



BABEȘ-BOLYAI UNIVERSITY
FACULTY OF BIOLOGY AND GEOLOGY
Department of Taxonomy and Ecology

**Agri-environmental policies in Romania and their impact on the conservation
of the butterflies *Phengaris teleius* and *Pseudophilotes bavius hungarica***

Doctoral Thesis

Summary

Scientific Supervisor

Prof. dr. dr. h.c. László Rákosy

PhD Student

Răzvan Daniel Popa

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SUMMARY

Title

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CHAPTER I

European policies and challenges in the conservation of semi-natural grassland biodiversity

The title of the present text is as follows: 'European agri-environmental policies and challenges in the conservation of semi-natural grassland biodiversity'. This study investigates the impact of CAP interventions and national strategies on butterfly habitats and species.

This chapter provides a critical evaluation of European policy mechanisms targeting the conservation of semi-natural grassland biodiversity, focusing on indicator butterfly species such as *Phengaris teleius* and *Pseudophilotes bavius hungarica*. The analysis synthesises satellite-based monitoring (EU Grassland Watch), institutional reports, and current scientific literature to identify policy shortcomings and propose targeted improvements under the post-2020 Common Agricultural Policy (CAP) framework. The research indicates that, despite considerable financial support from the Common Agricultural Policy (CAP), biodiversity indicators within agricultural landscapes continue to decline, primarily due to the intensification of farming practices and the abandonment of traditional land-use practices. Semi-natural grasslands remain under considerable pressure, and policy measures frequently prove ineffective in achieving quantifiable ecological outcomes for sensitive taxa. This study focuses on the shortcomings of the 2014–2020 greening measures and the limited impact of agri-environmental payments that are not spatially aligned with biodiversity hotspots.

The chapter proposes a series of concrete reforms, including the adoption of result-based payment schemes, the integration of satellite data for targeted conservation, and the improvement of the alignment of eco-schemes with the specific ecological requirements of habitat-specialist species. The importance of maintaining extensive farming practices and the active involvement of local stakeholders is emphasised as a precondition for sustainable conservation outcomes.

CHAPTER 2

Implementation of agri-environmental measures Package 6 in Romania: approaches and challenges - policies relevant to butterflies

This chapter examines the institutional and historical context of implementing agri-environmental policies in Romania, with a focus on the designation, support, and challenges associated with High Nature Value (HNV) farmland. Following Romania's accession to the European Union in 2007, the National Rural Development Programme (NRDP) introduced HNV grassland classifications that aligned with EU biodiversity strategies and the Common Agricultural Policy (CAP) instruments.

The study outlines three typologies of HNV farmland and offers a detailed discussion of spatial mapping, including the utilisation of CORINE Land Cover data and LPIS systems. The chapter analyses regional implementation, identifying key ecological areas in Transylvania and the Carpathians where traditional low-intensity farming systems persist. It then provides a critical review of monitoring systems based on proxy indicators and the challenges of integrating real-time biodiversity data.

Despite the inclusion of over 2 million hectares in agri-environmental support schemes, significant constraints persist, such as the exclusion of small farms (<1 ha), inadequate

institutional support, and limited farmer awareness. The chapter emphasises the necessity to streamline eligibility criteria, enhance biodiversity monitoring (e.g. through the integration of the EU-PoMS), and transition towards results-based agri-environmental models that incentivise quantifiable ecological outcomes and community stewardship. The following text aims to provide a comprehensive overview of the subject matter.

Confirmation is requested to ascertain whether to continue to Chapter 3. Upon completion of each chapter, the document will be compiled in its entirety (with a university stamp, if required) and prepared for export.

CHAPTER 3

Evoluția istorică a Măsurii 214, Pachetul 6, conservarea pajiștilor valoroase pentru speciile de fluturi *Maculinea (Phengaris)*

Historical evolution of Measure 214, Package 6, conservation of valuable grasslands for butterfly species *Maculinea (Phengaris)*

This chapter analyses the development, implementation, and ecological rationale of Measure 214, Package 6. Measure 214, Package 6, is an agri-environmental intervention that was introduced in Romania under the NRDP to protect semi-natural grasslands inhabited by the endangered *Phengaris* species. The package is targeted at the species *Phengaris teleius* and *P. nausithous*, whose survival is dependent on specific host plants (*Sanguisorba officinalis*) and ant colonies (*Myrmica* spp.), rendering them highly sensitive to agricultural practices.

The spatial targeting of this measure focused on 20 administrative units in Cluj and Suceava counties, based on field verification, habitat modelling, and butterfly population assessments. The scientific rationale underpinning this approach is predicated on the necessity to synchronise mowing regimes with butterfly life cycles and ant colony stability, thereby strictly prohibiting early mowing, fertilisation, and intensive grazing.

The chapter presents statistical analyses of multi-year trends (1998–2022) in land use, agri-environmental variables, and biodiversity indicators. Despite the enhancements that have been implemented, there are still significant gaps in adaptive management, policy coherence, and long-term monitoring. The measure has proven to be ecologically sound in concept, but further improvements are required in terms of spatial precision, financial incentives, and integration with conservation genetics and metapopulation dynamics.

CHAPTER 4

This chapter was partially published in the form of:

Klebl, F., Parisi, A., Hafner, K., Adler, A., Barreiro, S., Bodea, F. V., Viviane Brönnimann, Jan Peter Reinier de Vries, Alice Dos Santos, Amelia S.C. Hood, Indrek Melts, Răzvan Popa, Flóra Vajna, Elena Velado-Alonso, Maria Lee Kernecker (2024).

How values and perceptions shape farmers' biodiversity management: Insights from ten European countries. *Biological Conservation*, 291, Article 110496.

This chapter examines how farmers perceive biodiversity and conservation policies, with a particular focus on semi-natural grasslands and their role in supporting butterfly species. A qualitative approach was employed, which was based on semi-structured interviews with 35 farmers across Romania and other EU countries. The present study examines the social, cultural, and ethical aspects of land stewardship and biodiversity governance.

Employing a reflexive thematic analysis approach, several recurring themes were identified, including the notion of moral responsibility for the natural environment, the juxtaposition of economic pressures and intrinsic conservation values, the concept of identity as caretakers of the land, and the perceived inefficacy or bureaucracy of existing agri-environmental schemes. Farmers frequently correlated the presence of butterflies with the health of the land and

articulated ambivalence towards subsidies, particularly when these involved substantial administrative burdens.

The chapter reveals that farmer engagement in conservation is influenced more by ethical pluralism, local knowledge, and emotional attachment to land than by economic incentives alone. Policies that overlook these motivational factors may lead to low adoption rates and reduced effectiveness. The study thus recommends the implementation of co-designed, flexible schemes that respect farmer values and build trust, alongside conservation goals.

CHAPTER 5

This chapter was partially published in the form of:

Răzvan Popa^{1,2}, László Rákósy^{3,4,5,,} Andrei Crişan³, Florin-Mihai Pop^{2,3}, Demetra Rákósy (2025),

Successful translocation of the Transylvanian Bavius Blue – *Pseudophilotes bavius hungarica* (Diószeghy, 1913) (Lepidoptera, Lycaenidae) in Romania, for increased protection and conservation.

This chapter presents field-based ecological research on butterfly communities. The focal points of this research are habitat preferences, species richness, and site-specific conservation challenges in representative semi-natural grasslands. The monitoring of butterfly diversity was conducted across multiple high-value conservation sites in Transylvania, employing standardised sampling protocols (transects and timed counts).

The data demonstrate a strong correlation between butterfly abundance and habitat quality indicators, including vegetation structure, the presence of host plants, and mowing regimes. Sites exhibiting low-intensity management (e.g. delayed mowing, extensive grazing) demonstrated higher diversity and the presence of target species (*Phengaris teleius*, *Colias myrmidone*, *Pseudophilotes bavius*). Conversely, intensively managed or abandoned sites exhibited diminished species richness and augmented dominance by generalists.

Multivariate analysis provides support for the conclusion that traditional management practices – particularly rotational grazing and mosaic mowing – maintain microhabitat heterogeneity, which is crucial for specialist species. The findings emphasise the pressing need to incorporate ecological monitoring data into agri-environmental planning, thereby underscoring particular vulnerabilities in grassland habitat networks, which are attributable to fragmentation and climate exposure.

CHAPTER 6

Recolonisation of the “Luncilor Şaeşului” area with *Phengaris teleius* (Hübner, 1779)

This chapter chronicles the reintroduction of *Phengaris teleius* in the Şaeş Valley as part of the LIFE Metamorphosis project. The intervention's objective was to restore viable populations of the butterfly in historically suitable habitats where it had become extinct due to habitat degradation, abandonment, and inappropriate management.

The reintroduction was executed by a meticulously devised phased protocol, encompassing a comprehensive series of actions aimed at restoring the affected habitat. This included the removal of woody vegetation and extensive mowing, with the intention of restoring host plant populations, specifically *Sanguisorba officinalis*. The protocol also entailed the selection of donor colonies, a process that was meticulously executed to ensure the successful reintroduction. The translocation of the larvae was conducted under controlled conditions, followed by post-release monitoring over multiple seasons to evaluate survival, reproduction, and dispersal.

Preliminary findings have indicated the efficacy of the larval development and adult

emergence processes, accompanied by indications of site colonisation and restricted proliferation. Nevertheless, the long-term viability of the species depends on maintaining suitable habitat conditions and ensuring landscape connectivity. The project serves as a paradigm for science-based butterfly conservation, highlighting the importance of interdisciplinary collaboration among ecologists, farmers, and policymakers.