomic group, 2050 (percentage change versus 2020 baseline). Source: MAGNET-MSA model, ECO-READY project.

Biodiversity and food security: co-benefits and trade-offs

Biodiversity underpins the functioning and resilience of food systems across the different pillars of food security:

- **Availability:** Biodiversity enhances agricultural productivity, thanks to complementary species interactions, such as pollination and natural pest regulation, and Nature-based Solutions, including water filtration.
- **Stability:** Biodiversity's positive impacts on food availability bring long-term yield stability, further reinforced by

biodiversity's role in mitigating the effects of climate change and enhancing agriculture's resilience to extreme events.

- **Affordability:** Biodiversity, through its positive outcomes for food availability and stability, supports the long-term stabilisation of agri-food prices alongside targeted food policies.
- **Utilisation:** Biodiversity strengthens food utilisation by supporting nutrient-rich food production through, for instance, seed diversity or complex grazing systems.

The MAGNET modelling provides further insights into the **co-benefits and trade-offs that can exist between agriculture, biodiversity, and climate** (table 2).

Dimension	Green Transition	Middle Road	Rocky Road
Food availability (calory availability)	Moderate reduction (nutritionally sufficient)	Minor increase	Significant increase (but meat-heavy)
Food affordability	Minor increase (inclusive)	Moderate increase	Significant increase (nominal; inflation-driven)
Food utilisation (diet)	Moderate increase (more plant-based)	Stable	Moderate reduction (less plant-based)
Total MSA loss vs 2020	Minor increase (moderate biodiversity loss)	Significant increase (large biodiversity loss)	Moderate increase (moderate to large biodiversity loss)
Agri-food GHG emissions	Significant reduction	Moderate reduction	Significant increase
Agricultural land demand	Reduction	Stable	Increase
Fertiliser use	Reduction	Moderate reduction	Increase
Water use	Reduction	Stable	Increase (esp. in the Mediterranean)

Table 2: Integrated summary of food security and biodiversity outcomes by scenario, EU27, 2050. Note: Green indicates a more favourable outcome relative to current trends; Red indicates a less favourable outcome; Yellow indicates a broadly stable outcome. Source: MAGNET-MSA model and D1.5 (Moghayer et al., 2024).

Results show that the Green Transition performs best in delivering on both environmental and climate ambitions and food security. In this scenario, **food availability slightly declines, but caloric availability remains within the boundaries of the population's requirements**, hence maintaining Europe's overall food security. However, the scenario also assumes a dietary rebalancing towards more plant-based foods and reduction of animal products consumption.

The analysis helps to identify the **societal choices at stake in terms of production and consumption—such as the diets to promote**—towards a sustainable and resilient food system. A granular analysis of co-benefits and trade-offs is therefore crucial to inform policy debates and orientations.

To exploit the co-benefits between biodiversity, agricultural production, and climate resilience, **biodiversity considerations must be integrated into EU agricultural policy via a holistic approach**. As EU policy implementation is becoming more dependent on Member State priorities, **coordination across governance levels** and among administrations must be strengthened to guarantee policy coherence. Policymaking processes must embrace comprehensive and transparent analyses of trade-offs, notably on the perceived tensions between productivity and sustainability objectives.

Policy recommendations

Safeguarding Europe's food security requires unlocking the synergies between agriculture and biodiversity through a systemic approach to food. This implies rethinking the design of policies through a shared long-term vision co-created across sectors. Such an approach also calls for a reinforced multi-stakeholder and multi-level governance. While flagship initiatives may be coordinated at a higher-level, a systemic approach must involve authorities as well as agriculture, biodiversity, climate and consumption stakeholders at all levels to ensure coherent implementation and transformative change.

1

The European Commission, European Council, and European Parliament should establish a fully EU funded, sub-ringfenced budget for agri-environmental climate actions in the next Common Agriculture Policy, to deliver on biodiversity and climate, thus ensure EU food security. Policy frameworks must support farmers in the transition towards a more sustainable and resilient food system.

2

The European Commission should adopt a science-based methodology to granularly define the budget coefficients for each CAP intervention aimed at environmental objectives in future Multiannual Financial Frameworks, to accurately measure the environmental performance of CAP interventions. Over the coming years, comprehensive and evidence-based studies must be conducted to ensure a realistic translation of the

findings into the policies and programmes of the post-2034 Multiannual Financial Framework.

3

The European Commission should strengthen monitoring of environmental outcomes under the CAP through robust indicators linked to key biodiversity loss or restoration drivers. Greater alignment of indicators, definitions, and data formats across EU policies would also improve evidence-based policymaking and policy coherence. Biodiversity monitoring associated with agricultural policies should track outcomes for different taxonomic groups rather than relying exclusively on aggregate biodiversity indicators.

4

The European Commission and Member States should ensure integration between future National and Regional Partnership Plans (NRPPs) and the targets and measures outlined in the draft National Restoration Plans, leveraging the potential of agri-environmental and climate actions to contribute to the restoration of targeted agricultural ecosystems. Dedicated inter-ministerial dialogues and a robust coordination mechanism across the European Commission's directorates should ensure the coherence among future plans.

5

The European Commission, Member States and relevant agri-environmental stakeholders should strengthen coherence between the Common Agriculture Policy and the implementation of the Birds and Habitats Directive, building on existing acquis and on biodiversity's driving role for Europe's long-term food security.

6

Member States should promote in their NRPPs context-specific agricultural practices that enhance biodiversity and agroecosystems resilience through agri-environmental and climate actions and transition payments. Support should be directed to conversion and maintenance of organic farming, agroecological approaches, crop diversification and rotation, regenerative practices and precision farming where it contributes to reducing input use.

7

The European Commission and Member States, as well as European and national CAP networks and advisory services should boost the adoption of Nature-based Solutions in agriculture to harness the benefits that biodiversity brings to agricultural productivity and the resilience of agricultural landscapes in the face of climate change.

8

Member States should ensure NRPPs fund regional advisory networks that connect non-profit advisors, focusing on small farmers and agroecological practices to foster the environmental performance of farms. These networks may link to certified training centres of excellence, regional hubs across the EU, providing training, education, and knowledge exchange for farmers and advisors tailored to their local, regional challenges, legislative context, and environmental conditions. Further, Member States should set aside funding for advisory support to farmers to help them understand and implement the new CAP without extra financial or administrative burden.

9

Member States should prioritise, under the starter pack for young farmers, providing access to advisory services and training programmes rooted in farmers' local knowledge and intergenerational peer learning and focused on knowledge exchanges on organic and agroecological systems to leverage the high interest of new entrants in sustainable farming.

10

European, national, regional and local authorities should promote plant-based diets in Europe to support environmental objectives and recognise the role of food consumption as a key driver of food-system transformation. A detailed analysis of the synergies and trade-offs between food consumption and biodiversity conservation and restoration should inform the coherent development of associated food policies at EU, national, and regional levels.

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