



Promoting Grassland Insect Conservation and Diversity

Saturday 5th September 2009
10.30 to 18.30
Room A III

Co-ordinators **Nick Littlewood, Macaulay Land Use Research Institute**
Alan Stewart, University of Sussex



Session 1: Understanding Community Structure – 10.30

10.30 Keynote: Péter Batáry, András Báldi, and Teja Tscharnkte

How does grassland management affect the arthropod diversity at different scales? – examples from an Eastern and a Western European country

11.10 Alan Stewart, Fergus Massey, Libby John, Malcolm Press & Sue Hartley

Diversifying grasslands using parasitic plants: effects on the associated insect fauna

11.30 Thomas Sattler, P. Duelli, M.K. Obrist, F. Bontadina, R. Arlettaz, M. Moretti

Analysis of urban arthropod communities on different spatial scales reveal ecological information hidden by robust species richness measures

11.50 Lorenzo Marini, Paolo Fontana, Kevin J. Gaston, Andrea Battisti

Conservation of grassland insect diversity at multiple scales

12.10 Isabel Diaz Forero

Relationships between landscape structure, human impact and insect diversity





Session 2: Maintaining and Enhancing Diversity – 14.00

14.00 Keynote: Dave Goulson

Is the decline in European bumblebee diversity driven by loss of species-rich grasslands?

14.40 Nicky Redpath, Dave Beaumont, Kirsty Park, Dave Goulson
Restoration of machair grassland for the conservation of rare bumblebee species

15.00 Jenni Stockan, Mark Young, Simon Langan
Can riparian arthropod biodiversity be maintained or enhanced on managed grassland?

15.20 Stephen Venn and Sirrku Manninen
Managing Urban Meadows for Insect Biodiversity

15.40 Ben Woodcock
Contrasting success in the restoration of plant and phytophagous beetle assemblages of species rich mesotrophic grasslands





Session 3: Land-use and Diversity – 16.30

16.30 Keynote: Juha Pöyry

Local and regional factors affecting insect diversity in Finnish grasslands

17.10 Nick Littlewood

Grazing management influences moth community structure on a Scottish upland estate

17.30 Lorna Cole, D. McCracken, D. Robertson, B. Harrison

Enhancing the ecological diversity of Carabidae (Coleoptera) in riparian margins

17.50 Sally Huband, David I. McCracken

The influence of hay production practices on the butterfly fauna of Romanian subalpine meadows

18.10 John Dover, Alejandro Rescia, Sara Fungarino, Jon Fairburn, Peter Carey, Paul Lunt, Charlie Arnot, Andreas Lang

Land use and socioeconomics: the current situation and prospects for butterflies in the hay and grazing meadows of the Picos de Europa, northern Spain





Background

Grasslands are an abundant land type globally and represent typical landscape elements of rural areas (e.g. mountain pastures, dry meadows). They comprise some of the most bio-diverse semi-natural habitats known and, through their role in agriculture, can be key to maintaining rural livelihoods.

Agricultural practices are under multiple pressures to change. Semi-natural grasslands are at a risk from both the intensification and abandonment of agricultural land use practices, particularly in the newly acceded European Union (EU) member states. Meanwhile climate change renders arid areas unproductive and rising global food prices exert ever stronger incentives towards maximising productivity elsewhere. These processes are changing the biodiversity of grasslands and the appearance of rural landscapes. Ecologists, therefore, need to engage with policy makers to investigate methods for the sustainable grassland management.

Insects play a crucial role in grasslands. Aside from their intrinsic value, insects provide unique services in the form of nutrient cycling and pollination. They are highly effective environmental indicators (due to their rapid response to climatic and management changes) and provide food for birds and other predators. However, insect biodiversity may be declining even more rapidly than that of vertebrates and plants. This may have particularly serious consequences for grassland biodiversity and for sustainable agricultural production.

The symposium presents research ranging from mechanisms with wide-ranging application to specific management case studies. The underlying theme is to promote insect conservation and research as an integral part and product of sustainable grassland management.





How does grassland management affect the arthropod diversity at different scales? – examples from an Eastern and a Western European country



Péter Batáry
Georg-August University, Germany

Modern agriculture is one of the main anthropogenic threats to biodiversity. The decline of grassland species diversity due to management intensity was shown in several taxa both at local and landscape scales. In 2003 we made pitfall trapping for carabids and spiders and sweep-netting for grasshoppers on 21 pairs of extensively (max. 0.5 cow/ha) and intensively (min. 1 cow/ha) grazed semi-natural grasslands in Hungary. In 2008 we compared the same taxa sampled with the same methods of 10 pairs of organic (pesticide and fertilizer free) and conventional fertile mown meadows in Central Germany. In Hungary the local scale management generally did not affect the species richness and abundance of arthropods (exception: grasshopper abundance was higher on extensive fields), however, it had a significant impact on the community structure. At landscape scale, the semi-natural area % negatively affected the carabid abundance and had a significant effect on carabid and spider communities. In Germany, no effects at any scales were shown on the impoverished grasshopper fauna, which had very low frequencies due to the frequent mowing on both management types. (The other taxa are under identification). These results support the view that management effects should be studied at different spatial scales.

Péter Batáry is a conservation ecologist. His main current field of research is the effects of agricultural management on biodiversity and related ecosystem services at different spatial scales. Péter is a postdoc research fellow funded by the Alexander von Humboldt Foundation at the Agroecology Group of Georg-August University. His home institute is the Animal Ecology Research Group of the Hungarian Academy of Sciences and the Hungarian Natural History Museum, Budapest.

Follow-up Information

Batáry, P., Báldi, A., Samu, F., Szüts, T. & Erdős, S. (2008) Are spiders reacting to local or landscape scale effects in Hungarian pastures? *Biological Conservation*, 141: 2062-2070.



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Diversifying grasslands using parasitic plants: effects on the associated insect fauna



Alan Stewart
University of Sussex, UK

It is well established that hemiparasitic plants, such as *Rhinanthus minor*, can increase plant community diversity, primarily through suppression of grass hosts. This is increasingly being regarded as a promising conservation tool for diversifying lowland grasslands, by altering the competitive balance between plant species and facilitating colonisation by desirable forb species. However, the effects on other trophic levels have not hitherto been investigated. We experimentally manipulated *R. minor* densities under field conditions and demonstrated large significant indirect impacts of this hemiparasitic plant species on invertebrates from several trophic levels, including herbivores, detritivores, predators and parasites, as well as the physical structure of the grassland. The implications of these results will be discussed for the restoration and enhancement of species-poor grasslands and their associated invertebrate communities.

Alan Stewart is Senior Lecturer in Ecology at The University of Sussex, UK, where his primary research interests are in insect ecology and conservation, with projects in the UK, Fiji and Papua New Guinea. He has a long-standing interest in the Auchenorrhyncha (leafhoppers and related groups). He is Chairman of the Royal Entomological Society's Conservation Committee and the steering group for the Sussex Biological Records Centre. He is also on the editorial board for *Insect Conservation & Diversity*.

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Analysis of urban arthropod communities on different spatial scales reveal ecological information hidden by robust species richness measures



Thomas Sattler
University of Bern Germany

Urban habitat areas are spreading rapidly and therefore need to be included in biodiversity surveys. We analysed the relationship between arthropod biodiversity and urban environmental factors at 96 sites in three Swiss cities. We chose a two-step approach: First we analysed the influence of sealed area, age of settlement, human management and habitat heterogeneity (composition and configuration) on species richness of 29 taxonomic invertebrate groups. Results show that, overall, local species numbers are surprisingly robust to changes in environmental variables. The variables age and configuration exhibit a noticeable and positive effect on species richness while the remainder had only minor effects (increased sealed area and human management negative, composition positive effect). In the second analysis we re-analysed spiders and bees of the same data set with their species identity on different spatial scales (radius from 10m – 2000m). Despite city-specific influences there is a clear pattern that spider communities are influenced on local scale (maximum influence 100m) while bee communities are influenced on larger scales. Even though species richness is quite robust to man-made environmental changes in the urban area, species communities are heavily influenced by human planning and management. Management recommendations include less intensive and partial cutting of urban meadows/lawns.

Thomas Sattler's interests cover a wide range of topics within Conservation Biology and Ecology. His research focuses on the analysis of habitat requirements on the community and species level of arthropods, bats (including echolocation analysis) and birds and on different spatial scales, including GIS models. Currently, he is obtaining his PhD in an interdisciplinary research project in urban ecology.

Further Information

T. Sattler, P. Duelli, M.K. Obrist, R. Arlettaz, M. Moretti. In review. Response of arthropod species richness and functional groups to urban habitat structure and management. Landscape Ecology BiodiverCity Project: www.biodivercity.ch

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Conservation of grassland insect diversity at multiple scales



Lorenzo Marini University of Padova, Italy

The mechanisms underlying the observed decline in insect diversity in managed grasslands act at different spatial scales. Here, we present a multi-scale study investigating the impact of local management, landscape composition, and transformation of farm structure on orthopteran and butterfly diversity in Alpine grasslands. At the local scale, management intensity (cutting regime and fertilization) reduced species diversity due to direct mortality and alteration of sward structure, host plant abundance, and food quality. At the landscape scale, the presence of undisturbed woody vegetation in the close surrounding landscape (95m) was positively related to species richness probably due to a rescue effect. At the whole-farm scale, we found a strong positive effect of slope and a negative influence of farm specialization. Thus, local stakeholders should consider targeted agri-environment schemes to reduce the ongoing substitution of small traditional farms with large intensive farms. In our Alpine region, reduced nutrient output per area, preservation of grassland-forest mosaics at the landscape scale, and maintenance of low-intensity management of steep areas should be promoted, therewith reducing the negative impact on insect diversity of the current transformation of grassland marginal systems.

Lorenzo Marini is an ecologist with a strong focus on conservation biology in terrestrial ecosystems. His main research interests include the impact of global change on biodiversity at different spatial scales. He works with a wide spectrum of taxonomic groups including lichens, vascular plants and invertebrates. He often applies a multiple-scale approach including a landscape perspective in conservation sciences. He is currently a post-doc fellow at the Department of Environmental Agronomy of the University of Padova.

Further Information

Marini, L., Fontana, P., Klimek, S., Battisti, A., Gaston, K.J. (2009) Impact of farm size and topography on plant and insect diversity of managed grasslands in the Alps. *Biological Conservation* 142, 394-403

Marini, L., Fontana, P., Battisti, A., Gaston, K.J. (2009) Agricultural management, vegetation traits and landscape drive orthopteran and butterfly diversity in a grassland-forest mosaic: a multi-scale approach. *Insect Conservation and Diversity* 2, 213-220.

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Relationships between landscape structure, human impact and insect diversity



Isabel Diaz Forero
Estonian University of Life Sciences

We studied diversity of butterflies, bumblebees and day-flying moths in grasslands in conditions of different landscape structure and with different human impact. Key areas were chosen in North-East Estonia with grasslands situating in coastal area, in the forested landscapes, in flooded meadows. Part of study areas were situating under impact of oil-shale mining and air pollution (dust, sulphur and nitrogen compounds, higher pH) by electrical power plants. The number of butterfly and day-flying moth species was lower in the coastal zone where open and windy landscapes appear. Slightly higher diversity of all species was in mosaic landscape with lakes and forest patches. The impact of air pollution by power stations had some negative impact to the number of day-flying moth species, the number of butterfly species in these conditions was in average level and number of bumblebee species even slightly higher.

Isabel Diaz Forero is an Environmental Engineer with a Master Degree in Environment and Resource Management from the Vrije Universiteit of Amsterdam, The Netherlands. Currently, she is working in the Department of Environmental Protection at the Estonian University of Life Sciences as a third year PhD student. She is particularly interested in the field of insect conservation. Her research work is mainly focused on the analysis of different abiotic and biotic indicators for the evaluation of habitat quality.

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Is the decline in European bumblebee diversity driven by loss of species-rich grasslands?

Dave Goulson
University of Stirling, UK



Many bumblebee species have undergone significant range declines. Evidence is accumulating that the species in decline are mainly those dependent upon unimproved legume-rich grasslands, and that their decline is thus largely a response to the massive loss of this habitat in Europe. The social nature of bumblebees renders their effective population size low, since most individuals are sterile workers and each nest contains just one breeding female. Genetic studies reveal that many surviving bumblebee populations on unimproved grassland fragments are isolated and becoming inbred. Hence it seems that most surviving patches of species-rich grassland are too small to support many bumblebee species. This poses a challenge to conservationists, since preserving a diverse bee community is necessary to maintain plant diversity. Targeted agri-environment schemes may provide a mechanism by which populations of rare bumblebees can be both increased and linked to one another.

Dave Goulson is an insect ecologist working mainly on bumblebees, and has published more than 150 papers on this and related subjects. He is Head of the School of Biological and Environmental Sciences at the University of Stirling, and author of "Bumblebees; their behaviour, ecology and conservation" (OUP, 2nd edition out 2009). Dave was also founder of the Bumblebee Conservation Trust in 2006, a membership-based organisation which now has around 5,000 members

Further Information

Bumblebee Conservation Trust: www.bumblebeeconservation.org/



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Restoration of machair grassland for the conservation of rare bumblebee species



Nicola Redpath
University of Stirling, UK

The great yellow bumblebee, *Bombus distinguendus*, is the UK's rarest *Bombus* species. The decline of this species in recent decades has been largely attributed to agricultural intensification and *B. distinguendus* is now typically associated with the machair grasslands of north and west Scotland.

The small agricultural units or crofts which maintain machair are becoming increasingly economically unviable and as a result the abandonment of traditional management techniques is a relatively common occurrence.

This research aims to create management prescriptions which restore bumblebee forage plants to areas of machair which have become degraded. A comparative field trial consisting of five treatments was established on the Southern Hebridean island of Oronsay in April 2007. An area of machair was subdivided into 25 plots and the treatments were distributed in a quasi complete Latin square design. Each treatment plot was surveyed for bumblebee abundance and inflorescence availability throughout the bumblebee flight period in 2008.

In order to test the longevity of each treatment this monitoring process will be repeated in 2009 and 2010. Initial results indicate that the wildflower treatments which provided a continual availability of legumes throughout the flight period attracted the greatest number of foraging bumblebees.

Nicola Redpath graduated with a degree in Zoology from the University of Liverpool in 2006. After a brief period of working in environmental education, she commenced her PhD at the University of Stirling in January 2007. Nicola is now in the third year of her PhD and the principle focus of her research is the development of conservation strategies and habitat management for the great yellow bumblebee, *Bombus distinguendus*, in northwest Scotland.

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Can riparian athropod biodiversity be maintained or enhanced on managed grassland?



Jenni Stockan
Macaulay Land Use Research Institute, UK

Riparian zones represent the interface between terrestrial and aquatic ecosystems and as such have been the focus of land management policies aimed at reducing diffuse pollution and improving habitat quality. However, it remains unclear how individual terrestrial taxa respond to changes offered by these remedial measures and what the relative influences of land compared to water are. Coleoptera were sampled across riparian zones within two catchments in north-east Scotland. Carabidae, an important indicator group, were identified to species. A total of thirty-eight environmental variables were investigated to see if they correlate with the variation in taxon abundance and diversity. Results from stepwise multiple regression showed that land use and bank shape were key factors influencing abundance and species richness with grasslands providing the most favourable conditions. Further correlations were found between soil and water variables and individual taxa. Our findings demonstrate that grasslands have the potential to be and significant biodiversity resource in riparian zones. However desired management outcomes need to be clearly defined as different management favours different groups of species.

Jenni Stockan is an insect ecologist at the Macaulay Land Use Research Institute where she works on both terrestrial and aquatic insects. Jenni is working towards a PhD with her research on riparian insects.

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Managing Urban Meadows for Insect Biodiversity



Stephen Venn
University of Helsinki, Finland

Communities of forbs and insects have adapted to habitats managed for agricultural purposes over several centuries. Sprawling urban regions often contain remnants of such semi-natural habitats that, with appropriate management, provide suitable habitat for threatened species of these taxa. Also municipalities are committed to policies for the maintenance of biodiversity. However, little is known about the influences of urbanization factors (e.g. nutrient deposition, landscape composition) on meadow assemblages. In the Helsinki Meadows project, we investigate vascular plant, lepidopteran, carabid beetle and hymenoptera assemblages of dry and fresh meadow habitats in and around Helsinki. Data on management regimes, environmental and spatial factors are also evaluated. This information is being applied to refine the planning and management of networks of meadow habitats for the enhancement of biodiversity. Our results show that the numbers of vascular plant and lepidopteran species are lower in urban than rural meadows. Management of urban meadows successfully reduces nutrient levels and thus promotes the occurrence of these interdependent taxa. A number of carabid species were sensitive to management intensity, and less intensive management resulted in more even carabid assemblages. Moreover, landscape level spatial factors such as fragmentation and patch size and connectivity, are important for lepidoptera.

Stephen Venn is an ecologist, whose research focuses on carabid beetle assemblages of urban habitats in particular. He has also participated in a number of international multidisciplinary research projects on urban green space systems. Since 2006 he has coordinated the Helsinki Meadows Project, which is the topic of this presentation. Stephen's teaching responsibilities include courses on conservation biology, urban ecology and urban green space systems. He is also strongly involved in the application of web-based teaching and currently works as planner of e-Learning for the Faculties of Biosciences and Pharmacy at the University Helsinki.



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Contrasting success in the restoration of plant and phytophagous beetle assemblages of species rich mesotrophic grasslands



Ben Woodcock
Centre for Ecology & Hydrology, UK

Since the end of the Second World War changing management of species rich mesotrophic grasslands has resulted in their large scale loss and degradation across Europe. Restoration of grasslands that have been agriculturally improved (e.g. NPK fertiliser, silage cutting regimes and increased livestock stocking rates) provides a valuable approach to the conservation of these threatened habitats. Over a four-year period a replicated block design was used to test the effects of seed addition (green hay spreading and brush harvest collection) and soil disturbance on the restoration of phytophagous beetle and plant communities. Patterns of increasing restoration success, particularly where hay spreading and soil disturbance were used in combination, were identified for the phytophagous beetles. For the plants, however, initial differences in restoration success in response to the same treatments were not followed by temporal increases in plant community similarity to target mesotrophic grasslands. It is possible that the long term consequences of the described management practices would not be the establishment of beetle and plant communities characteristic of the targets for restoration. However, short term increases in community similarity taxa to species rich mesotrophic grasslands for both plants and phytophagous beetles do significantly improve their conservation value.



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Local and regional factors affecting insect diversity in Finnish grasslands



Juha Pöyry

Finnish Environment Institute, Finland

The significance of factors affecting the diversity of insect communities inhabiting semi-natural grasslands were studied in SW Finland. Maximum species richness of insect groups peaked at taller vegetation (ca. 30 cm) compared to vascular plants (ca. 20 cm). While plants had benefited from resumed grazing, highest species richness of butterflies and moths occurred in abandoned grasslands. The difference between plants and insects in relation to the effects of management can be understood in two ways: (1) more suitable niches for herbivorous insects occur in structurally diverse tall unmanaged vegetation compared to low vegetation maintained by management, and (2) species in higher trophic position (e.g. herbivorous insects) are less tolerant to disturbances compared to species in lower trophic position (e.g. plants) as suggested by Huston's "dynamic equilibrium model". However, species differed in their responses to management, and declining butterflies and moths exhibited highest abundances in old pastures. In addition to the local factors, regional habitat connectivity exhibited a strong impact on total abundance of the declining butterflies and moths. Therefore, management of grassland insect communities should be implemented on regional scale, and varying management intensities are recommended in order to take into account the differing requirements of different taxa.

Juha Pöyry works as a senior research scientist in the Biodiversity Research Programme at the Finnish Environment Institute (SYKE). His background is in ecology and conservation of insects with PhD in Zoology from the University of Helsinki. His research interests follow two major lines: the management of insect communities in semi-natural grasslands and the combined impacts of climate change, habitat loss and species traits on boreal insect communities. His studies on grassland insects have mainly focused on the effects of management on butterflies and moths, but more recently also on bees and aculeate wasps. Juha has experience on the practical conservation issues of insects through participation in the working groups for butterflies and moths as well as for bees and aculeate wasps in Finland.

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Grazing management influences moth community structure on a Scottish upland estate



Nick Littlewood
Macaulay Land Use Research Institute, UK

Ongoing changes to grazing regimes in the Scottish uplands, especially the removal of sheep, are likely to have significant impacts on biodiversity. To investigate cascading multi-trophic interactions, a grazing experiment with four grazing treatments and six replicates was established on an upland acid grassland site in Perthshire, Scotland. Nocturnal adult moths were sampled by light-trapping in the fifth and sixth years after establishment of treatments. Moth abundance and species richness were lowest in the most intensely sheep-grazed treatment and highest in low-intensity sheep grazing and ungrazed treatments. Grazing impacts on community structure were investigated by assigning moth species to a number of groupings. Grazing treatment interacted significantly with larval foodplant preference with a disproportionately high number of graminoid-feeding species being present in the ungrazed treatment. There was also a significant interaction with the moths' over-wintering life stage. Species overwintering as eggs were well-represented in the low-intensity sheep grazed treatment whilst those overwintering as caterpillars were well represented in the ungrazed treatment. A continued reduction in livestock grazing levels on the Scottish uplands may lead to a general increase in moth abundance but a decline for species within some functional groups.

Nick Littlewood is an applied ecologist with a strong background in wildlife conservation. He leads on terrestrial insect ecology at the Macaulay Land Use Research Institute and has particular interest in Lepidoptera and Auchenorrhyncha community ecology. Nick sits on the Management and Steering Groups of the North East Scotland Biological Records Centre (NESBREc) and the North East Scotland Biodiversity Partnership and edits the annual North East Scotland Bird Report

Further Information

Littlewood, N.A., (2008) Grazing impacts on moth diversity and abundance on a Scottish upland estate. *Insect Conservation and Diversity*, 1: 151-160.

Glen Fingas Project: www.programme3.net/heritage/glenfinglas.php

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Enhancing the ecological diversity of Carabidae (Coleoptera) in riparian margins



Lorna Cole
SAC, UK

Erecting fences along riparian field margins in intensively managed grasslands not only helps to mitigate diffuse pollution but also has the potential to enhance farmland biodiversity. This study surveyed a range of riparian margins and analysed carabid assemblages to determine the influence of riparian management on carabid ecological structure. While the ecological composition of wide riparian margins (> 4m) was distinct from unfenced margins and the adjacent field, the composition of narrow margins (< 2m) was not. Wide margins had a higher proportion of flightless carabids and species that overwinter as adults indicating that wide margins provide more stable habitats with greater refuge potential for overwintering beetles. Wide margins therefore appear to have greater potential than narrow margins at enhancing the ecological diversity of carabids at the farm level.

Lorna Cole is an agricultural ecologist based at SAC (Scottish Agricultural College). Her research focuses on the interaction between farming practices and wildlife with the aim of determining ways of integrating biodiversity goals into intensive farming systems. She specialises in carabid beetles and is particularly interested in modelling them at both the species and ecological group level.

Further Information

Cole, L.J., Morton, R., Harrison, W., McCracken, D.I & Roberston, D. 2008. The influence of riparian buffer strips on Carabid beetle (Coleoptera, Carabidae) assemblage structure and diversity in intensively managed grassland fields. *Biodiversity and Conservation* 17: 2233-2245.

Cole, L.J., McCracken, D.I., Baker, L. & Parish, D. 2007 Grassland conservation headlands: Their impact on invertebrate assemblages in intensively managed grasslands. *Agriculture, Ecosystems & Environment*: 122: 252-258.



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The influence of hay production practices on the butterfly fauna of Romanian subalpine meadows



Sally Huband

The Macaulay Land Use Research Institute, UK

Low-intensity farming maintains large areas of semi-natural grasslands in the Romanian uplands but there are few examples of studies considering the relationship between land use practices and the biodiversity of these habitats. This research investigated the relationship between hay meadow management and the temporal and spatial patterns of butterfly assemblages in the meadows of one mountain village. Standard butterfly transects were used and 46 species were recorded during the course of two summers in a transect corridor area equating to 1.7 hectares. This confirmed the high nature value of hay meadow management in the study location. Ordination of the butterfly data confirmed the destructive impact of mowing for adult butterflies, at the level of the meadow, but also revealed the importance for later emerging species of having late mown meadows and unmanaged grassland in the landscape. The presence of many small meadows, their idiosyncratic management by smallholders and variations in the natural environment all combine to produce heterogeneity in the hay meadow habitat. This heterogeneity is important for maintaining the diversity of butterflies and other semi-natural grassland species, but it is likely to lessen as the already evident trend of land abandonment accelerates.

Sally Huband is an interdisciplinary scientist with a background in ecology and the social sciences. Her PhD combined ecology and social anthropology to research the role of Romanian pastoralists in conserving biodiversity. Her post doctoral research at the Macaulay Land Use Research Institute explores the cultural meanings attached to farming and to hunting as a means to understanding peoples' attitudes towards biodiversity.

Further Information

www.efncp.org/hnv-showcases/romanian-carpathian-mountains/

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Land use and socioeconomics: the current situation and prospects for butterflies in the hay and grazing meadows of the Picos de Europa, northern Spain



John Dover
Staffordshire University, UK

Agricultural policy and economics combine to threaten biodiversity in mountain landscapes: intensification of easily accessible meadows and abandonment of smaller, less accessible, meadows.

We examined land-use change in the Picos de Europa, Cantabria, from 1951-2004, in a 1.5x1.6km study area. We carried out butterfly transects around 47 meadows and investigated the impact of landscape, biotic and abiotic parameters on species richness and abundance. Mark-recapture studies were used to assess the impact of the current landscape configuration on dispersal. Shrinkage of meadows was evident; 58% of grazing meadows and 5% of hay meadows were completely lost. In 2004 15,000+ butterflies of 75 species were recorded. Species richness was affected by altitude, presence of water, scrub, aspect and slope; hay meadow management was positive for satyrid butterflies but negative for violet-feeding fritillaries. Total abundance was negatively affected by summer grazing, but hay meadow management was positive for satyrids. Water, scrub, altitude, and slope positively affected abundance of family groupings, with density of *Plantago lanceolata* and distance to nearest meadow being negative. Dispersal was strong for some species, but more restricted in others.

The prospects for butterflies in this mountain landscape are likely to worsen if loss and shrinkage trends are not halted.

John Dover's research interests lie in the broad field of landscape ecology and biodiversity, with a particular focus on biodiversity in relation to regeneration/green infrastructure, the ecology and status of green lanes (England), the ecology of the western jewel butterfly *Hypochrysops halyaetus* in remnant *Banksia* woodland (Australia), factors affecting the distribution, abundance and species richness of butterflies in the wider countryside and insect dispersal studies in relation to wildlife corridors.

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