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# Editorial

By *Alessandra Fidelis*

Travelling has always been one of my greatest passions. If I can combine this with my second passion—plants—then it becomes the perfect experience. Even better is travelling to discover plants I have never seen before, in extraordinary landscapes, while sharing knowledge and experiences with colleagues from different parts of the world. What could be better than that?

I was strongly influenced by my MSc and PhD supervisor, Jörg Pfadenhauer, who taught me to be curious about plants and vegetation types across the globe. He also consistently encouraged me to attend conferences, broaden my scientific network, and, above all, explore different ecosystems and cultures.

The IAVS Symposia have given me the opportunity to do all these things: travel to different countries, meet colleagues and expand my network, participate in unforgettable excursions, and encounter plants that I previously knew only from books (well, not only plants, also scientists!). Most importantly, IAVS symposia are exceptionally welcoming to young scientists who are beginning their careers, eager to present their work, and excited to meet the renowned researchers they know from publications and textbooks.

My first IAVS Symposium was the 44th Symposium, held in Freising (Germany) in 2001. At that time, I had just completed my Bachelor's thesis and was in Germany as part of an exchange program. For a young scientist, participating in an international symposium alongside leading vegetation scientists was an extraordinary opportunity. I still remember having lunch and a wonderful conversation with Professor Eddy van der Maarel, who introduced me to the association, which was entirely new to me then. He explained how important it was to engage with a scientific society such as IAVS and emphasized how approachable and supportive the people at IAVS symposia



A. Fidelis presenting in IAVS Symposium in Greeley, Colorado, US, 2025.

were. He was absolutely right. During that symposium in Freising, I met my two future supervisors, an encounter that completely changed the direction of my career. I could never imagine that Freising would be my home for the next 8 years. After that first meeting, I became much more engaged with the association and started attending IAVS Symposia everytime I could.

The earliest IAVS symposia were held mainly in Germany from 1956 to 1981. In 1982, the symposium adopted the format and name we know today, beginning with the meeting in Prague. Since then, we have celebrated 67 IAVS Symposia. In recent decades, the meetings have been organized annually, usually alternating between locations in Europe and outside Europe. IAVS symposia have already taken place across North, Central, and South America, Africa, Oceania, and Asia, reflecting the truly international nature of our association.

Beyond the stimulating scientific presentations and discussions, the excursions are undoubtedly one of the highlights of every IAVS Symposium. Typically, there are pre- and post-symposium excursions (of several days), as well as mid-symposium field trips during the conference week (one day). For me, these excursions are the best way to experience vegetation types from different parts of the world while learning directly from local botanists and vegetation scientists. The symposia also provide opportunities for many important meetings: editors of AVS, JVS, and VCS discuss journal matters, working groups and sections meet to plan activities, the Council gathers for strategic discussions, and the General Assembly brings members together to learn more about the association's activities and future directions.



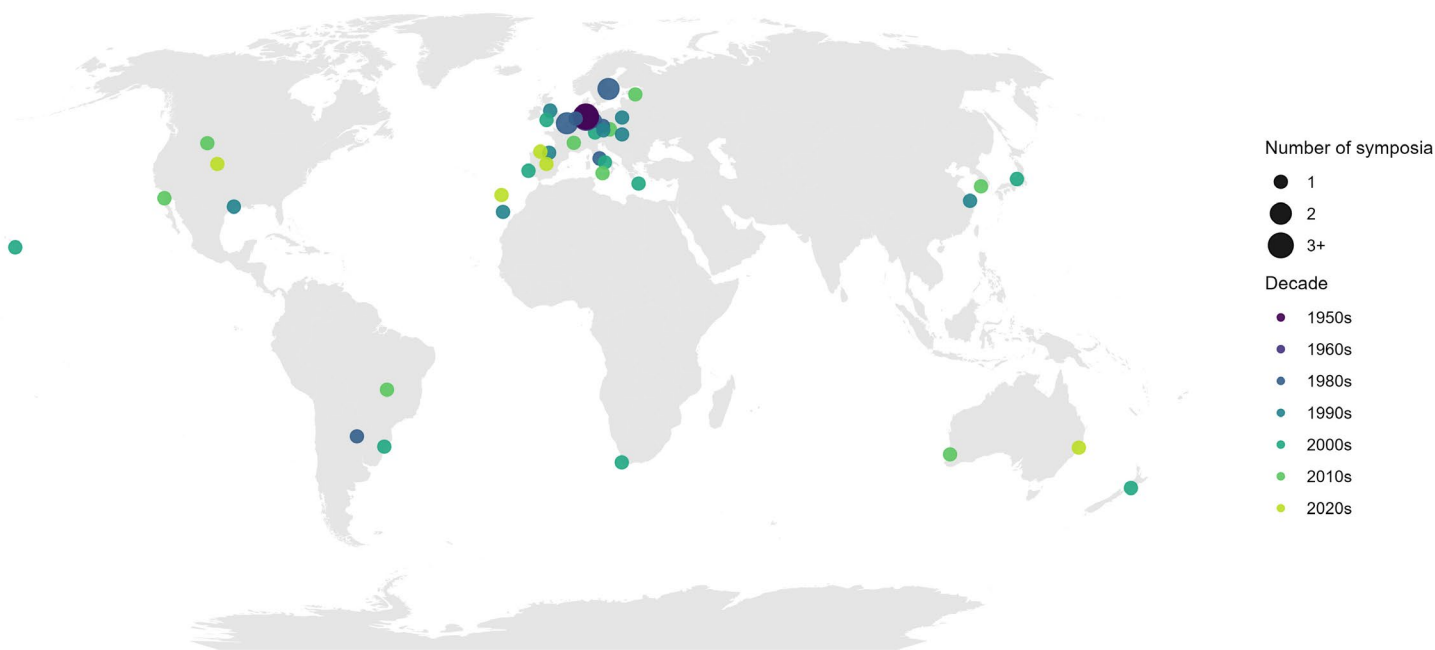
But how can students, early-career researchers, or even senior scientists from developing countries attend an international conference, that most of the times are so expensive? One important answer is the IAVS travel grants. Every year, IAVS offers travel support, and applicants do not need to be students to qualify. The grants may cover registration fees, travel expenses, accommodation, and even visa application costs when necessary. This demonstrates how strongly IAVS is committed to supporting its members and ensuring broad participation in the association's most important event.

And, of course, you can also organize an IAVS Symposium yourself. We know how challenging organizing a symposium can be, but it is also an incredible opportunity to bring this important event to your country and region. Hosting a symposium locally can make participation much more accessible for scientists and students who might otherwise be unable to attend. Think about it: when was the last time an IAVS Symposium took place close to your home?

If you are interested but unsure where to start, members of the Meetings Committee are always happy to help. I had the pleasure of helping organize the IAVS Symposium in Pirenópolis in 2016. Despite the hard work and many sleepless nights, the experience was immensely rewarding. We were especially pleased to see so many students and young scientists from Brazil and across South America attending the symposium. That meeting also created momentum for discussions that eventually led to the establishment of the Latin America and Caribbean Regional Section.

This year, the 68th Annual Symposium of the International Association for Vegetation Science will be held in Gijón, Spain. Next year, the 69th Annual Symposium of the International Association for Vegetation Science will be held in Ghana. So, if this editorial has inspired you to participate in—or perhaps even organize—an IAVS Symposium, I would be delighted to talk with you about it.

IAVS symposia



Location of IAVS symposia throughout the years. Prepared by I. Axmanová

# Professor Ioannis Tsiripidis (1971–2026), obituary

By Anna Mastrogianni

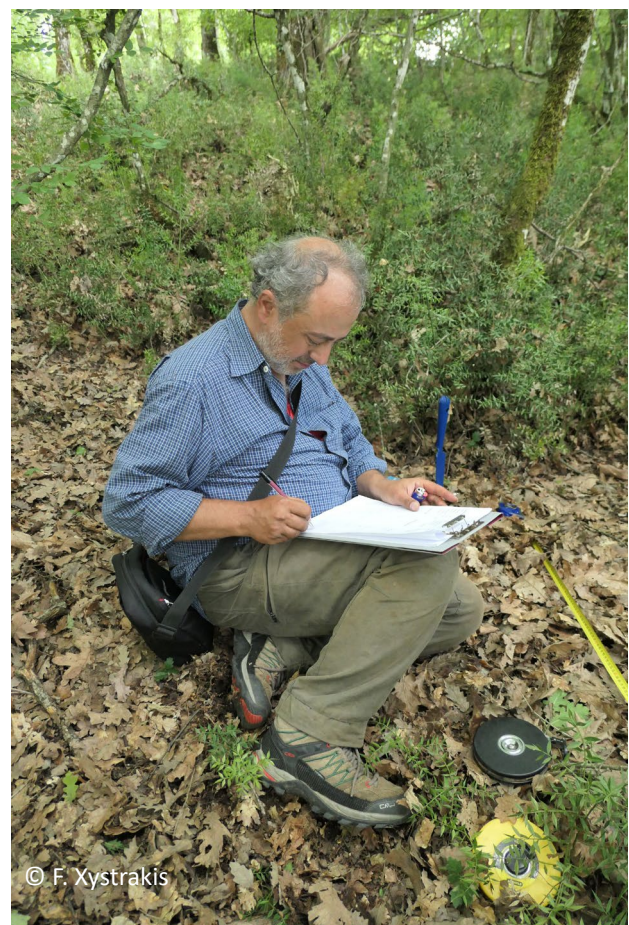
Professor Ioannis Tsiripidis, Greek phytosociologist, passed away on 23 February 2026 at the young age of 55. He was one of the country's most distinguished botanists, who dedicated his life and academic career to the study of plant communities and plant ecology, while he also contributed significantly to the field of monitoring and conservation of plant biodiversity of Greece.

Ioannis Tsiripidis was distinguished for his intellectual insight, his dedication to the study of vegetation, and his hard-working nature. He was known for his integrity and his selfless commitment to science, as well as to his students and collaborators. Yet his defining role within the botanical community was also closely tied to his warm personality, which, apart from being an outstanding scientist, made him also a trusted collaborator and a dear friend.

He was born in Thessaloniki on 8 May 1971, where he spent both his childhood and adult life. He studied at the School of Forestry and Natural Environment of the Aristotle University of Thessaloniki and decided to pursue research on the world of plants when he first observed a hawthorn flower (*Crataegus* spp.) under a stereoscope. After completing his undergraduate studies, he conducted his doctoral research on the plant communities of the beech forests of the Greek Rhodope Mountains, which he defended in 2001. After working for a few years as a researcher on projects related to the study and conservation of plant biodiversity, he pursued an academic and teaching career, eventually being appointed Lecturer in the School of Biology at the Aristotle University of Thessaloniki in 2004. As a member of the Laboratory of Systematic Botany and Phytogeography, over the following 22 years, he served the fields of



Ioannis in the Frakto region of the Rhodope Mountains, June 2015



Ioannis conducting vegetation sampling in the Zagori region (NW Greece), June 2020

vegetation science and plant biodiversity research with exceptional dedication, inspiring and training a large number of students and early-career researchers while producing significant scientific work. In addition, he served on several important national and international scientific committees, contributing substantially to the shaping of biodiversity policy, including Greece's "Natura 2000" Committee and the Working Group for the National Forest Strategy.

Ioannis Tsiripidis' main research field was phytosociology, with a particular emphasis on forest ecosystems. During a period of rapid developments in vegetation science, he enriched the Greek botanical community by contributing to a deeper understanding of the country's plant biodiversity while also adopting modern research methods and statistical approaches. Among his most notable qualities was his effortless ability to generate new research questions. The results of his research activity constitute a significant addition to the existing knowledge of plant biodiversity, already evident from the early stages of his scientific career.

Beginning with his contribution to the phytosociological study of beech forests, he helped reveal important phytogeographical patterns and the ecological gradients

underlying vegetation differentiation in Greece. From these early steps, he became an enthusiast of vegetation data and the insights their analysis could provide. Throughout his life, he tirelessly and passionately collected primary biodiversity data. He continuously generated new research questions and sampled new vegetation plots, often moving on to the next idea before fully exhausting the previous one. His scientific curiosity and creativity left behind an invaluable legacy of data and inspiration for his students and collaborators. Although the study of beech forest communities remained at the core of his research interests, he studied a wide range of vegetation types over the years. His work was driven by a desire to understand the complex mechanisms underlying species assembly in complex or rare habitats. Through the Master's and Doctoral theses he supervised, he aimed to address questions related to aquatic ecosystems, riparian and coastal vegetation, ravine forests of refugial character and patterns of vegetation succession following changes in traditional land use in the Greek countryside.

At the same time, he held a deep appreciation for the value and potential of databases. From the early stages of his career, he devoted a significant part of his research efforts to compiling vegetation data on beech forests in Greece, leading to the creation of the Hellenic Beech



Ioannis with fellow botanists during a field sampling trip in the Nea Kameni island, Santorini, Greece, March 2011

Forests Database. He had early recognized that the synthetic use of large sets of primary data could create great opportunities for ecological research. As a result, one of his major aspirations was the creation of the Vegetation Database of Greece, which would include as many published and unpublished vegetation plots as possible and serve as a valuable tool for plant biodiversity research at both national and international levels. Although this effort has now been almost completed, he unfortunately did not live to see the Vegetation Database of Greece published before his untimely passing. This database, which was created through many years of joint effort with his closest collaborators, is now for them to complete and publish.

An important element of his personality and a defining factor in his research career was his constant drive to enrich his work with newly available tools and contemporary research approaches. The flourishing of new methodologies in vegetation science in recent decades provided him with ideas and plans aimed at a holistic understanding of plant communities. He sought to make the simultaneous study of multiple facets of plant biodiversity an integral part of his research group's approach, he established permanent sampling plots for monitoring vegetation over time, experimented with modern methods for ecosystem mapping through the use of unmanned aerial vehicles, and incorporated multi-scale sampling into the research practice of his group. Yet he was not only a user of available methods, but he also

contributed to the development of methodology itself. With his well-known commitment to methodological rigor, he developed an algorithm for the identification of diagnostic taxa in vegetation datasets.

In recent years, a major focus of his work was the systematic collection of primary data on the functional traits of the Greek flora. With the support of his collaborators and students, Ioannis Tsiripidis laid the foundations for the creation of the Greek Functional Traits Database, which currently includes measurements from more than 4,500 plant individuals belonging to over 600 plant taxa. His vision was the continued enrichment of this database so that it would cover as much of the Greek flora as possible and serve as a valuable resource both for the study of functional diversity and for the implementation of evidence-based ecosystem management practices.

An important part of his contribution was closely linked to nature conservation and the implementation of European environmental policy. Ioannis Tsiripidis played a leading role in the design, coordination, and implementation of habitat type conservation status monitoring projects within the framework of the Natura 2000 network. Particularly, he contributed decisively to the development and application of the core methodology for assessing the conservation status of the country's habitat types. At the same time, within the framework of these activities, he collected an exceptionally large number of vegetation plots across almost the entire



Ioannis with colleagues in the Nestos Gorge during the field excursion of the 18th Conference of the Hellenic Botanical Society, October 2024

range of habitat types occurring in Northern Greece. In this way, he contributed substantially to the creation of a unique body of primary data for the applied study and management of nature, largely based on vegetation plots with periodically repeated surveys. One of his enduring goals was to update and expand the interpretation manual of the habitat types of Greece. He succeeded in completing it during the final year of his life, with the valuable contributions of colleagues from Greece and abroad, thereby delivering an important reference work to the scientific community. Through this work, he aimed to bridge applied nature study and management with the scientific study of vegetation. To this end, he created a habitat type identification key, while he also incorporated a syntaxonomic overview of the vegetation types occurring in Greece down to the level of alliances, and links between these alliances and habitat types. This work was based on key recent publications on vegetation syntaxonomy in Europe.

Ioannis Tsiripidis' published research output consists of 91 papers in international peer-reviewed journals and 18 books or book chapters. However, this surely represents only a small fraction of what he would have managed to contribute to the scientific community of vegetation science and phytosociology, if he had not passed away so early.

Beyond his published work, however, those who had the privilege of collaborating with Ioannis Tsiripidis will remember him as a deeply kind, easy-to-approach person, generous with his time, energy and knowledge. His hard-working nature and reliability made him a trustworthy companion in every joint endeavour. He was a particularly beloved member of the Greek botanical community, both as a researcher and as a friend, forming lasting relationships with many of his close colleagues and collaborators since the earliest stages of his scientific career.

Ioannis Tsiripidis's deep love for nature and vegetation could not go unnoticed by anyone who had the opportunity to accompany him in the field. A characteristic expression of his enthusiasm for observing plant communities was the dedication with which he collected vegetation plots, even under adverse conditions. Many were the times when the end of a sampling found us holding a flashlight in our hands, as night had already fallen before he decided it was time to conclude the day's work in the field. Several sampling sheets were saved at the last minute from the rain that caught us in the field. Yet even the rain did not deter him from continuing to write on paper with a humble pencil. This inexhaustible passion was also what made Ioannis Tsiripidis a truly exceptional teacher. He always wanted to bring students close to nature and fieldwork, passing on his enthusiasm for observing and recording biodiversity.



Ioannis in the Chaindou region of the Rhodope Mountains, August 2015

Finally, the imprint Ioannis Tsiripidis left on his doctoral students is invaluable. To them he offered decisive guidance and served as a source of inspiration, while also leaving them his most valuable legacy, namely his way of thinking. He was always methodical, well organized, and faithful to the fundamental principles of vegetation science, yet his primary concern was to cultivate in his students the spark of scientific curiosity and the joy of discovery through observation. The ability to generate of new scientific questions was, in his view, the most important skill to pass on to the young researchers he mentored. The field often provided the perfect setting for this, as he would share ecological stories connected with the history and socio-economic context of the places we visited. Ioannis Tsiripidis was a vivid storyteller and always eager to share his knowledge and experiences, whether during a sampling session in the field or in a late-night discussion in the office.

His absence leaves a void that will be difficult to fill. Yet his work, his students and collaborators, his scientific rigor, and his intellectual curiosity will remain a living part of the scientific community he loved so deeply.

# Introducing recently defended PhD theses

By Irena Axmanová

*The IAVS Bulletin continues its tradition of presenting recently defended PhD theses in vegetation science and related disciplines. This section offers a valuable opportunity to highlight new research, introduce early-career scientists to our international community, and showcase the diversity of topics, regions, and approaches represented within IAVS.*

## Natural vegetation and habitats of the Synyukha river basin: syntaxonomy, ecological differentiation, conservation

(defended in June 2024)

**Kateryna Lavrinenko**



**Supervisor:**

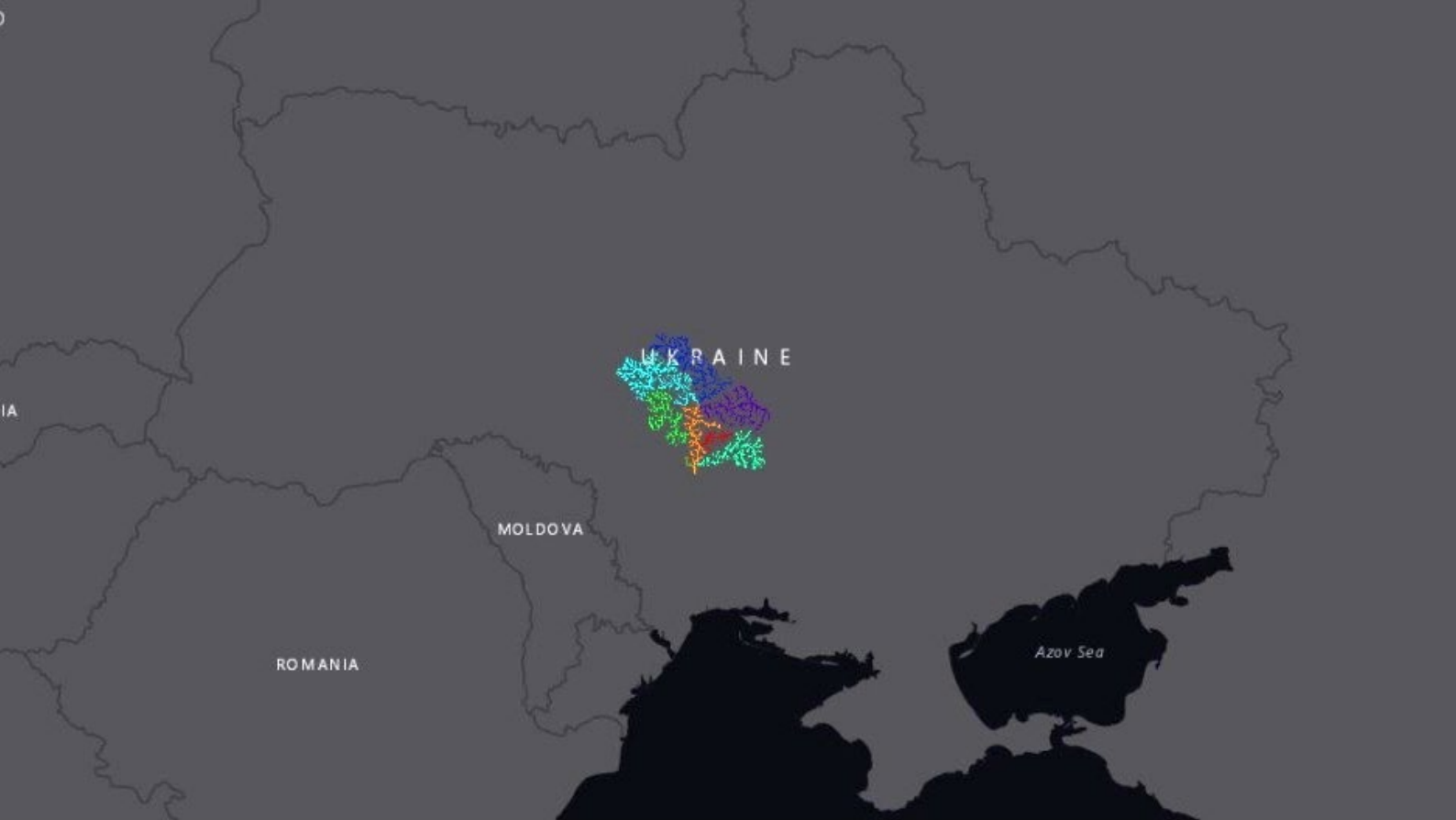
**Dr. Anna A. Kuzemko**

Department of Geobotany and Ecology, M.G. Kholodny Institute of Botany NASU, Kyiv, Ukraine



Dr. Anna A. Kuzemko

Biodiversity conservation in Europe increasingly depends on high-quality regional data. Ukraine occupies a key position in this context, lying at the intersection of several major vegetation regions and hosting a wide range of forest, steppe and wetland ecosystems. The Synyukha River, a left tributary of the Southern Bug River in central Ukraine, represents a particularly important yet insufficiently studied area. Due to its location within the transition zone between the forest-steppe and steppe regions, the Synyukha River basin is characterised by a high diversity of zonal vegetation types, including both forest and steppe communities. In addition, the widespread occurrence of granite outcrops along the valleys creates pronounced microrelief heterogeneity, which further enhances habitat diversity and contributes substantially to the richness and structural complexity of the vegetation cover. At the same time, this territory has been subject to long-term and intensive land-use pressure, resulting in strong fragmentation of natural habitats. Until recently, vegetation data from the basin remained insufficiently representative, a number of syntaxonomic issues were



Location of the Synyukha River basin within the territory of Ukraine



**Typical landscapes the Synyukha River basin:** **A.** Steppe part: forest vegetation occurs exclusively in depressions and other lowered landforms; river floodplains are weakly developed and narrow; true steppe and petrophytic steppe vegetation predominates, 'with characteristic ravine (bayrak) forests also present. **B.** Forest-steppe part: forested interfluves and wide river floodplains, often with wetland features; extensive areas and high diversity of forest, meadow, wetland and meadow-steppe vegetation

unresolved, and a comprehensive understanding of the vegetation cover was still missing. Despite numerous botanical records scattered across the literature, an integrative, basin-scale assessment of vegetation and habitats had been lacking, limiting both scientific understanding and conservation planning.

My doctoral dissertation is devoted to the study of natural vegetation and habitats of the Synyukha River basin, with a particular focus on the development of classification schemes for vegetation and habitats, the analysis of ecological and topological differentiation of vegetation, the degree of its anthropogenic

transformation, and its conservation value. The research was conducted during 2021–2023.

For vegetation analysis, we used 729 original full phytosociological relevés of natural and semi-natural vegetation, recording 915 species of vascular plants, 54 species of bryophytes, and 36 species of lichens. The vegetation of the Synyukha River basin is represented by aquatic, wetland, meadow, steppe, psammophytic, halophytic, shrub, forest, and chasmophytic vegetation types. The resulting vegetation classification scheme includes 24 classes, 38 orders, 65 alliances, 159 associations, and 17 rankless communities. Of these, 10

classes, 18 orders, 36 alliances, and 107 associations are reported for the Synyukha River basin for the first time.

One new association, characterized by wet slightly saline tall-forb grasslands lacking strongly halophytic species *Festuco arundinaceae-Caricetum otrubae* was tentatively described as new for science within the *Althaeion officinalis* alliance.

The association Polygono hydropiperis-Veronicetum anagallidis-aquaticae was identified for the first time in the Forest-steppe of Ukraine using an expert system for the *Phragmito-Magnocaricetea* class. In addition, the forest stream unranked community (Comm. *Carex remota*) of the *Montio-Cardaminetea* class was recorded for the first time in the plain part of Ukraine. Furthermore, the halonitrophilous pioneer unranked community (Comm. *Crypsis aculeata*) of the *Crypsietea aculeatae* class was documented for the first time in the right-bank forest-steppe of Ukraine. Fringe vegetation of the *Trifolio-Geranietea* class, psammophytic vegetation of the *Koelerio-Corynephoretea* class and halophytic vegetation of the *Festuco-Puccinellietea* class were listed and analyzed for the first time within the territory of the basin.

Habitat diversity of the Synyukha River basin is represented by 39 types of natural and semi-natural habitats according to the EUNIS classification (third level of the updated version), 49 types according to the National Habitat Catalogue of Ukraine (third level), and 105 types according to the UkrBiotop classification (fifth level). By remote sensing methods and machine learning algorithms a large-scale habitat map of the basin was produced and the areas of different habitat types were assessed. It was found that more than 71% of the Synyukha River basin area is occupied by arable land, approximately 11% by residential habitats and technotopes, artificial plantations, clear-cuts, and ruderal habitats, while only 17.5% of the area is covered by natural habitats. Among natural habitats, meadow steppes (R1A), hornbeam-oak forests (T1E), and sedge swamps (Q53) prevail in the forest-steppe zone, whereas true steppes (R1B) dominate in the steppe zone. The analysis of ecosystem well-being of the study area demonstrated a significant lack of ecosystem services due to the predominance of synanthropic habitats over natural and semi-natural ones.

In terms of absolute species richness, inland surface waters (C) and wetlands (Q) habitats are the poorest in species (ranging from 1 to 13 and from 1 to 31 species per community, respectively), whereas grasslands (R) and forests (T) are the most species-rich.

Among grassland habitats, the highest species richness was recorded in calciphilous meadow steppes R1A (59 species), true steppes R1B (55 species), thermophilous forest fringes R51 (54 species), and perennial rocky grasslands R16 (52 species). Among forest habitats, the highest richness was observed in temperate continental

pine forests T35 (53 species) and thermophilous deciduous forests T19 (50 species)

The leading factor of differentiation of natural vegetation in the Synyukha River basin at the levels of classes and alliances is soil moisture, which correlates with nitrogen availability and soil aeration. At the class level, significant differentiation is also driven by moisture variability and overall salinity regime, while at the alliance level additional important factors include soil reaction, salinity, carbonate content, and climatic variables. Vegetation of the steppe part of the basin is characterised by the predominance of true steppe and petrophytic steppe vegetation and the presence of ravine (bayrak) forests.

In contrast, the forest-steppe part is characterised by larger areas and higher diversity of forest, meadow, wetland, and meadow-steppe vegetation, the presence of interfluvial forests, boreal elements, as well as azonal psammophytic and halophytic components. Soil moisture, moisture variability, nitrogen availability, aeration, and light availability play a leading role in the topological differentiation of vegetation, while soil moisture, thermal climate, and continentality are the key drivers of geographical differentiation.

Among the syntaxa of natural vegetation the most sensitive to destructive impacts are those represented by phytocoenoses subjected to active land use, pioneer and species-poor communities, communities at early successional stages, or those associated with mobile substrates. Using a modified coefficient of phytocoenosis destruction, it was shown that the most transformed vegetation types are pioneer psammophytic vegetation of the *Koelerio-Corynephoretea* class, petrophytic vegetation of the *Sedo-Scleranthetea* class, and meadow vegetation of the *Molinio-Arrhenatheretea* class, particularly pasture meadows of the *Cynosurion cristati*, *Plantagini-Prunellion*, and *Potentillion anserinae* alliances.

The rare component of the vegetation cover includes 109 species of various conservation status, including five species listed in Appendix I of Resolution 6 of the Bern Convention, ten species classified as Near Threatened (NT) at the national level according to the IUCN Red List, 33 species listed in the Red Data Book of Ukraine, as well as a number of species protected at the regional level. In addition, 34 associations belonging to 13 formations of the Green Data Book of Ukraine and 35 habitat types listed in Resolution 4 of the Bern Convention were identified. The highest numbers of rare species were recorded in vegetation of the *Festuco-Brometea*, *Carpino-Fagetea*, and *Molinio-Arrhenatheretea* classes. Using a habitat approach, we have justified the establishment of 35 new protected areas with a total area of 1 500 hectares.

It was established that the key threats to biodiversity in the basin include plowing, afforestation of steppe slopes, cutting of natural forests, uncontrolled burning,



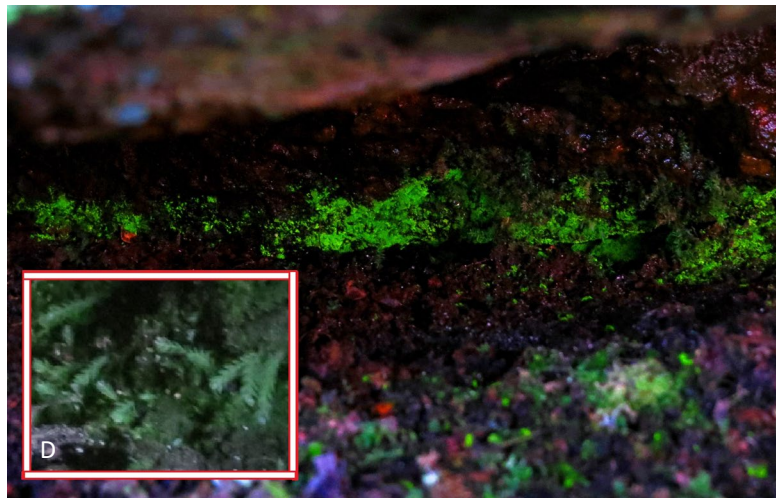
**Dominant and widespread vegetation types of the Synyukha River basin (alliances):** A. *Arrhenatherion elatioris*; B. *Festucion valesiacae*; C. *Carpinion betuli*; D. *Aceri tatarici-Quercion*; E. *Sedo-Scleranthion*; F. *Hypno-Polypodium vulgaris*.

overgrazing, mining activities, increased recreational pressure, fragmentation and modification of natural ecosystems, as well as various types of pollution. To conserve natural vegetation, a comprehensive action plan was developed, focusing on the preservation of existing natural vegetation and restoration of degraded areas, identification, assessment and minimisation of threats, the establishment of a scientifically grounded monitoring system, public involvement in conservation decision-making, and environmental education activities.

The research results were used in the preparation of the monographs “Post-war Development of the Nature Reserve Fund of Mykolaiv Region” and “Ecosystem Well-

being: Methodology for Assessing Ecosystem Services Using Indirect Methods”. A total of 729 phytosociological relevés collected during field surveys were published on GBIF as five datasets.

The dissertation research was supported by the Ukrainian Nature Conservation Group (UNCG) within the projects “Assessment of Ecosystem Services Lost by Ukrainians as a Result of the Russian Military Invasion” (ID 21GR3259), “Natural Potential in Post-war Community Planning of Mykolaiv Region” (Transition Promotion Program, Ministry of Foreign Affairs of the Czech Republic, 2023), and “Protected Areas of Kirovohrad Region as Part of Ukraine’s Green Recovery” (supported by NESEHNUTI,



**Selected examples of vegetation communities reported for the first time from the Synyukha River basin: A. Comm. *Carex remota* (All. *Caricion remotae*); B. Ass. *Polygono hydropiperis-Veronicetum anagallidis-aquaticae* (All. *Verbenion supinae*); C. Comm. *Crypsis aculeata* (All. *Cypero-Spergularion salinae*); D. Comm. *Schistostega pennata* (All.? *Diplophyllion albicantis*); E. Ass. *Festuco arundinaceae-Caricetum otrubae* ass. nom. prov. (All. *Althaeion officinalis*); F. Comm. *Cladonia* sp. + *Poa bulbosa* (All. *Koelerion glaucae*)**

Brno, Czech Republic, 2024). Additional support was provided by the IAVS grant “Ukrainian Members Research Fund” (2022) within the project “Diversity and Classification of the Vegetation of Granite Outcrops in Central Ukraine (Dnipro Upland)”.

I express my sincere gratitude to my scientific supervisor, Dr. Anna A. Kuzemko for supervision and continuous support throughout the preparation of this dissertation. I am also thankful to my colleagues and collaborators for their assistance during fieldwork, data processing, and constructive scientific discussions that significantly

contributed to this study. I extend my special thanks to the Armed Forces of Ukraine for making it possible to continue scientific work even during the full-scale war in Ukraine.

#### Publications related to the thesis

Lavrinenko, K.V. 2024. Natural vegetation and habitats of the Synyukha River basin: syntaxonomy, ecological differentiation, conservation. Thesis for a scientific degree of Doctor of Philosophy. Kyiv, 744 p.

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Integrated workflow of vegetation research in the Syniukha River basin: field surveys, monographs using the research data and fragment of the habitat map derived from automated satellite image interpretation.

# Climate-driven elevational shifting of plant distributions in the selected sites of Siwaliks of North Western India

(defended in November 2024)

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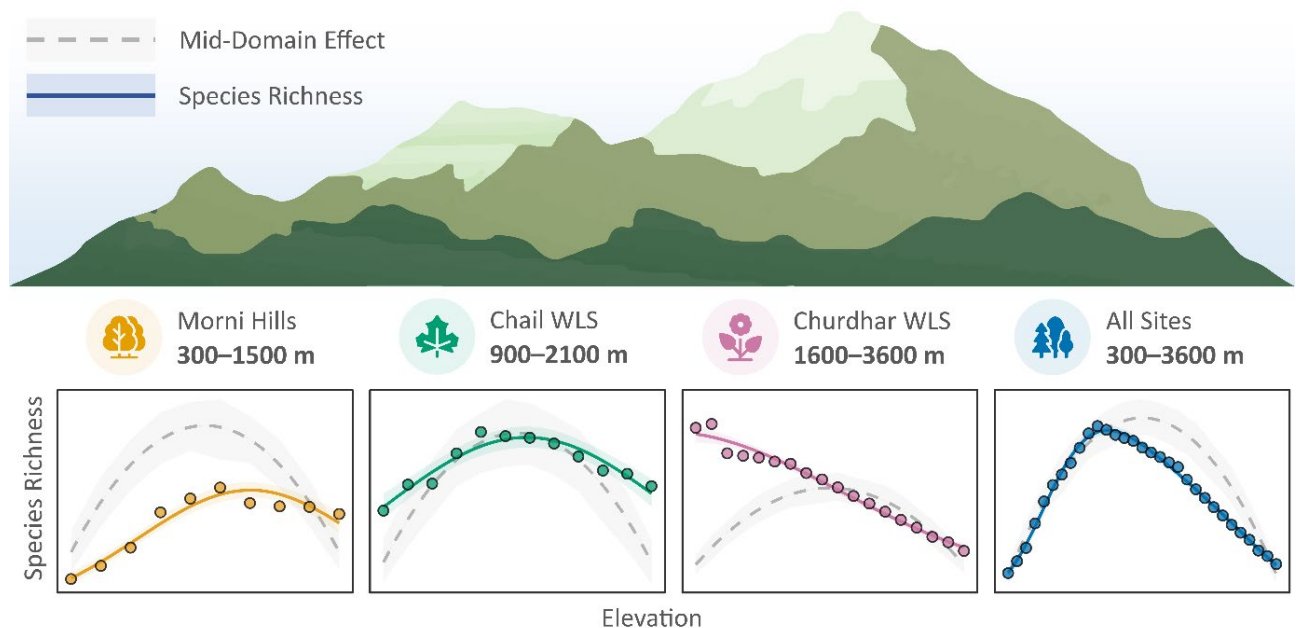
Despite growing research efforts, our knowledge of species distribution remained limited due to the high idiosyncrasies and complexities of species responses to environmental change. This study investigated patterns, determinants, and dynamics of plant distributions along elevational gradients in the Western Himalayas. By meticulously combining field observations with existing literature, this research compiled a comprehensive database of the elevational distribution of over 1,000 plant species across three protected areas. The plant species richness was estimated for 100-m elevational bands using the range interpolation method. The patterns and determinants of species richness were explored using generalised linear models, mid-domain effect (MDE) null model simulations, and structural equation modelling. Ensemble MaxEnt models were employed to predict the range dynamics of ten dominant tree species under



Abhishek Kumar in Chail Wildlife Sanctuary (Personal archive of A. Kumar).

projected climatic scenarios.

The results revealed that unimodal patterns are common, though a decreasing pattern was also observed. The observed patterns showed substantial deviations from the predictions of the MDE null model. These deviations suggest that factors beyond range constraints shape richness patterns along elevational gradients. While



Elevational patterns of plant species richness in Western Himalayas

the direct effects of climatic variables were stronger, their indirect effects were more strongly mediated by water-energy dynamics than energy availability. These findings suggest that physiological tolerances and liquid water availability govern the elevational richness patterns of plants. Species distribution models predicted elevational range contractions for *Cedrus deodara*, *Pinus roxburghii*, *Quercus lanata*, *Quercus semecarpifolia*, and *Rhododendron arboreum*, while other species like *Lyonia ovalifolia*, *Mallotus philippensis*, and *Quercus leucotrichophora* are projected to shift their distribution towards higher elevations. The elevation range of *Shorea robusta* and *Taxus wallichiana* can lean towards their higher and lower elevations, respectively. All investigated species, except *Shorea robusta*, are predicted to lose their suitable habitats under future climates, with the highest decline predicted for *Quercus semecarpifolia*. By providing crucial insights into future trajectories, this study contributes to prioritise conservation efforts and developing effective management plans for the Western Himalayas. The findings presented in this thesis will be helpful for prioritising conservation efforts and developing effective management plans for the Western Himalayas.

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Northern Dry Mixed Deciduous Forest vegetation in Khol Hi-Raitan Wildlife Sanctuary of Morni Hills



A view of Chail Wildlife Sanctuary showing the vegetation of Oak forests with the occasional presence of Blue Pines.



A view of Churdhar Wildlife Sanctuary showing Kharsu Oak's treeline and herbaceous vegetation of alpine pastures

## Ecological boundaries between crop fields & dry grasslands: Small-scale patterns of plant diversity

(defended in May 2025)

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Prof. Monika Wulf



Prof. Karsten Wesche

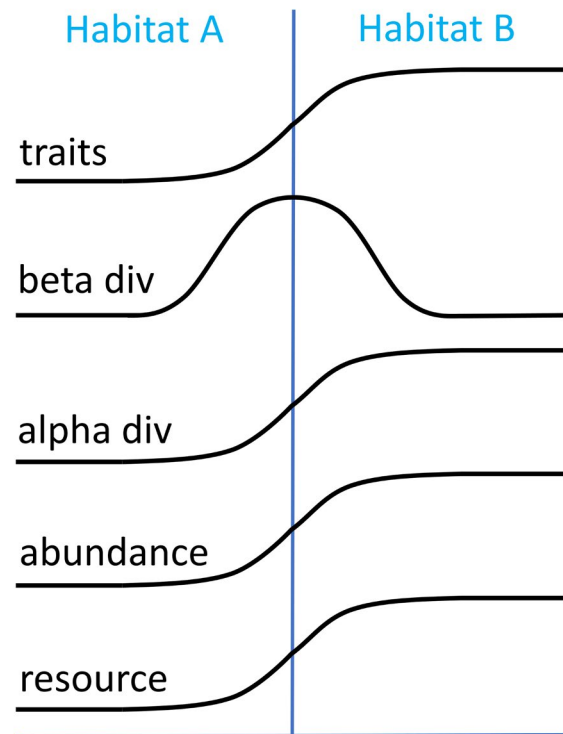
Central European agricultural landscapes are experiencing ongoing biodiversity loss, which can only be mitigated through a comprehensive understanding of biodiversity distribution patterns and their drivers. Landscapes consist of habitat patches, which are connected through boundaries, making boundaries an omnipresent and fundamental component of landscapes. This thesis aims to address the surprising scarcity of studies on small-scale plant diversity patterns across open habitat system boundaries. We therefore sampled vegetation and soil along transects extending from crop field interiors into adjacent dry grassland interiors in two German landscapes, the Eifel and the Uckermark.

Looking first only into the grasslands, we observed an increase in species richness with distance from adjacent crop fields, with significantly higher species numbers in grasslands bordering organic fields compared to those next to conventional fields. Notably, this difference persisted consistently across the entire 50-meter transect length, indicating that the effects of adjoining farming practices penetrate deep into grassland interiors. Similarly, Ellenberg indicator values for nutrients revealed a consistently higher nutrient load in grasslands adjacent to conventional crop fields throughout the transect.

We then looked across the boundary into both habitats, considering species groups based on habitat preferences. We observed a monotonic increase in overall species richness from the crop field interior to the grassland interior. Generalists exhibited a similar pattern, while grassland specialists showed a sigmoid curve, increasing only within the grassland. Arable specialists peaked at the crop field edge and declined towards the grassland. Ellenberg indicator values for moisture, nutrients, and light effectively mirrored the overall species response, with light values showing an inverse pattern.

Finally, we expanded our view beyond alpha diversity and developed a model for beta diversity. It shows a peak across boundaries, and we validated this model for our system. We found the peak for beta diversity to be driven by turnover, i.e. the replacement of species, and not by nestedness, i.e. the gain or loss of species. Further, we found some species occurring exclusively across the boundary, absent from adjacent habitat interiors. Consistent with our model, the studied environmental parameters, indicator values, and plant species traits exhibited steeper gradients across boundaries compared to habitat interiors.

We showed a strong impact of land use extending deep into neighboring habitats, and found that besides local drivers, there is also an indication of the influence of landscape context associated with farming practices. Due to land use, following natural conditions, the boundary between crop fields and dry grasslands appears primarily determined by changes in nutrient load and disturbance regime. We confirmed the concept of ecological boundaries as landscape components



Conceptual model of ecological boundaries, linking small-scale characteristic dynamics across various ecological scales, from environmental conditions shaping resources, through species abundances, alpha and beta diversity and functional traits.

where characteristics change most strongly, while demonstrating that the existence, strength, and spatial dimension of ecological boundaries are perspective-dependent, varying for functional groups. With the beta diversity model, we filled a gap in ecological theory on boundaries. Finally, we synthesized our new concepts with the existing ones into a comprehensive model for ecological boundaries, integrating multiple layers of driving, mediating, and responding characteristics. This model links small-scale patterns of these characteristics, from underlying environmental conditions shaping resource distribution and habitat quality, through species abundances, to species richness, composition, and functional traits.

As the beta-diversity peak across the boundary was driven by turnover of species, showing disjunct species compositions of adjoining habitats, and partly by additional species occurring only here, the boundaries between crop fields and dry grasslands contribute to landscape species diversity. This supports the value of numerous small habitats with high boundary density. However, the observed deep edge effects suggest a minimum size necessary for full development of the habitats with the corresponding species spectrum. Balancing these findings, our results align with other research in advocating for diverse landscapes with numerous small habitat patches, including some larger ones, to optimize biodiversity conservation.

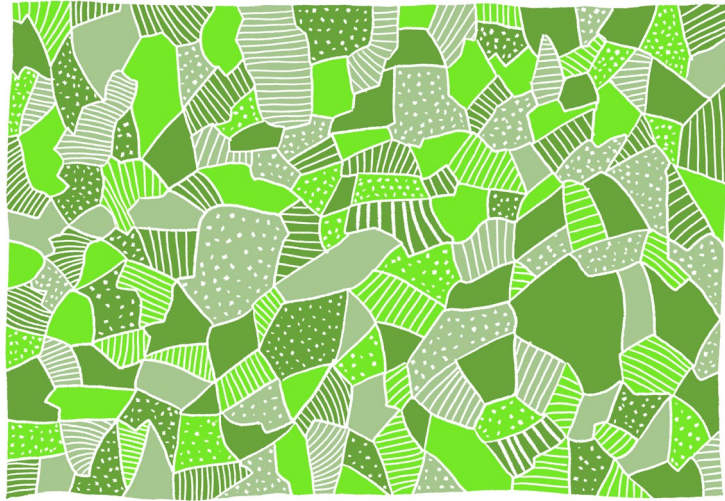
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Landscape with numerous habitat patches, including some large ones, to support species diversity (thanks to Kathrin Dommel for the graphic design).



Typical boundary between crop field and dry grassland in a young moraine landscape in NE Germany.

## Changes in vegetation and flora of the Czech Republic

(defended in February 2026)

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After the defence, with my supervisor, Milan Chytrý

*"We never record the same species composition twice."*  
(inspired by Heraclitus)

Over recent decades, natural habitats have been under increasing human pressures, yet their long-term impacts on vegetation and floras across large areas remain poorly understood. The Czech Republic represents a unique model area for studying temporal changes in temperate European flora and vegetation thanks to its long tradition of botanical research and the availability of extensive, high-quality data on species distributions in space and time. The main aim of my PhD thesis was to synthesize changes in non-forest vegetation and both forest and non-forest flora across the country over recent decades. To achieve this, I examined temporal dynamics in vascular plant species and plant communities at regional and national scales and compared trends across habitat types and time periods.

To characterise regional vegetation change, together with my colleagues, we conducted three vegetation resurvey studies: in acidophilous dry grasslands in southwestern Moravia (Harásek et al. 2023), basiphilous semi-dry grasslands in the Central Moravian Carpathians (Klinkovská et al. 2024) and sand vegetation in the Vienna Basin (Friesová et al. 2025).

Acidophilous dry grasslands in southwestern Moravia have remained relatively stable over the past 30 years, yet subtle declines in habitat quality were evident. Species

richness, threatened species and dry grassland specialists decreased, while the competitive grass *Arrhenatherum elatius*, annuals, juvenile woody plants, and nutrient-demanding species increased. Conservation management, particularly mowing in protected areas, mitigated these negative trends but did not fully halt them.

Basiphilous semi-dry grasslands in the Central Moravian Carpathians, historically maintained by grazing and hay-making, showed similar patterns over the past four decades. Species richness, threatened species, and xerophilous, light-demanding specialists declined since the 1980s, whereas competitively strong species with higher moisture and nutrient requirements, along with juvenile woody plants increased. Some communities became more mesophilous. Again, these negative trends were more pronounced outside protected areas.

In the Vienna Basin, the main types of sand grasslands have persisted over recent decades, however, their species composition changed markedly. Overall species richness increased, yet the proportion of sand and dry grassland specialists, as well as species adapted to grazing, declined. Species with higher nutrient and moisture requirements, neophytes, and graminoids increased due to eutrophication and natural succession following the abandonment of previous management. Pioneer sand vegetation showed the strongest decline in sand specialists and thermophilous species, indicating a shift towards more closed grasslands. These findings highlight the need for targeted conservation management and continued monitoring to maintain the habitat quality of inland sand vegetation.

To understand, how these regional trajectories interact at the national scale, I compiled all available vegetation resurvey data from the Czech Republic. Newly obtained and digitised data were contributed to the ReSurveyEurope database (Knollová et al. 2024). During my three-month internship at the Martin Luther University Halle-Wittenberg in Halle (Germany), I analysed non-forest vegetation-plot time series from this dataset under the supervision of Helge Bruehlheide. The results revealed substantial temporal changes in habitat quality (Klinkovská et al. 2025). Although species richness increased in most habitat types, shifts in taxonomic and functional composition indicated declining habitat quality. Habitat specialists and threatened species became less represented, while trees, shrubs, tall herbs, strong competitors, and nutrient-demanding species increased across all non-forest habitats. The concurrent decline of light-demanding species suggests widespread eutrophication and natural succession following the abandonment of traditional management. Additional habitat-specific trends pointed to varying importance of multiple drivers: moisture-demanding species declined in wetlands, springs, and mires, likely due to drainage, river regulation, and climate-driven drought, while dry grasslands, ruderal, weed, sand and shallow-soil

vegetation became more mesic with more pronounced successional processes. Alpine and subalpine vegetation, meadows, mesic pastures, *Nardus* grasslands, and heathlands, showed declines in insect-pollinated species and increases in grasses.

My PhD thesis also included a methodological study evaluating the accuracy of two-visit vegetation resurveys by comparing them with long-term trends in species richness and community turnover which we conducted together with Kryštof Chytrý (Chytrý et al. Submitted). Using a dataset of permanent plots sampled multiple times, often annually, we extracted pairs of surveys and compared models based on these pairs with those based on the full time series. Two-visit resurveys reliably predicted long-term trends in community turnover, but matched long-term trends in species richness in only half of the cases. While two-visit resurveys remain an essential tool for detecting vegetation change, they should be interpreted cautiously, with a focus on species composition rather than species richness.

To complement vegetation change analyses, I examined trends of individual species using more than 4.6 million occurrence records of 1912 species from the Pladias database collected over the past six decades (Klinkovská et al. 2024). These data were never collected systematically for long-term monitoring and thus are biased with higher sampling intensity in specific regions and time periods. In collaboration with Michael Glaser from the University of Vienna, we used dynamic occupancy models within a Bayesian framework to account for sampling biases. Five main trajectories of temporal change emerged. Competitively strong, nutrient-demanding generalists that successfully colonize new and highly disturbed habitats supported by eutrophication and anthropogenic disturbances strongly increased in 1961–1980. Shade-tolerant species of less disturbed habitats increased between 1981 and 2000, indicating an effect of habitat abandonment, and thermophilous species began to spread in the last 20 years, reflecting rising temperatures. Competitively strong species of less frequently disturbed habitats with higher moisture and nutrient requirements and low light requirements increased gradually over the whole study period. In contrast, specialised species of nutrient-poor habitats with low colonisation and competitive ability, associated with more frequent but less severe disturbances, steadily decreased due to habitat degradation following the cessation of traditional management, and many of them have been included in the national Red List. Temporal trends for individual species are available in an interactive Shiny app: [https://klaraklink.shinyapps.io/pladias\\_occ\\_models/](https://klaraklink.shinyapps.io/pladias_occ_models/).

Overall, the patterns of vegetation and floristic change identified in this dissertation provide valuable insights into the drivers of biodiversity change at both regional and national scales. This knowledge can serve as a basis for further monitoring and guide conservation strategies

aimed at preventing further habitat degradation. The database of resurveyed vegetation plots compiled for this thesis provides an important resource for long-term ecological research. Moreover, the analytical approaches applied here, including modern statistical methods and innovative uses of opportunistic data, offer a model for future studies of biodiversity change across spatial scales, regions, and taxon groups.

**Full text of the thesis available at:** <https://is.muni.cz/th/b9gpr/?lang=en>

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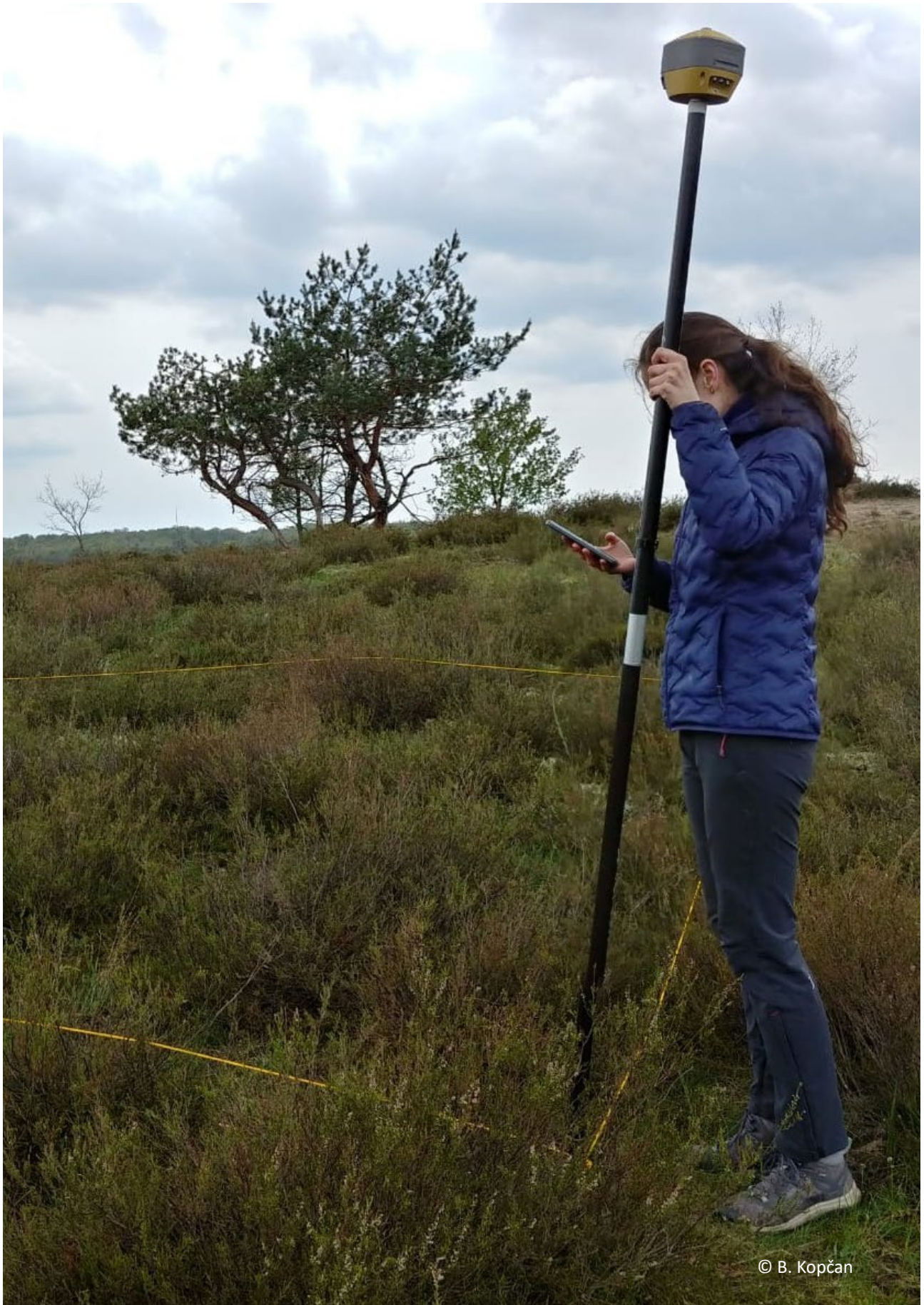
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Repeated vegetation-plot survey in basiphilous semi-dry grassland dominated by *Inula ensifolia* in Nature Monument Roviny (Milonice, Czech Republic, 16 July 2022).



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Georeferencing of the resurveyed vegetation plot using differential GPS to allow for accurate relocation and more precise future monitoring.

## Patterns and drivers of post-fire vegetation in differently managed Central European Scots pine forests

(defended in March 2026)

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Dr. Thilo Heinken

In recent years, severe wildfires have burned large areas of forest in Germany. However, research into fire ecology is still underrepresented in Central Europe despite future scenarios predicting an increased fire risk. To contribute to closing this knowledge gap, we have studied early post-fire vegetation in two differently burned Scots pine (*Pinus sylvestris*) forest stands in Brandenburg (NE Germany).

First, we studied spatial initial recolonization patterns of post-fire vegetation. We started with post-fire tree regeneration patterns (Schüle et al. 2023). We analysed the effects of different post-fire forest management, distance to potential seed sources, fire severity and spatial position on the abundance of the four most frequent naturally regenerated tree species (*Populus tremula*, *Betula pendula*, *Pinus sylvestris* and *Salix* sp.). We found that the densities of *Pinus sylvestris* and *Betula pendula* were limited by distance, while the distance to the next potential seed source had no effect on *Populus tremula* and *Salix* sp. Post-fire forest management was an important predictor of tree regeneration density, but it was species-specific.

Using a similar approach, we have studied the effects of post-fire forest management, fire severity and pre-fire land-use legacies on ground vegetation patterns (Schüle et al. in revision). We showed that pre-fire land use legacies can still impact post-fire vegetation. For example, they can reduce colonization from the seed bank, but enhance nutrient availability in older forests.

On the other hand, soil disturbance by post-fire forest management activated the seed bank, but reduced the cover of bryophytes. Higher fire severity decreased the cover of seed bankers.

Next, we focused on temporal patterns. For this, we have studied post-fire vegetation in differently managed burned forest sites over the first six years after the fire (Schüle & Heinken 2026). Our results showed that the vegetation in burned sites differed drastically from the vegetation in unburned controls. It was characterized by open land species and indicators for nitrogen, reaction and light due to increased nutrient and light availability after the fire. Species composition was already shifting in the first post-fire years, as open land species started to decrease, while forest species increased. The effect of increased nutrient availability after the fire declined immediately, resulting in a decrease of nitrogen and reaction Ellenberg indicator values. Complete salvage logging resulted in slower recolonization and often different patterns.

In order to make precise estimates of the post-fire vegetation biomass in our study area, we have adapted the PhytoCalc aboveground allometric biomass estimation approach for the most important species of Central European post-fire vegetation and extended the models for the estimation of belowground biomass (Schüle & Heinken 2024). To achieve this, we have sampled aboveground and belowground biomass of the most significant young tree, herb and grass species and aboveground biomass of dominant bryophyte species in our study area. A comparison with the original model, which was calibrated with samples from undisturbed forests and models calibrated for unburned clear-cuts, revealed that these models estimate post-fire vegetation biomass imprecisely, probably mainly due to increased irradiance and nutrient levels on burned sites, which affect tissue densities.

In the last study, we examined the effect of post-fire forest management on multiple components of post-fire ecosystems (Schüle et al. 2026). Intensive management, such as complete salvage logging, was shown to lead to more extreme abiotic conditions, which resulted in higher microclimatic temperatures, enhanced heat and drought stress in the soil and lower nutrient availability. Conversely, natural tree regeneration biomass was high on all sites. However, intensive management clearly decreased plant and saproxylic beetle diversity, as well as bryophyte biomass.

In my thesis, I provide deep insights into the composition and dynamics of post-fire vegetation in Central European Scots pine forests. I could disentangle several factors, which affect initial spatial recolonization patterns and which are often dependent on the species traits such as the recolonization strategy or specific habitat requirements, as expressed by the Ellenberg indicator values. My research revealed that post-fire forest management is a

key driver of spatial and temporal vegetation patterns. My thesis gives a comprehensive overview of the different effects of post-fire forest management and provides several management recommendations, which can be valuable for managing burned forests in the future.

**Full thesis available:**

<https://doi.org/10.25932/publishup-69985>

**Publications related to the thesis:**

Schüle, M., Domes, G., Schwanitz, C., Heinken, T. (2023): Early natural tree regeneration after wildfire in a Central European Scots pine forest: Forest management, fire severity and distance matters. *Forest Ecology and Management*. 539: 120999. <https://doi.org/10.1016/j.foreco.2023.120999>

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Sampling of bryophyte biomass



Burned Scots pine forest two years after a wildfire with dead pine trees and succession of *Populus tremula* and *Erigeron canadensis*.



Dense regeneration of *P. tremula* on a completely salvage logged site six years after the fire.

## Farmland ponds as unique aquatic islands for plant diversity

(defended in March 2026)

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Wetlands are among the world's most vulnerable ecosystems, and in the Mediterranean region, farmland ponds are particularly exposed to the influence of surrounding agricultural land use while still supporting unique biodiversity. These small waterbodies are widely recognized as "island-like" systems; however, key functional differences exist among them. Ponds host not only strictly aquatic plants but also adjacent terrestrial species that, living at the land–water interface, interact with aquatic environments and, like aquatic species, can be strongly influenced by water physical and chemical properties.

This work aimed to: (i) provide an accessible collection of pond vegetation data paired with water physico-chemical measurements, serving as a resource for investigating the links between plant communities and their environmental settings; (ii) analyze how the extent of agricultural land use and various factors operating at multiple spatial scales influence the diversity and structure of plant communities; (iii) clarify if, and to which extent, processes of community assembly in farmland ponds resemble those in islands.

We studied 115 ponds located across landscapes (pondscape) with varying agricultural land-use extents in continental and insular areas of Italy. We surveyed aquatic and riparian plant communities alongside water physico-chemical parameters. This work has enabled the creation of the PONDY dataset, a comprehensive resource covering plant diversity and abundance, community composition, habitat types, and water chemistry for Italian ponds. The dataset comprises 575 plots, of which



232 are aquatic and 343 are terrestrial, 743 vascular plant taxa and 5 macroalgae encompassing 364 genera and 89 families. Terrestrial plots host 690 taxa belonging to 87 families, while aquatic plots host 117 taxa belonging to 36 families. The dataset includes 10 taxa belonging to the Italian Red List and 39 alien species. Moreover, 11% of the aquatic plots have been classified in a Habitats Directive 92/43/EEC habitat type, while 48% have been classified in an EUNIS habitat type. The dataset contains, for each



In the field with my supervisor Claudia Angiolini.

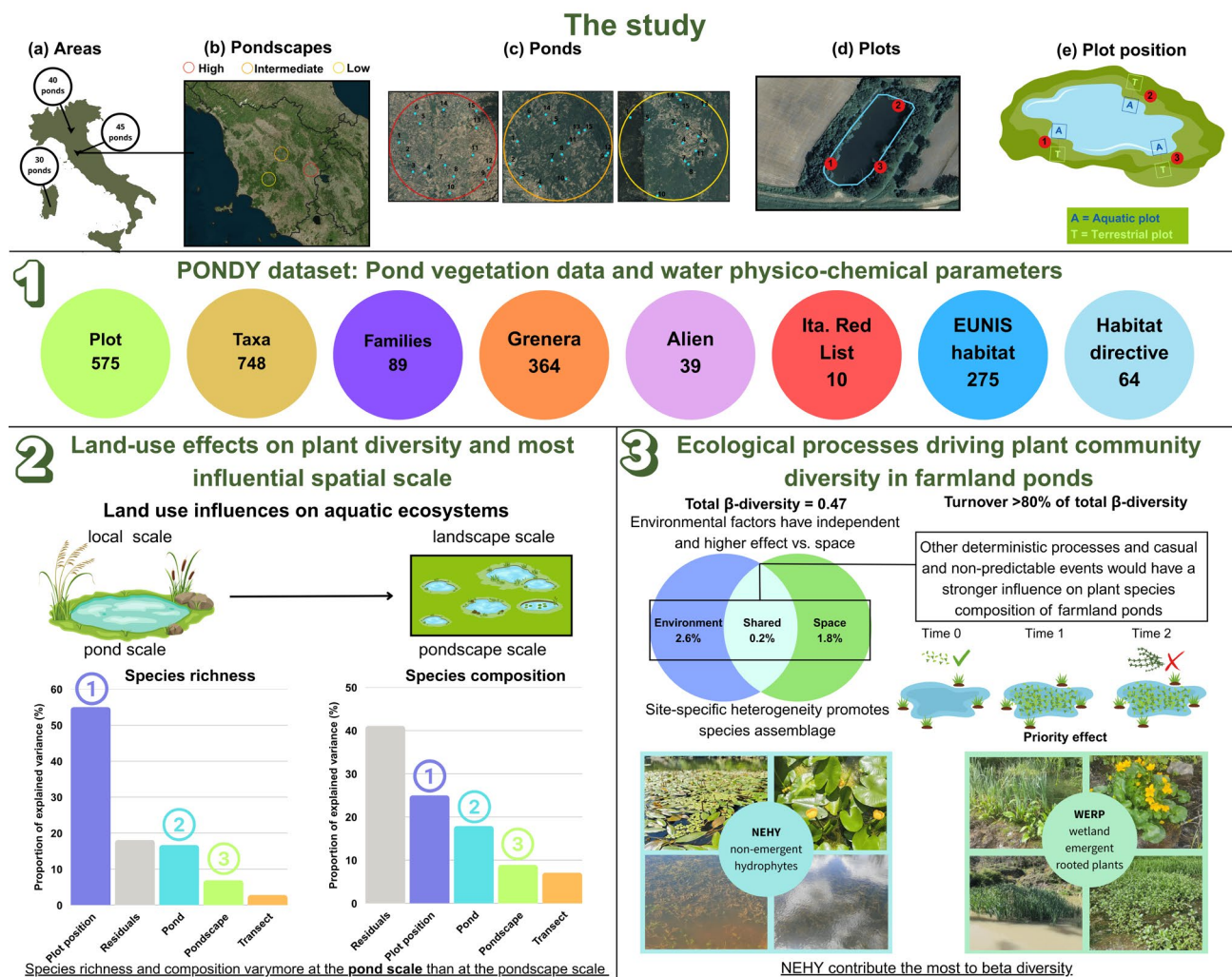
plot, measurements of physico-chemical water variables such as dissolved oxygen, water depth, and temperature, pH, turbidity, conductivity, and nutrient concentration. This dataset represents a key resource for studying plant–environment relationships, developing predictive models, and supporting freshwater conservation efforts. With this work we found out that species richness and plant community composition varied with the extent of agricultural land-use in the pondscape, with pondscales with the highest agricultural land-use extent having lower aquatic plant species richness and a dominance of species adapted to anthropogenic disturbance. In contrast, the pondscape with the lowest agricultural land-use extent hosted a richer aquatic biodiversity, particularly of helophytes. We found that pond-specific features, possibly related to pond management, play a more significant role than landscape-scale features in shaping plant diversity, underscoring the importance of acting on individual ponds alongside whole pondscape management for conservation purposes. Lastly, we found that environmental factors, particularly climate and water physico-chemistry, had stronger effects than spatial variables on community composition, indicating that local environmental heterogeneity drives species sorting even at small spatial scales. Yet these factors

explained only modest variance, suggesting the role of other deterministic processes together with stochastic ones in affecting plant diversity. Water-dependent species emerged as the main contributors to beta diversity, reflecting their sensitivity to site-specific conditions. Overall, ponds are unique habitats partially resembling islands. Their beta diversity mirrors a degree of isolation, but the influence of local factors highlights distinct ecological dynamics compared to true islands.

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## The Seed Regeneration Niche in Alpine Communities

(defended in May 2026)

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Clara Espinosa with the peak “Urriellu” in the background, one of the sampling sites in the central massif of Picos de Europa National Park.

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Recent studies in functional ecology highlight the key roles of seed traits and regeneration processes in determining patterns of species coexistence, plant biodiversity and community assembly. However, the myriad of morphological, physiological, and biochemical processes that regulate seed persistence and germination make addressing fundamental questions about seed ecology particularly challenging. These processes are rarely studied in an integrated manner, and very few functional ecology studies on seeds have focused on alpine communities, i.e., communities occurring above the natural tree limit. Alpine zones are subject to strong ecological filters and sharp microclimatic conditions that constrain plant life forms while simultaneously exhibiting high phylogenetic diversity, thus representing unique natural laboratories for exploring seed functional traits. While adult plant traits show convergence towards a more conservative strategy (stress-tolerant and slow-growing), alpine regeneration has been only recently integrated into community ecology studies. Most alpine species present short-distance dispersal events and short seed longevity, although some species form a persistent soil seed bank, with delayed germination phenology, and high seedling emergence and mortality.

This PhD thesis aims to advance our understanding of the seed regeneration niche of alpine communities, understood as the ensemble of conditions required by adult plants for successful seed reproduction. We examine 16 traits—biophysical, morphological, and germinative—and their ecological drivers (at both macro- and microscales), with an emphasis on two analytical levels of functional ecology: intraspecific and interspecific. With this goal in mind, we aimed to address existing knowledge gaps on seed longevity and germination responses to microclimatic gradients in two alpine communities with different macroclimates, thereby providing a more integrated view of the alpine seed regeneration niche. Over 4.5 years, we conducted more than 50 field campaigns to collect seeds from 69 alpine species and, combining field and laboratory experiments, we assessed seed germination responses to artificial ageing and to different temperature, photoperiod, and water-stress regimes.

According to our results, alpine seed longevity is strongly influenced by seed oil content but not correlated to ecological gradients. This relationship may help refine *ex situ* conservation protocols for seed banks and improve our understanding of seed persistence patterns in alpine environments (Espinosa del Alba et al., 2025a). Our germination experiments also show patterns that partially align with prior literature: a large proportion of alpine species require cold stratification and high temperatures, but under warmer microclimates, alpine species advance germination by 52 days on average (Espinosa del Alba et al., 2024). When comparing germination cues across two alpine communities with different macroclimates (temperate vs Mediterranean alpine), the main difference was in responses to cold-stratification requirements (Espinosa

del Alba et al., 2026). Thus, our findings reveal substantial interspecific variation associated with biogeographic, microclimatic, and phylogenetic characteristics. This interspecific variability suggests that, under future climate scenarios, some species may continue to regenerate successfully by seed, whereas others may regenerate only in years when climatic conditions are favourable. In the long term, such differential regeneration responses could drive shifts in the composition of alpine plant communities towards species with lower cold-stratification requirements (i.e., lower dormancy) and with germination that is more drought-resistant. Moreover, our experiments also uncovered significant intraspecific plasticity in response to microclimatic gradients of water availability (Espinosa del Alba et al., 2025b). This plasticity may act as a buffer against environmental changes, enabling species to maintain successful regeneration. The results of this thesis highlight the importance of the seed regeneration niche in the community assembly of alpine communities.

#### Publications related to thesis

Espinosa del Alba, C., Fernández-Pascual, E., Jiménez-Alfaro, B. (2024) Microclimatic variation regulates seed

germination phenology in alpine plant communities. *Journal of Ecology*, 113 (1), pp: 249-262. DOI: 10.1111/1365-2745.14461.

Espinosa del Alba, C., Mondoni, A., Baizán, S., Fernández-Pascual, E., Jiménez-Alfaro, B. (2025a) Functional trade-offs and microclimatic drivers of seed oil traits in alpine environments. *Plant Biology*, 27(7), pp: 1401-1413. DOI: 10.1111/plb.70097.

Espinosa del Alba, C., Cruz-Tejada, D., Jiménez-Alfaro, B., Fernández-Pascual, E. Functional intraspecific variation in the base water potential for seed germination along soil microclimatic gradients. (2025b) *Functional Ecology*, 39 (3), pp: 897-911. DOI: 10.1111/1365-2435.14754.

Espinosa del Alba, C., Fernández-Pascual, E., Götzenberger, L., Jiménez-Alfaro, B. (2026) The Alpine Germination Syndrome differs between Temperate and Mediterranean habitats. *Journal of Vegetation Science*, 37(2). DOI: 10.1111/jvs.70134.



Clara Espinosa and Borja Jiménez-Alfaro doing a vegetation relevé in the Sierra de Villabandín while Eduardo Fernández-Pascual is burying a temperature sensor (personal archive of C. Espinosa).



Microclimatic gradients measurement the Alto la Cañada, burying a temperature and water potential sensor (personal archive of C. Espinosa).



Vegetation relevé in the Sierra de Villabandín, while taking submetric GPS coordinates (personal archive of C. Espinosa).

# I AVS historical archive

By Irena Axmanová

We are exploring options for creating a comprehensive archive of historical IAVS materials and would greatly value input from the community.

We envision two complementary components:

**Governance archive** — including documents such as reports from working groups, symposium materials, participant lists, council minutes, and financial overviews. This archive already exists but mainly covers recent years. Its purpose is to ensure continuity, transparency, and institutional memory, and to support the Governing Board (GB) in its activities.

**Community photo archive** — focused on historical photographs and related materials shared by members. For this, we propose a two-step workflow: materials would first be uploaded to a temporary “transfer” space and then curated into a structured archive with standardized metadata. We emphasise the importance of including contextual information (e.g. names, dates, locations, descriptions).

To guide further development, we would appreciate your input on the following:

- Do you have experience with platforms or photo-archiving systems that might be more suitable than a general file-sharing platform?
- What features should be prioritised (e.g. metadata standards, searchability, persistent identifiers, versioning)?
- How can we best balance open community contributions with quality control and long-term usability?
- Would you be interested in contributing materials or assisting with curation?

Below is a scan of an original photograph taken by Hartmut Dierschke during the 1983 IAVS excursion to Corrientes, Argentina, as an example. Historical photographs could be accompanied by structured metadata files (e.g. listing people, year, location, and context in an Excel table) or by annotated copies of the images.

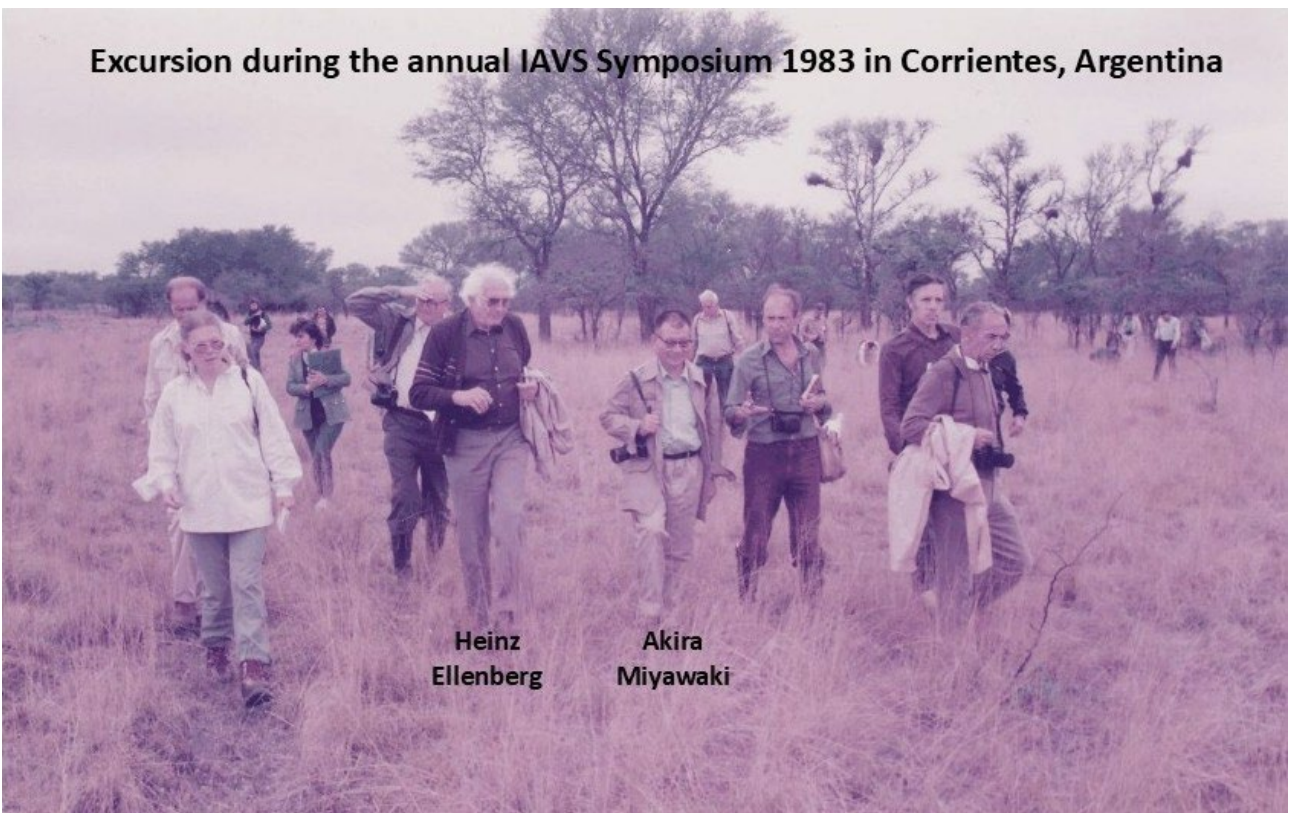
Any suggestions, experiences, or examples of good practice would be very welcome. Let us know by email ([axmanovairena@gmail.com](mailto:axmanovairena@gmail.com)) or reach out to us at the IAVS symposium.



IAVS symposium 1982, Prague, Czechoslovakia.



Original scan with information stored in an Excel file



Alternative approach. Storing both the original picture and the annotated picture, e.g. "xx.jpg" and "xx\_caption.jpg"

# How accurate are our cover estimates?

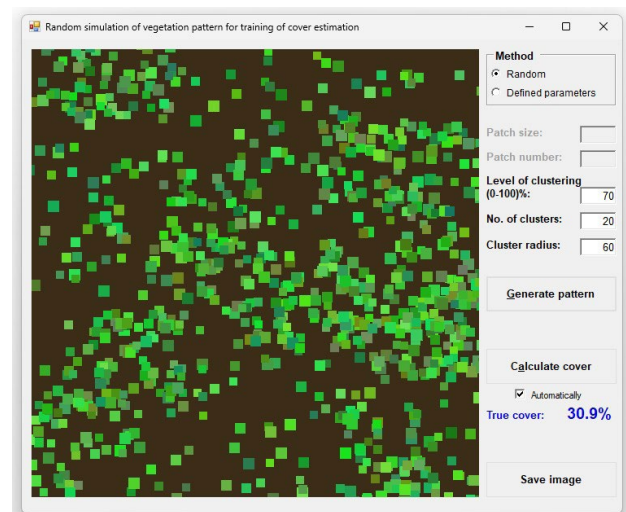
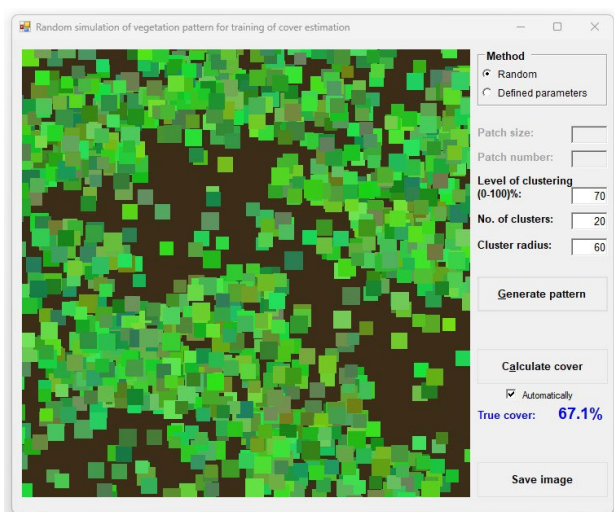
By Lubomír Tichý

Following standard vegetation-ecological terminology, vegetation cover is defined as the proportion of ground surface covered by the vertical projection of above-ground plant parts (van der Maarel & Franklin 2013). Estimating species cover is among the most common activities in vegetation science. A field ecologist may estimate plant cover thousands of times during a single vegetation season. The EVA database alone (Chytrý et al. 2016) contains more than 2 million vegetation plots, including over 50 million individual estimates of species cover and millions of additional estimates of vegetation-layer cover. Although the accuracy and reproducibility of visual cover estimates have received considerable attention in the methodological literature, the estimation process remains inherently subjective and is influenced by the experience, perception and personal calibration of individual observers.

In particular, students and inexperienced observers benefit from working alongside experienced vegetation ecologists, as cover estimation skills are best developed through repeated practice, discussion and calibration in the field. To support the training and evaluation of cover estimation skills, the software JUICE.NET (the educational successor to the JUICE program; Tichý 2002; freely available at <https://www.sci.muni.cz/botany/juice/NET/>) includes a new function called *Simulation of covers*. This

tool generates artificial vegetation patterns composed of randomly distributed objects within a user-defined area and automatically calculates their cover values. The resulting images can be saved and used for teaching, training, testing observer consistency, and exploring the effects of spatial arrangement on cover estimates. By providing a direct link between a known “true” cover value and its visual representation, the tool offers a simple way to investigate the accuracy and reproducibility of visual cover estimates.

Human visual perception is inherently selective, and it is quite possible that some cover values are estimated more accurately than others. Cover values around 50% may be perceived more intuitively because they correspond to a visual balance between occupied and unoccupied space, whereas estimates further away from this balance require greater subjective judgement. In addition, very low cover values may be systematically overestimated, as small and conspicuous objects tend to attract disproportionate attention from observers. The perceived cover may also depend on the spatial arrangement of vegetation patches. For example, a few large patches can create a different visual impression than many small patches occupying the same total area. Likewise, strongly aggregated vegetation may be perceived differently from evenly dispersed vegetation, even when the true cover remains identical.



Examples of artificial vegetation patterns generated by the ‘Simulation of covers’ function in JUICE.NET. The generated patterns differ in both total cover and spatial arrangement of vegetation patches. The left image has a true cover of 67.1%, whereas the right image has 30.9%. Such images can be used for teaching, training and testing the accuracy and consistency of visual cover estimation.

Are you able to estimate cover correctly? You can test your own cover estimation skills by completing the online questionnaire available at <https://forms.gle/NTshAsu1N9veRVDY8>. At the end of the survey, you will find a link to the true cover values. Your responses will help us investigate observer bias and improve our understanding of the accuracy and consistency of visual cover estimates.

## References

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Training of students in the vegetation methods led by L. Tichý, Z. Lososová and M. Večeřa, Mohelno, Czech Republic, 2026.



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Vegetation sampling at the Parque Nacional dos Campos Amazônicos.

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### IAVS Bulletin Article Submission

Have an idea for an IAVS Bulletin article? Are you a PhD student who just defended and would you like to introduce your thesis? Or, would you like your photograph of vegetation featured in the next issue?

Please email the editor at: [axmanovairena@gmail.com](mailto:axmanovairena@gmail.com).

### Credits

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