

9th Student Conference on Conservation Science, Balatonvilágos 2024

*SCCS Europe - Connecting Eastern and Western Europe in conservation
biology*

*Balatonvilágos (Lake Balaton), Hungary
10 – 14 September 2024*

ABSTRACTS



*Eds: T. Németh, G. Süle, A. Báldi, B. Palotás
HUN-REN Centre for Ecological Research*

<https://sccs.ecolres.hu/>

Background of the conference

The Student Conference on Conservation Science series started in Cambridge and have expanded with Brisbane, Beijing, Bangalore and New York.

SCCS is the largest international conference in conservation science, where students and early career scientists are welcomed and have the chance to present their research, learn from each other and meet with experts of the field who can offer them guidance in their future careers.

In 2015, Hungary joined this inspiring event and organizes a conference, especially for young scientists from all around Europe to build a network among the presented parts of the continent.

Plenary speakers at the SCCS Europe 2024

Yann Clough



Yann Clough is Professor in Environmental Sciences and Assistant Director for Research at the Centre for Environmental and Climate science (CEC), Lund university, Sweden. He studied agriculture in France and the Netherlands, and did his PhD in Agroecology in Göttingen, comparing biodiversity in organic and conventional agriculture. His work focusses on the links between land-use, biodiversity, ecosystem services and resilience to climate change in farm and farm-forest landscapes in temperate and tropical agricultural systems. Much of his research is interdisciplinary, and international collaboration currently includes participation in H2020 Safeguard (European Pollinators) and UPSCALE (Upscaling push-pull technology in East Africa). He currently leads the ERC Project DrivenByPollinators aimed at assessing the role of pollinators in mediating effects of landscape-scale land-use effects on plant communities.

Costanza Geppert



Costanza Geppert is a researcher at the University of Padova, in Italy. After a MSc thesis on the effectiveness of flower strips and organic farming to support pollinators at Goettingen University (DE), she was awarded her PhD for studies on climate change effects on plants and herbivore insects at the University of Padova. Currently, she works on social-ecological systems, ecosystem services and human-nature connections, with a focus on insects. She teaches a course on insects under global change.

Deepa Senapathi



Deepa Senapathi trained as an ecologist and conservation biologist. After completing her undergraduate studies in Zoology at the University of Madras, India, she briefly explored aspects of Molecular Ecology as a visiting researcher at the University of Cambridge. She then moved away from the lab to the field and completed a MSc in Applied Ecology and Conservation at the University of East Anglia before completing her PhD at the University of Reading, UK. She has worked on critically endangered bird species including the Jerdon's Courser and the Mauritius Kestrel but has focussed more on insect pollinator conservation over the last decade. Her research focusses on the impacts of environmental change on biodiversity and ecosystem services. More recently she had focussed on knowledge exchange and working with policymakers and land managers to enhance land management for biodiversity and improve livelihoods.

Tamara Mitrofanenko



Tamara Mitrofanenko is working as an expert in the field of regional sustainable development as part of the team of the United Nations Environment Programme, Office in Vienna, Secretariat of the Carpathian Convention and at the University of Natural Resources and life Sciences, Vienna (BOKU), Institute of Landscape Development, Recreation and Conservation Planning (ILEN). Her work has been largely focused on Central and Eastern Europe, and the Caucasus countries. Her PhD Thesis was focused on “Integrating approaches from the Intergenerational field into protected area management and regional development governance”. Since learning about the importance of transdisciplinary approaches for sustainable regional development, she has devoted her efforts to integration of transdisciplinary approaches into academic systems and policy processes as well as science-policy-practice interface in the context of sustainable regional development, as well as Education for Sustainable Development.

Agnieszka Wypych



Agnieszka Wypych is an associate professor in climatology at Jagiellonian University in Krakow and works also in the Institute of Meteorology and Water Management - National Research Institute which serves as National Weather Service in Poland. Her main research fields cover climatology, hydroclimatology and GIS in environmental sciences while the current research interests are mostly weather extremes as well as climate change and variability and its impact on the environment and the society. She is currently a head of Human-Environmental Systems Research Centre at Jagiellonian University and also a chair of the Commission on Climatology International Geographical Union.

Magdalena Kubal-Czerwińska



Magdalena Kubal-Czerwińska, is an Assistant Professor in the Department of Tourism and Health Resort Management, Institute of Geography and Spatial Management, Faculty of Geography and Geology at the Jagiellonian University in Krakow. Her background is solid in socio-economic geography and tourism, she holds both: MSc and PhD in Tourism Geography. She is an active and involved researcher with research interests revolving around such topics as entrepreneurial behaviour in hospitality on rural areas, gender in tourism, cultural tourism, sustainable development in tourism and hospitality, attitudes and behaviours towards the problem of reducing food waste. She was involved as a researcher in national and international projects, e.g., the Visegrad funds, Twinning (H2020), National Science Centre (Poland). She is an active member of the Human-Environmental Systems Research Centre (HES Research Centre) at the Faculty of Geography and Geology of the Jagiellonian University, a center of excellence in the field of research on human-environmental system.

Daniel Fischer



Daniel Fischer is professor of Sustainability Education and Communication at Leuphana University Lüneburg, where he also holds the UNESCO Chair in Higher Education for Sustainable Development. His research explores how more sustainable ways of living can be facilitated in education, with a special emphasis on Teacher Education. He uses inter- and transdisciplinary approaches to understand how sustainable practices of meeting needs evolve and change over time and in different cultural settings, and what role communication and learning processes play in this. Daniel led several grant-funded projects nationally and internationally to study how innovative practices like mindfulness, storytelling, or citizen science can raise reflexivity, build competencies, and empower learners to take action. As part of the Sustainability Education and Transdisciplinary Research Institute (SETRI) at Leuphana University, Daniel's work contributes to bridging boundaries between research and practice for transformative change.

Péter Batáry



Péter Batáry is a scientific advisor and research group leader at the HUN-REN Centre for Ecological Research, in Hungary. He studied biology and ecology in Budapest, and performed his PhD in behaviour ecology in Debrecen, Hungary. He then moved for eleven years to the University of Göttingen, Germany, and focused on agroecology. Major fields of his interest are case studies and meta-analyses about grassland fragmentation, biological effectiveness of agri-environment schemes, pest control and pollination. He is interested in agroecology, urban ecology, and how environmental interventions can be aligned with production or development.

Awards SCCS Europe 2024

Best Talk Awards

- Ahlam Sentil: „The critical role of maintaining the native wild vegetation for pollinator conservation despite the use of habitat plants”
- Réka Szilágyi: „Social-ecological integration of corncrake (*Crex crex*) conservation in a Transylvanian cultural landscape”
- Gergő Rák: „Plant community driven habitat choice of a grassland specialist: the Hungarian meadow viper prefers community transitions”

Best Poster Awards

- Ágnes Tóth: „The vertical distribution of the soil seed bank in wet meadows and implications for restoration”
- Abdubakir Kushbokov: „Soil seed bank assessments along degradation gradients in the Kyzylkum desert”

The awards comprised of free publication opportunities in Nature conservation journal from Pensoft and book prizes from Zsolt Molnár (HUN-REN Centre for Ecological Research).



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Talks and posters

of the

9th SCCS Europe

Balatonvilágos, Hungary

10 – 14 September

2024

Talks

Genetic structure and diversity of eastern imperial eagle populations across Eurasia

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The eastern imperial eagle is a long-lived raptor species with a wide Eurasian distribution. Russia and Kazakhstan possess the largest populations, which are migratory, while the western populations are mostly sedentary. We analysed feather samples of 204 individuals collected from nine geographical populations then examined their genetic structure and diversity. Our results suggest a population structure with four distinct clades: 1. Carpathian Basin, 2. Northern Macedonia, 3. Thrace-Anatolia and 4. the unit of eastern populations. Despite of the geographic proximity, the three western clades showed a higher degree of differentiation than expected and all three of them were more similar to the eastern clade than to each other. This pattern could be explained by bottleneck effects and fragmentation of the western population or a colonization scenario with eastern origin. Our findings serve as genetic proof for strong philopatric behaviour, which likely limits gene flow. This and the western non-migrating behaviour increase the risk of inbreeding in the future. Our research raises awareness for the monitoring of isolated populations and for the potential genetic consequences of non-continuous distribution paired with non-migrating behaviour.

The critical role of maintaining the native wild vegetation for pollinator conservation despite the use of habitat plants

Ahlam Sentil¹, Thomas James Wood¹, Patrick Lhomme¹, Laila Hamroud¹, Insafe El Abdouni¹, Oumayma Ihsane^{1,2}, Youssef Bencharki², Pierre Rasmont¹, Stefanie Christmann², Denis Michez¹

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Several management practices have been suggested to mitigate the global pollinator decline in agro-ecosystems, including wildflower strips and Farming with Alternative Pollinators (FAP). FAP dedicates 25% of the field area to seed Marketable Habitat Enhancement Plants (MHEP) around the main crop, occupying 75% of the field. However, wild pollinators may not rely fully on the resources that FAP provides, and need additional resources from wild flowering plant communities. Here we aim to compare wild pollinator communities between FAP fields, monoculture and the nearby wild flowering plants. We developed two experimental trials with two main crops (faba bean and eggplant) in North-West Morocco and we compared wild pollinator richness and wild pollinator specialization between FAP fields, control fields and the nearby wild flowering plants. We recorded a significantly higher pollinator richness in FAP fields compared to wild flowering plants and monoculture. Moreover, 28% of the pollinator species collected, were only observed on wild plants. These results highlight the potential of FAP approach as a tool for pollinator conservation in farmlands. However, the maintenance of the surrounding wild flowering plants is necessary to cater all the pollinators present in farmlands.

The influence of linear landscape elements on the diversity and abundance of pollinators in Serbia

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Linear landscape elements play a crucial role in supporting many species by providing habitats and facilitating movement and genetic exchange. However, they can also act as barriers, disrupting these connections. The SPAS project (Serbian Pollinator Advice Strategy), funded by the Science Fund of the Republic of Serbia, monitors insect pollinators in Serbia, raises awareness of their importance, and advises on improving pollination services crucial for food quality and crop yield. During this project we examined the effects of natural and artificial linear landscape elements on the diversity and abundance of hoverflies, wild bees, and butterflies in Serbia. Data were collected from 30 sites during three seasons (spring, summer, and autumn) over two years (2022 and 2023). This research aims to provide a better basis for successful landscape management strategies and conservation policies, ultimately aiding species conservation.

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Connecting protist to conservation ecology: rare ciliates from a highly human-impacted side-arm of the Danube River

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Large rivers are highly human-impacted, especially side-arms that flow through large cities. How the biofilm, a crucial functional group in river ecosystems, changes in terms of species composition over an entire seasonal cycle remained understudied. Here, we examined the heterotrophic protists in the biofilm of the Soroksár Danube (Danube side-arm), significantly affected by human impact. We studied the colonization patterns using glass slides, following species composition at day 1, 3, 6, 11, and 28 days, from December 2020 to November 2023. Two rare ciliates appeared only during certain times. First, *Stentor niger* (Mueller, 1773) was characteristic of the spring and early summer periods, a species that has not been previously recorded in Hungary. The morphological and autecological descriptions of this species are incomplete, and its known occurrences are questionable due to frequent misidentifications. Second, *Apocarchesium arndti* (Norf & Foissner, 2010) played a significant role in the biofilm community during late summer. The ecological requirements of the species is unclear with only sporadic occurrence from Germany and Hungary. Our results highlight the conservation value of even heavily human-impacted large river stretches from the middle Danube.

Insufficient scientific evidence hinders large carnivore management in Romania

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Romania hosts Europe's largest population of brown bears and gray wolves. Due to the rapid anthropization of the landscape, human-large carnivore interactions are increasingly common. Thus, evidence-based actions are needed to achieve coexistence. This study aims to increase the effectiveness of large carnivore management by (1) assessing the alignment of the conservation actions enforced in Romanian protected areas management plans by comparing these actions with evidence-based actions; (2) analyzing the perceptions of the local population regarding the national management actions of the European brown bear and gray wolf; and (3) exploring how the interaction with large carnivores influences the perception of the local population regarding the management actions applied. The results show that most enforced actions don't display convincing evidence of their effectiveness, many of which still have unknown conservation outcomes. Our survey exposed a low tolerance among people, particularly towards bears, an openness to hunting, and a lack of confidence in the authorities' decisions. This research contributes to large carnivores' conservation in Romania by aiding protected areas administrators to identify conservation actions with proven effectiveness while considering local needs.

Effects of propagule pressure, priority effect and trait similarity to control *Conyza canadensis* by seeding native species

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The success of invasive alien species (IAS) is aided by their characteristics, high propagule pressure and the priority effect. In a pot experiment, we investigated whether seeding native species can reduce the fitness of invasive alien *Conyza canadensis* if the native species have similar characteristics, if they have higher propagule pressure, or if we provide priority for natives. We selected four native species of varying trait similarity to *C. canadensis* (*Festuca vaginata*, *Galium verum*, *Gypsophila paniculata*, and *Saponaria officinalis*), sowed them separately and in mixture, at low (12 seeds) and high seed rates (60 seeds), and added *C. canadensis* at the same time or with one-month delay. We measured the height, leaf area, leaf weight, SLA, number of flowers and seeds and biomass of the mature plants. Using GLMMs, our results show that the height, biomass, and number of seeds of *C. canadensis* are negatively affected by the combined seeding of the four species, and that the biomass can be reduced by seeding native species with higher seed rates, while the SLA of *C. canadensis* can be reduced by sowing *F. vaginata*, *G. verum*, or *S. paniculata* in priority. We conclude that seeding of native species in mixture, at higher rates or in priority can control invasive *C. canadensis*.

Short-term effects of organic fertilization in species-rich mown grasslands

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Organic fertilization of Natura 2000 grasslands is not allowed in Hungary by law. However, the periodic removal of biomass-locked nutrients by mowing may reduce the soil nutrient content, potentially compromising biomass yield. Our aim was to reveal how organic fertilization affects the conservation value and the hay yield of species-rich saline, loess and fen grasslands. We chose 4 stands for each grassland type in central Hungary and applied 2 kg/m² cattle manure to 40×40 m treatment plots in February 2023, while adjacent plots of the same size were used as controls. Organic fertilization resulted in a significant increase of soil K, but we could detect no change in the levels N and P in the summer of 2023. We found no effect on the species composition and species richness of any grassland type, but biomass increased significantly, with 56, 46 and 20% on average in saline, loess and fen grasslands, respectively. This increase was restricted to graminoids; the biomass of forbs was not affected by treatment. In the first growing season after the treatment we found no negative effect of single organic fertilization, while the significant increase of biomass can be considered a favourable outcome. However, longer term monitoring is needed to draw a final conclusion.

Acclimative/adaptive mechanisms of *Vallisneria americana* in the outflows of Lake Hévíz and implications for ecosystem expansion

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Invasive species pose a significant threat to ecosystems worldwide. One such invasive species, *Vallisneria spiralis*, has been identified along 40 km of the western shore of Lake Balaton. This study focused on the allochthonous *Vallisneria americana* Michx. in the outflows of a thermal lake, Lake Hévíz, which poses a potential threat. Two populations from different sections (upper and lower) of the outflow were studied. Significant differences were observed in the photophysiological traits of these populations, with the population in the lower part of the outflow showing signs of better fitness compared to the upper population. These results suggest an ongoing adaptation of *Vallisneria americana* to the colder conditions in the lower part of the Hévíz Lake outflow. This adaptation indicates a potential for further spread towards Lake Balaton, raising concerns about its impact on the local ecosystem. Understanding the adaptive mechanisms of *Vallisneria americana* is crucial for developing management strategies to limit its spread and preserve the ecological balance of Lake Balaton and its surroundings.

Effect of habitat type on pollinators in a protected area

Edoardo Lincetto

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Pollinator insects are in decline, mostly due to habitat loss and fragmentation. Preserving different habitat types is crucial for pollinator protection, because different habitat types, such as forests or calcareous grasslands, maintain extremely different pollinator communities. The focus of this thesis is to study the diversity and abundance of syrphid flies and bees of the Euganean Hills, a protected area in North Eastern Italy, in three different types of habitats: abandoned quarries, calcareous grasslands and forest edges. In this regard 24 sites have been selected, which were sampled in four different periods between May and July using transects. Our results show that the forest edge is the habitat type with the highest abundance in syrphid species, while abandoned quarries and calcareous grasslands have both comparable values. For the bees instead, the habitat type with the highest abundance is the abandoned quarry, following forest edges and calcareous grasslands. Surprisingly, abandoned quarries resulted important habitat for pollinators. In conclusion, our results confirm that to support pollinator diversity, it is recommended to maintain a high diversity of habitat types.

Assessment of germination strategies of lowland hay meadow species to optimize locally sourced seeds for ecosystem resilience

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The restoration of lowland hay meadow should coincide with conserving native flora to sustain ecosystem resilience. However, erratic availability and quality limit native seed uses. For wild species, germination capacity result occasionally leads to misinterpretation in the field. Thus, the study aimed to select germination parameters as determinant clustering factors of tested species, investigate correlation the cluster performance with seed mass and predict germinability based on climatic factors. Seeds of 23 meadow species were sourced from 3 areas and weighed with Thousand Seed Weight method. Germination test was conducted for 50 seeds/species in 3 replications under 20°C/16 hours (dark): 30°C/8 hours (light) with 1000 lux (light intensity) on environmental growing chamber for 34 days. Species were divided into the highest-early, mid-high late, mid-low early, lowest-late, and dormant cluster based on germination capacity, rate, synchrony, and uncertainty. This distinctness expressed intra-specific variation of germination strategies with greater germination performance correlated inversely with larger-seeded size due to dormancy. An increase in monthly temperature and precipitation was forecasted to reduce germinability. These results may assist local seed mixture making.

Plant community driven habitat choice of a grassland specialist: the Hungarian meadow viper prefers community transitions

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This study aimed to define the viper's habitat selection by examining (i) preferences for different land cover types, (ii) the impact of habitat patch transition distances on occupancy, and (iii) the effects of habitat composition at various spatial scales. Viper observations from 2010 to 2024 and land cover maps were used. Ivlev's electivity index used for land cover preference analysis, while the effect of transition distances on viper presence was examined by GLM. Habitat composition effects were examined at various spatial scales to determine which describes the presence of vipers best. PCA reduced habitat composition data dimensionality, and GLMM assessed the influence of these principal components and Shannon diversity at increasing scales. Results showed a preference for closed sand steppes, dry and semi-dry grasslands, open sand steppes, and mesotrophic wet meadows. Distance from habitat transitions negatively affected viper occupancy. PCA identified four principal components significantly influencing habitat preferences, with larger scales more important for explaining habitat composition effects and Shannon diversity decreasing in significance with increasing scale. This study offers crucial insights for conservation strategies to preserve this grassland specialist.

Increased habitat diversity in agricultural landscapes attract birds, but do not change bird community composition

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Agricultural intensification is a principal driver of biodiversity loss. Restoration of low-disturbance habitat patches could mitigate this crisis. To assess the effects of landscape and spatial context of low-disturbance habitat patches, we established diverse native flower plantings in heterogeneous and homogeneous agricultural landscapes in Central Hungary. We used three spatial configurations at each site: one large field, three smaller strips, and a control site. Five years later, we conducted point count of birds at our sites (in April and May). Each point count lasted 10 minutes, birds were recorded within a 100 m radius from the middle of the sites. We showed that there were more bird species and abundance in heterogeneous landscapes. More species were present at fields, than at control sites. On bird abundance, treatment had a significant interaction effect with landscape context: there were no difference between treatments at heterogeneous sites, while in homogeneous agricultural landscapes both fields and strips increased bird abundance. Neither treatment, landscape context nor sampling round had an effect on community composition. In conclusion, increased habitat diversity via plantings affects birds positively, especially in homogeneous agricultural landscapes.

Key factors in the conservation of a mountainous grasshopper's declining populations in Central Europe

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The large banded grasshopper *Arcyptera fusca* (Pallas, 1773) has a wide Eurasian distribution. Local extinctions and significant population declines are known from its entire range. This trend is more pronounced in Central Europe, with serious losses in Hungary too, where over the last decades only eight populations remained from the previously known 31 mostly due to the abandonment of mountain meadows. We aimed to study such underlying factors in the decline of *A. fusca* in Hungary, which can be controlled by conservational tools to promote its long-term regional survival. We found that nymphs and adults generally prefer microhabitats with short vegetation. Moreover, freshly hatched nymphs were mainly found on patches with bare soil, suggesting the principal importance of these spots for oviposition. *A. fusca* turned out to be a polyphagous species, meaning that its presence should not depend on the prevalence of a particular plant species. Using mark-recapture method, we showed that nymphs and adults have a low dispersal ability, making it impossible for them to colonize highly fragmented habitats. Therefore, regular mowing and creating bare patches can help the local survival of extant populations, while establishing new populations can promote its regional survival.

Urban and garden ponds as amphibian habitats in a European city (Budapest, Hungary)

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Amphibians are the most threatened vertebrates with more than 41% of amphibian species considered to be currently at risk of extinction due to urbanization, habitat loss, degradation, fragmentation and the spread of invasive species. Drastic declines in amphibian populations threaten the long-term conservation prospects of worldwide biodiversity as all these stressors affect amphibian populations at different spatial scales. To preserve biodiversity and maintain the quality of aquatic ecosystems it is important to analyze patterns and underlying mechanisms that drive habitat use of amphibians both on individual species level and on a community level. Although public ponds provide suitable habitat for amphibian species, thereby promoting freshwater biodiversity, there is an increasing awareness of the potential role of garden ponds. Garden ponds can increase habitat connectivity in the landscape and provide refugia for species to escape local extinction events, thereby stabilizing metapopulation dynamics within urban landscapes. By using a dataset compiled as part of a citizen science project in 2022 we aim to investigate the potential differences in species composition of urban and garden ponds, and to identify the drivers and underlying mechanisms behind any observed difference.

Influence of vegetation structure on occupancy of the Hungarian meadow viper (*Vipera ursinii rakosiensis*)

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The endangered Hungarian Meadow Viper has lost the vast majority of its range over the last century, and its abundance has not increased significantly despite many conservation measures. There is a lack of knowledge on the vegetation structural factors that determine occupancy of the viper. We collected data in the habitats of Kiskunság during four spring and autumn seasons. We surveyed quadrats for vipers and photographs were taken against a whiteboard placed in the vegetation to investigate the effect of the mean value of vegetation structure variables measured in each quadrat on occupancy. We ran occupancy models in which the probability of detecting vipers was explained by the mean operational temperature per survey and the probability of occupancy by vegetation structural factors. The best models included the height of closed vegetation, which had negative effect on occupancy. Operative temperature showed also a negative effect on the viper detectability. This suggests that occupancy may be affected by vegetation structural factors, with a preference for more open vegetation beyond a minimum cover,

maybe for thermoregulatory reasons. Conservation interventions and grazing might be important to ensure a heterogeneous, low density vegetation structure preferred by the viper.

Comparison of pollinator communities between semi-natural grasslands and newly restored grassland parcels in an agricultural landscape

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Nowadays, due to the intensification of agriculture and the increase in demand for feed and food, large amounts of land are used for agricultural purposes. This often means creating monocultures (sowing one crop over a large area) in places where valuable habitats would otherwise be found. This practice leads to the degradation of these habitats and a loss of biodiversity. In the Kiskunság region, 8 landscape fragments of 0.5 ha in size have been set aside from cultivated areas in 2020. These plots were sown with a seed mixture of insect-pollinated plants. This treatment has created new grassland fragments in the landscape in the hope that they will halt the decline in pollinator diversity. To assess how effective this treatment is, we used Malaise traps. These are tent-like traps that collect insects that fly into them. The insects caught include bees, hoverflies and butterflies, all important pollinators. The results can show how and to what extent the pollinator communities of grasslands differ from the pollinator communities of restored grasslands we have created.

Connecting pelagic biodiversity – ecosystem functioning research to river restoration

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Large rivers are among the most human-impacted ecosystems. Global warming severely affects climate components, impacting large river environment. In Europe, precipitation is expected to increase in the northern, but decrease in the southern regions, significantly affecting river hydrology. Seasonal water discharge is altered, with low-flow conditions becoming more frequent and water temperatures rising. Human activities, such as the construction of hydropower dams, have increased over the last century, while nutrient pollution from wastewater and agriculture has improved, especially in the last two decades. However, freshwater biodiversity and corresponding ecosystem functions remain severely impacted, potentially leading to the loss of essential services for humans. This study highlights that large river plankton communities can help understand ecosystem-level responses to environmental change, and the role biodiversity plays in mediating the response, based on the biodiversity-ecosystem functioning (BEF) relationship within and across multiple trophic levels. Our results underscore the difficulty in generalizing the BEF relationship in large river plankton, and to draw conclusions for diversity-related river restoration actions.

Restoring soils with organic soil amendments; A case study in South Iceland

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Soil is being threatened by anthropogenic activities like erosion, infertility from excessive use of chemical fertilizers and desertification that is amplified by climate change. This research aimed to analyse the effects of four organic soil amendments (municipal waste, bokashi, chicken manure, and bonemeal) on soil properties and vegetation cover in comparison to two application rates of chemical fertilizers and a control. Methods involved: soil samples analysis (pH, SOM, C/N, and available carbon); vegetation surveys (vegetation height, vegetation cover) in 2021 and 2022; and a tea-bag index study. Bonemeal plots had higher soil pH than in plots where higher dose of chemical fertilizer was applied. For 2021, chemical fertilizer plots had higher grass cover and vegetation height than the control. For 2022, vegetation cover was higher for plots with chemical fertilizer, bonemeal, and chicken manure than the control. Litter stabilisation factor was higher for chicken manure than in the control and bokashi plots. This study highlighted chicken manure and bonemeal as alternatives to chemical fertilizers and is an important step for reducing waste and achieving circular economy by restoring soils using locally sourced organic soil amendments.

Social-ecological integration of corncrake (*Crex crex*) conservation in a Transylvanian cultural landscape

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As biodiversity in European agricultural areas is declining, many conservation programs aim to protect specific endangered species. One of the greatest challenges is to develop relevant and effective measures, that fit well to local social and ecological conditions. Our study assesses the social-ecological integration of the corncrake (*Crex crex*) conservation in an Eastern European cultural landscape. The analysis of semi-structured interviews conducted in the Csík and Gyergyó basins in Transylvania shows that this emblematic species is “known” by local farmers mainly due to the agri-environmental scheme dedicated to corncrake conservation. Individual strategies for participation or non-participation in the scheme depended on many factors, including the size, productivity and accessibility of a site, as well as other economic considerations. We identified the assumptions made by conservationists that turned out to be false when engaging in dialogue with local farmers. The study also assesses whether the specific measure has the capacity to shape the landscape at a larger scale. We argue that understanding the local social-ecological context and knowledge system is the basis for ethical and effective conservation.

How understanding movement patterns of mobile links can promote habitat restoration in grasslands

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Long-term, low-intensity grazing by large herbivores has become popular in grassland restoration due to its positive effects on habitat structure, biodiversity, and ecosystem resilience. These benefits arise from grazing, seed dispersal, nutrient distribution, and other activities performed by grazers as they move through the habitat. While such grazing practices are evidently positive, the drivers affecting movement and space-use among grazing animals are not yet fully understood, despite being essential for formulating data-driven recommendations for an optimal restoration of grasslands. Using advanced data science tools, we analyze 12 years of GPS-tracking data to characterize the movement of cattle and konik Polish horses in a German grassland conservation area. We analyze 1) the degree to which group behavior and spatial separation occur among and between species, 2) which behaviors can be extracted from tracking data and environmental parameters, and 3) how activity levels and space-use depend on season and environmental factors. Our results have direct implications for grassland restoration with grazers. Additionally, this study deepens our understanding of movement, opening the door to a fuller comprehension of the complex links between movement and the environment.

The impact of grazing livestock on grassland shorebirds in Hortobágy National Park

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Migratory shorebirds (*Charadriiformes*) are significant components of the biodiversity within the coastal grassland environment in the world. Shorebirds are primarily breed on coastal habitats, wetlands, mudflats, and shorelines, as these environments offer abundant food sources such as aquatic invertebrates, small fish, and algae. However, some shorebird species may also be found in or near grassland habitats, especially during certain parts of their life cycle or during migration. These species (*Charadriiformes*) require managed and coordinated conservation actions in countries that are part of either migration, breeding, or nonbreeding routes. Nowadays, shorebirds are facing intensively grazed in natural grasslands during breeding and migration seasons, highlighting decrease in species and abundance every year. There is a lot of evidence worldwide showing the negative effect of grazing livestock on the quantity and quality of shorebird habitat features. Additionally, grazing livestock dramatically changes vegetative structure and species composition, decreasing the density of native species, and replacing some species with others with different functional traits.

Functional traits insights: how landscape and transect factors influence pollinator responses

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Combining data on functional traits with taxonomic diversity is essential to better understand the interplay between biodiversity and ecosystem functioning. This study aimed to evaluate the key trait patterns of wild bees (WB), hoverflies (HF), and butterflies (BF), and the influence of different land cover types and transect characteristics on the distribution of trait categories (TC) of three pollinator groups. Sampling occurred at 26 sites in Serbia. The most prevalent TC for WB was soil as nest area (70%), for HF it was zoophagous larvae (49%), and for BF it was larvae in the field layer environment (40%). Grassland cover showed a positive correlation with certain TC for all three groups. At the transect level, there was a positive correlation between total flower cover and WB nesting in stems and wood ($p=0.039$); HF larvae feeding on roots, stems, plant leaves, and live animals ($p=0.021$); and BF larvae in ground, field, and shrub layers environment ($p=0.048$). Vegetation height positively affected WB and BF trait categories. Our results suggest that multiple variables and different spatial scales should be considered when studying pollinator ecology.

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Both local and landscape factors affect ground-dwelling spider assemblages of Eurasian forest steppes

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Forest steppes are among the biologically richest yet highly endangered ecosystems in the temperate zone. However, there is a notable knowledge gap regarding the local-scale and landscape-scale factors on the spider biodiversity of natural forest steppes. We investigated the effects of habitat type and landscape heterogeneity on spider diversity in forest steppes of Kiskunság National Park, Hungary. We sampled ground-dwelling spiders using pitfall traps in the grasslands, forest edges and forest interiors along a gradient of landscape composition (forest amount) and configuration (edge length) within 18 landscapes. We collected a total of 22,550 adult specimens belonging to 153 species. The three habitats of forest steppes showed a distinct community composition with a characteristic set of species traits. The forest edges had higher species richness than forest interiors. The trait diversity (RaoQ) was the highest in grasslands, while the lowest in the forests. We found that the increasing forest amount in the landscape positively affected species richness in grasslands but negatively in forest edges and interiors. Our results emphasise the importance of habitat complementarity and therefore the high value of all components of the forest-steppe landscape.

Effects of climate change and nest site competition on the reproduction of the barn owl (*Tyto alba*) and tawny owl (*Strix aluco*)

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As climate change intensifies, its effects may become increasingly pronounced, modifying fundamental ecological processes such as interspecific competition. In our long-term study spanning over 25 years, we examined the different breeding parameters of a sympatric barn owl (*Tyto alba*) and tawny owl (*Strix aluco*) population. For barn owls, breeding onset correlated with temperature and advanced over the study period, whereas the tawny owl's breeding onset unchanged. When the two species used the same nestbox in the same year (tawny owl starts breeding earlier), barn owls produced one more egg and owlet in average, and their breeding delayed by five weeks, which may have led to a reduction in their chances for second breeding as shown by the absence of these in this kind of nestboxes. In contrast, the tawny owl's breeding started one week earlier upon sequential breedings, also with increased clutch size, although this did not manifest in the number of fledglings. We suggest that the competition between the species is already significant and expected to

further intensify due to the effects of climate change. As the barn owl faces declining population trends in many areas, climate change and the competitive relationships described also hold significant conservation interest.

Posters

Soil seed bank assessments along degradation gradients in the Kyzylkum desert

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Due to unsustainable use, almost 50% of the rangelands have been degraded at various levels in Uzbekistan. The significance of soil seed banks (SSBs) in the self-restoration of degraded areas necessitates the assessment of their restoration potential. This study aims to assess the regeneration potential of the rangelands by evaluating the density and species composition of the SSB and comparing it with existing vegetation in the Kyzylkum desert. This will enable us to ascertain the importance of the seed bank resources in the soil and their interaction with aboveground vegetation. The evaluation has been conducted in 20 study sites starting from sacrificed areas (SA) near watering wells towards the moderately grazed distant areas. Four distinct gradient zones were selected, each including two transects and three plots (5x5 m) per transect (in total 480 plots). Preliminary results of the vegetation survey showed that *Peganum harmala* was the dominant species in the SA at all sites, indicating degraded rangeland. Moving away from wells, plant communities became increasingly species-rich, with *Artemisia diffusa*, *Carex physoides*, *C. pachystylis* in grasslands grazed at low intensity. The research is ongoing and the germination of the seed bank samples will be started in September 2024.

The vertical distribution of the soil seed bank in wet meadows and implications for restoration

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Habitat transformation and fragmentation is considered the main driver of biodiversity loss worldwide. Soil seed bank, as one of the seed-based approaches in habitat restoration, can play an important role in re-establishing the native vegetation composition and structure of degraded ecosystems. The aim of our study was to examine the restoration potential of the soil seed bank in wetlands in Central Hungary. We studied the soil seed bank of wet meadows at four depths (0-10 cm, 10-30 cm, 30-50 cm, 50-70 cm). Seedling emergence method was used to detect germinable seed densities. We found that the seed bank of wet meadows had high species richness and seed density. A large number of viable seeds was also found in deeper soil layers. Species with passive dispersal, less water requirement and larger seeds occurred in large abundance in the lower soil layers. The dominance of species without specialized spatial dispersal in the seed bank suggest that they invest more in temporal dispersal by soil seed bank. Our results imply that soil seed bank can support vegetation recovery and therefore, restoration projects can be based on soil seed banks, but the active introduction of some target species is necessary.

Socio-economic drivers for abandoning semi-natural grasslands in Europe

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The main aim of this study is to analyse the socio-economic drivers causing abandonment of and the incentives and policy measures that can prevent this trend in semi-natural grasslands in Europe. Understanding these aspects is important for maintaining biodiversity-rich traditional agricultural landscapes. A comprehensive literature review and expert interviews in Estonia, Sweden, Switzerland, Hungary, Italy, Spain, and Portugal were conducted to provide a diverse perspective on this issue. Our findings clearly pointed out that abandonment of semi-natural grasslands is a hot topic and have been taking place in all studied countries. The EU's common agricultural policy (CAP) has had a positive impact, providing financial support to reduce abandonment and increase the area of semi-natural grasslands. There was clear political willingness to address this issue, with a strong emphasis on the importance of these grasslands for biodiversity conservation and cultural heritage preservation in all over the Europe. The study also mapped out the key drivers of for abandonment, aiming to develop effective solutions like more diverse management plans. In conclusion, while financial incentives such as those provided by the CAP are beneficial, there is a need for more comprehensive policies. Continued political commitment, which is not guaranteed, and tailored solutions for specific regions are crucial to prevent further abandonment and ensure the sustainability of these agricultural landscapes.

Traditional knowledge and lichen conservation

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Conservation of lichens varies by geographical area. In Europe species protection is more ahead, but lacking in the tropics, though protecting habitats in national parks protects all organisms. Traditional knowledge may contribute to the conservation, especially in the tropics where it is more available. The knowledge of animals and higher plants is well documented worldwide compared to that of lichens. However, lichens have applications in medicine, monitoring, and they are important research object in various fields of science, have a role in succession and form a considerable part of biodiversity in various ecosystems. Despite their importance, lichens face significant threats from pollution, climate change, and habitat destruction. Semi-structured interviews were conducted in the Kenyan population to investigate how traditional knowledge contributes to the conservation of lichens. The results show a knowledge-gap between young and old people, mostly in urban areas except those in nature-related professions. Academic and traditional knowledge should be merged and passed to subsequent generations to maximize effective conservation. Additionally, sensitization of locals on the overcollection of lichens for their daily purposes could change their attitude toward conservation.

The effectiveness of different survey methods for monitoring pollinating insects in various habitats

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The status of pollinating insects is a matter of international concern, but knowledge of abundance and species declines is often limited due to a lack of systematic and consistent monitoring. Therefore, there is an urgent need for standardised protocols and a better understanding of how the effectiveness of different methods affects the estimation of pollinator insect abundance and diversity. The SPRING pollinator monitoring programme has developed and tested a standardised sampling method at European level, comparing two common methods of sampling wild pollinating insects (solitary bees, bumblebees and hoverflies): pan trap and transect collection. In the Pannonian region (Hungary and Romania) the efficiency of the two methods was studied at 12 sampling sites in 1 km quadrats (semi-natural and agricultural habitats). The pan trap and transect methods showed different patterns of pollinator communities. In most cases, the trap method detected more wild bees than the transect method. The difference between the two methods was significant in homogeneous intensive agricultural areas. Considering the different functioning of the methods and the environmental differences, we discuss their effectiveness for monitoring pollinating insect communities and pollination services.

Migration dynamics of Black-headed Gull (*Larus ridibundus* Linnaeus, 1766) on the Danube river in Novi Sad

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Gulls successfully use the different habitats and resources of urban environments, which causes a interactions with humans. In the non-breeding period the Black-headed Gull is especially numerous near cities on large rivers of the Pannonian Basin. In Novi Sad, they mostly feed at the city landfill, then roost on the Danube River within the urban area. Our research aimed to investigate the migration of Black-headed Gull (hereafter BHG) in Novi Sad by determining the movement directions of color-ringed individuals and monitoring the seasonal dynamics of abundance on the Danube from November to April during three wintering seasons. The color-ringed BHGs mostly move from north, northeast and northwest (Central and Eastern Europe). Almost half of the marked BHGs come from the landfill of Zagreb (Croatia). BHGs on the Danube in Novi Sad begin to gather in greater numbers during November, and the highest numbers are reached in February (29.166 individuals). BHGs are common and numerous species in Novi Sad during the non-breeding period, which can transmiss patogenes, antibiotic resistance and microplastics from landfill to the coast and river in the city. Future research should consider different strategies in order to manage interactions of humans and gulls in Novi Sad.

Detecting differences in foraging behaviour of *Bombus terrestris* on three plant species using computer vision-based methods

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To understand the processes behind pollinator declines we have to understand their behaviour because it can influence pollination efficiency. We aim to explore the foraging behaviour of bumblebees in field conditions, recognizing its importance from economic and conservation perspectives. We recorded bumblebees' movements on *Lotus creticus*, *Persicaria capitata*, and *Trifolium pratense* patches in urban areas of Terceira. For the automated bumblebee detection, we created computer vision models based on a deep learning algorithm. To estimate how much time bumblebees spent with handling and travelling, we estimated the colour similarity from areas where insects were detected to a predefined 'optimal flower colour' and compared their values among the three plant species. There were more bumblebees and they were flying longer paths in *Lotus* than in the other two plants. There was a significant difference in the handling time between different plants, with the longest being recorded on *Trifolium*. Our results indicate that the optimum handling time on the larger-headed *Trifolium* is longer than that on the smaller-headed *Persicaria* and *Lotus*, and also justifies that computer vision-based-monitoring can be used as a non-destructive, reliable tool for studying bumblebee foraging behaviour.



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