



# The failure of agri-environment measures to promote and conserve grassland biodiversity in Slovenia

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## ABSTRACT

The effectiveness of four grassland-specific agri-environment measures (AEM), implemented in the frame of the European Agricultural Fund for Rural Development (EAFRD) in the period 2007–2013 in Slovenia was studied. We questioned whether the measures – “extensive grassland maintenance”; “preservation of special grassland habitats”; “preservation of grassland habitats for butterflies” and “bird conservation in humid extensive meadows in Natura 2000 sites” did genuinely support the conservation (maintenance or improvement) of high nature value (HNV) grasslands in Slovenia. The HNV grasslands were defined on the basis of national fine-resolution field mapping of habitat types. Two main outcomes emerged: AEM did not reach the vast majority of HNV grasslands in Slovenia (only 3%); the proportion of HNV grassland area included in AEM was negligibly low (1). Moreover, even this very limited interest in AEM did not target only grasslands of HNV, but any permanent grasslands regardless of their conservation value: forty-one percent (41%) of the grassland areas included in the AEM were actually non-HNV grasslands (2). The absence of pre-selection criteria for grasslands along with an absence of monitoring of the effectiveness and efficiency of the measures and low interest in the subsidies among farmers, led to almost complete failure of the AEM to promote and conserve species-rich extensive grasslands in Slovenia between 2007 and 2013. Even with some minor differences, the same concept was maintained for the currently running EAFRD 2014–2020, which raises serious concern.

## 1. Introduction

Semi-natural grasslands represent an important land use type in Europe. They play a basic role in feeding ruminants and other herbivores and in providing important regulation of ecosystem processes, e.g., reducing erosion by supporting slope stability, regulating the water regime and purifying water of fertilizers and pesticides (Smit et al., 2008). Extensively managed semi-natural grasslands, with low nutrient intake, support high plant, insect and bird biodiversity and thus provide cultural ecosystem services along with a healthy environment yielding food, herbs and honey. This takes place, for example, by contributing to a region's cultural heritage and to aesthetic and recreational values (Reed et al., 2005; Hopkins and Holz, 2006). Apart from cultural services, semi-natural grasslands play an important role in nutrient cycling, balancing of the local climate and soil erosion, while sustaining pollinators and biological control agents (which have long been neglected in grassland studies) (Öckinger and Smith, 2007; Clough et al., 2014; Fantinato et al., 2018a, b; Söderman et al., 2018). Biodiversity-

rich grassland habitats were formed by a long history of locally adapted land use (Küster and Keenleyside, 2009). Maintenance or reintroduction of traditional management practices is important in the preservation of grassland habitats and their biological and cultural value (Dahlström et al., 2013). However, modern agricultural practices, along with fragmentation and land abandonment in recent decades, have caused a substantial biodiversity decline across Europe (Cousins et al., 2007; Kaligarič and Ivajnsič, 2014).

In response to increasing concern about the loss of grassland biodiversity, the European Union introduced agri-environment measures (AEM), which provide financial compensation to farmers for loss of income and for carrying out biodiversity-enhancing land-use measures (Finn and Óhuallacháin, 2012; Mewes et al., 2015). First introduced in 1985 under pressure from the United Kingdom and the Netherlands, AEM are the oldest and the most significant measures for pursuing environmental objectives across the farmed landscape in Europe (Batary et al., 2015). They include a variety of programs in different Member States across Europe, and over time a number of agri-

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environmental schemes (AES) have been developed. The concept of High Nature Value (HNV) farmland and the conservation of rare species (HNV farming throughout EU-27 and its financial support under the CAP, 2014) appeared in the nineties. Despite considerable effort in the detailed preparation of the schemes, the success of AESs in terms of conservation was summarized to be mixed at best (Mewes et al., 2015).

In Slovenia, more than half of the total utilized agricultural area was occupied by permanent grasslands in the period 2005–2013 (Eurostat [http://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental\\_indicator\\_-\\_cropping\\_patterns](http://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental_indicator_-_cropping_patterns)), including a variety of species-rich grassland communities (Kaligarič et al., 2006; Škornik et al., 2010; Mason et al., 2013). As the number of studies on the effectiveness of agri-environment measures (AEM) is limited across Member States (Sutcliffe et al., 2014; Hülber et al., 2017), we focused our study on the effectiveness of four specific sub-measures within the Slovenian system for AEM in the period 2007–2013, which had specific conservation objectives regarding grasslands of high conservation value. The general objective of our study was to assess whether the AEM do genuinely support the maintenance or improvement of biodiversity on species-rich extensive grasslands. Four grassland-targeted AEM were studied: “Extensive grassland maintenance” (ETA); “Preservation of special grassland habitats” (HAB); “Preservation of grassland habitats for butterflies” (MET); and “Bird conservation in humid extensive meadows in Natura 2000 sites” (VTR). Since the Slovenian scheme of agri-environment payments permits farmers to join any of the four AEM (ETA, HAB, MET, VTR) with any type of permanent grassland (having been permanent for at least four years) without any pre-selection criteria or qualification (e.g., high species richness, the presence of certain indicator species and/or habitat type), we hypothesized that there existed limited surface matching between the area of HNV grasslands and the area of grasslands included in any of four grassland-focused AEM in the period 2007–13. More specifically, we aimed to answer the following questions: (1) what percentage of grassland surface included in a single AEM matches the surface of HNV grasslands in the defined study areas in Slovenia? (2) what proportion of the surface area included in the AEM was not recognized as HNV grasslands? (3) how large was the proportion of HNV grasslands not enrolled in any of the four AEM within the defined study areas? and finally, (4) are there differences in the size component between HNV and existing ETA, HAB, MET and VTR grasslands?

## 2. Material and methods

### 2.1. The four grassland-focused AEM from the Slovenian scheme

Table 1 summarizes the main characteristics of the four grassland-focused AEM from the Slovenian system of subsidies in the period 2007–2013. It should be pointed out that the minimum size of agricultural land with the same type of actual use for which an AEM payment could be obtained was 0.1 ha. However, the farm cumulative area for a given sub-measure should cover at least 0.3 ha, unless the conditions for individual sub-measures are otherwise specified (i.e. conservation of extensive Karst pastures). Moreover, the use of mineral fertilizers, plant protection products and sewage sludge application and the use of silt or residue from fish farms were not allowed if applying for any of the AEMs.

### 2.2. Study area determination

The freely available, field-based, digital, non-forest habitat type (HT) maps ([http://www.zrsvn.si/sl/informacija.asp?id\\_meta\\_type=62&id\\_informacija=705](http://www.zrsvn.si/sl/informacija.asp?id_meta_type=62&id_informacija=705)) and the vector layers of AEM eligible areas (GERK database; [rkg.gov.si/GERK/WebViewer/](http://rkg.gov.si/GERK/WebViewer/)) in Slovenia were used to determine the spatial extent of this study. The fine-resolution field HT mapping (horizontal resolution of 2 m) followed the PHYSIS typology of habitats based on the Palearctic classification (Devilleers and

**Table 1**  
Characteristics of selected agri-environment measures (AEM).

Agri-environmental measure (AEM) Acronym	Extensive grassland maintenance ETA	Preservation of special grassland habitats HAB	Preservation of grassland habitats for butterflies MET	Bird conservation in humid extensive meadows in Natura 2000 sites VTR
<b>Main objective</b>	Preserving biodiversity through extensive and traditional use of grassland	To increase grassland area within the “Ecologically important areas” (around 60% of the Slovenian territory), along with the preservation of endangered plants and animals	To increase the grassland area in internal zones of “ecologically important areas” and to preserve the habitats of endangered grassland butterfly species listed in Annex II of the Habitat Directive (92/43/EC)	To provide for a healthy population status among endangered bird species in humid extensive meadows and the conservation of border strips and other structural elements of an agricultural landscape
<b>Eligible area</b>	Whole country	Ecologically important areas	Ecologically important areas	Special Protection Areas (SPA), based on the provisions of the Bird Directive (79/409/EEC), or in the major areas for appearance of bird sightings of humid extensive meadows in the Natura 2000 sites
<b>Stocking density criterion</b>	0 to 0.5 livestock units/Ha	0.2 to 1.9 livestock units/Ha	0.2 to 1.9 livestock units/Ha	0 to 1.5 livestock units/Ha
<b>Management</b>	Mowing and pasture	Mowing and pasture	Mowing and pasture	Mowing, gathering and pasture not allowed before 1 <sup>st</sup> August
<b>First mowing/grazing</b>	Not defined	After 15 <sup>th</sup> July	Once a year, not between 1 <sup>st</sup> July and 20 <sup>th</sup> August	Once a year, not before 1 <sup>st</sup> August

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