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EDITORIAL

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From Drivers of Landscape Change to Pathways for Action in Landscape Ecology: Key Insights from IALE 2025 Bratislava in a Rapidly Changing World

The IALE European Landscape Ecology Congress, held every four years, is a key event for the European landscape ecology community, bringing together researchers, practitioners, policymakers, students, and stakeholders for knowledge exchange and collaboration. The 2025 congress in Bratislava was especially significant, taking place near Piešťany where IALE was founded in 1982, symbolizing the organization's evolution from Cold War-era cooperation to a global network. The 2025 meeting continued this legacy by promoting dialogue and action.
This editorial examines the 2025 congress, from IALE's founding in Piešťany to its current role addressing environmental and societal crises. We review its historical context, in particular Eastern European contributions in former Czechoslovakia, and the ongoing influence of pioneers like Prof. Milan Ružička. We then analyze congress participants and their contributions using bibliometric analysis to reveal patterns and international trends. Finally, we reflect on the 2025 issue of Landscape Online, exploring how its publications align with and expand upon the key discussions and innovations that defined this year's European Congress.

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1 The historical context: from Piešťany to Bratislava – Landscape Ecology in a Changing Europe

The IALE 2025 European Landscape Ecology Congress was held in Bratislava, Slovakia – the country with a rich tradition in landscape ecology going back to the early 1960-ties. Prof. Milan Ružička (1929-2024) was a key person for the development of landscape ecology in former Czechoslovakia. Trained in botany and geography, he contributed to the early development of the Slovak Academy of Sciences (SAS) and participated in the establishment of several of its biological laboratories. Receiving the first scientific experience in phytosociology and geobotanical mapping, he perceived a need for a more comprehensive approach to environmental issues. With the aim to address this issue, he established the Department of landscape biology and design in the former Institute of Biology of SAS in 1962. Further development led to the establishment of

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the Institute of Landscape Biology SAS on 1.1.1965. It was a pioneering effort, a new institute was one of the first interdisciplinary workplaces focused on environmental issues in the former Czechoslovakia and one of the first research centres studying the biology and ecology of the landscape worldwide. Prof. Ružička, as the director of the Institute, prepared the concept and developed the Institute's activities, which required new methods, as well as the education of specialists with interdisciplinary awareness. The institute's focus was comprehensive research into the relationships between humans and the landscape, primarily studying the impact of human economic and industrial activity on the biological component of the landscape. Together with his colleagues, he recognised the need for international cooperation very early and maintained close contacts with institutes in Germany, France, the Netherlands, and with institutions in other parts of Eastern and Southern Europe. These international connections were crucial for building trust and establishing mutual understanding across the political and cultural divides of the Cold War era. To support the exchange of scientific knowledge, he initiated and organised International Symposia addressing landscape ecological research. The first one was held on 4-7 September 1967 in Bratislava and Východná (Slovakia) - see table 1. The tradition of the Symposia remains strong. To date, 19 Symposia have been held, and the series continues to offer a unique forum for scientific exchange, fostering both academic collaboration and practical applications in landscape planning and management.

Already, in the conclusions from the first Symposium (1967), a proposal for establishing an international association dedicated to landscape ecology was put forward. This idea gained further momentum in the late 1970s through the efforts of Dutch landscape ecologists and took concrete shape at the International Congress "Perspectives in Landscape Ecology" in Veldhoven, the Netherlands, in April 1981 (Kozová and Hrnčiarová 2011). During this congress, the foundation of a new international association was proposed, with plans to officially establish it the following year.

The 6th International Symposium on the Problems of Landscape Ecological Research, held in Piešťany, Czechoslovakia, from October 25 to 30, 1982, was chosen as the founding location (Figure 1). This decision was not only symbolic but also practical: during the Cold War, personal meetings between Western and Eastern European researchers were severely re-

Table 1. Overview about International Symposia on Problems of Landscape Ecological Research organised by the Institute of Landscape Ecology of the Slovak Academy of Sciences from 1967 to 2023.

Year and location	Topic
1967, Bratislava and Východná	Theoretical problems of biological landscape research
1970, Smolenice	Application of landscape ecology in practice
1973, Smolenice	Content and object of the complex landscape research in the point of view of protection and formation of the environment
1976, Smolenice	Ecological data for optimum landscape utilisation
1979, Stará Lesná	Ecological stability, resistance, diversity, potentiality, productivity, and equilibrium of the landscape
1982, Piešťany	Ecosystem approach to the (agricultural) landscape
1985, Pezinok	Topical problems of landscape ecological research and planning
1988, Zemplínska Šírava	Spatial and functional relationships in landscape ecology
1991, Dudince	Theory and practice in landscape ecology
1994, Smolenice	Present state and new trends in landscape ecology
1997, Nitra	System approaches to landscape research
2000, Stará Lesná	Protected areas and landscape ecological research
2003, Mojmírovce	Landscape ecology – an international integrating tool in environmental issues
2006, Stará Lesná	Implementation of landscape ecology in the new and changing conditions
2009, Bratislava	Landscape – Theory and Practice
2012, Smolenice	Landscape and Landscape Ecology
2015, Nitra	Landscape Ecology: From Theory to Practice
2019, Smolenice	Landscape diversity and biodiversity
2023, Trenčianske Teplice	Landscape and Society in the context of globalization

stricted. The symposium in Czechoslovakia provided a rare opportunity for joint gatherings, easing the logistical and political challenges that otherwise hindered direct collaboration across the Iron Curtain. During the founding event in Piešťany, I.S. Zonneveld became the first President of the International Association for Landscape Ecology (IALE), while Milan Ružička was elected as the first Vice-President of IALE. In 1984, at the first IALE seminar in Roskilde, Denmark, the IALE Executive Committee approved the establishment of the Eastern European Region of IALE, a move initiated by Slovak scientists and chaired by Milan Ružička. Between 1984 and 1990, the international symposia held in Czechoslovakia became part of IALE's official activities, coordinated by the Secretariat of the Eastern European Region.

In that period, the team led by Prof. Ružička was dedicated to the development of both theoretical and applied aspects of landscape ecology. The basic methodological principle was to solve theoretical questions on practical problems. This approach forced the development of new theoretical and methodological principles. As a result, a specific landscape ecological school emerged, and a new method of LANDscape Ecological Planning – LANDEP (Ružička & Miklós, 1982) – was created. Later, the Czechoslovak approach to ecological networks was developed as the Territorial System of Ecological Stability (TSES, ÚSES). This work received significant recognition at the 4th World Congress of INTECOL in 1986. The congress highlighted its merits in the development of landscape ecology, not only in Europe but also worldwide. Following this, in the editorial of the first issue of the new international journal Landscape Ecology, the editor-in-chief and INTECOL president, Frank Golley, characterised the works of M. Ružička and L. Miklós as bearers of one of the two main directions in landscape ecology, focused on ecological landscape planning (Golley 1987). In 1992, the Earth Summit in Rio de Janeiro recognised the LANDEP methodology as one of the proposed methodologies for the integrated protection of natural resources in the Agenda 21 framework.

Figure 1. One of the excursions also took participants of the European Landscape Ecology Congress IALE 2025 to Piešťany. Here, participants gathered in front of the former congress building, which now serves as apartment accommodation. (Photo: Juraj Lieskovský).

The new political situation after 1990, and especially after the establishment of the Slovak Republic in 1993, enabled the introduction of ecological principles into policy and legislation. Landscape ecologist László Miklós played a crucial role in this process. He served first as Deputy Minister and later as Minister of the Environment for two terms. During this period, Slovakia's first environmental policy was developed. Principles of landscape ecology were introduced to laws on spatial planning, nature protection, land consolidation, and environmental impact assessment. This was followed by methodologies: the methodology of landscape ecological planning and the methodology of territorial systems of ecological stability. A legal definition of the term "landscape" was also adopted. All these activities and documents were designed to implement LANDEP and TSES into regular planning practice.

In 2001-2002, concrete steps were taken to establish the Slovak chapter of IALE. In June 2003, a draft proposal of the statutes was officially registered. IALE-SK commenced its activities on January 12, 2004, with the first plenary meeting, which elected the chairman and other members of the Executive Committee. The aim of IALE-SK was to participate in IALE activities, support the advancement of landscape ecology in the Slovak Republic, and promote its application in the context of environmental management. IALE-SK participated in preparing the National Programme for the Implementation of the European Landscape Convention and in developing methodologies for its partial assignments.

In this period, Slovak landscape ecologists prepared or led the preparation of crucial atlas publications: Landscape Atlas of the Slovak Republic (Miklós & Hrnčiarová 2002), Atlas of Representative Geoe-

cosystems of Slovakia (Miklós& Izakovičová 2005), Landscape Atlas of the Czech Republic (Hrnčiarová et al. 2009), Representative Landscape Types of Slovakia (Bezák et al. 2010), Atlas of the Archetypes of Landscape in Slovakia (Hreško et al. 2015), and Atlas of the Natural Capital of Slovakia (Izakovičová et al. 2025).

2 The European Congress in 2025: a platform for discourse and action in landscape ecology

The IALE 2025 European Landscape Ecology Congress, "Landscape Perspectives in a Rapidly Changing World," took place at Comenius University in Bratislava, Slovakia. It was organised by the Institute of Landscape Ecology of the Slovak Academy of Sciences with the Faculty of Natural Sciences of Comenius University Bratislava, IALE-Europe, the Czech Society for Landscape Ecology (IALE-CZ), and Mendel University in Brno. The Congress was under the patronage of Mr. Juraj Droba, Chairman of the Bratislava Self-Governing Region, and Mr. Matúš Vallo, Mayor of Bratislava.

The Congress welcomed 428 researchers and PhD students from 36 countries. Most participants were from Europe, with a few from Chile, the USA, China, Indonesia, South Korea, and Australia. The congress's theme reflected recent shifts in research caused by our rapidly changing world, introducing new challenges, opportunities, methods, technologies, and solutions. The scientific program included three days of lectures in two auditoriums and five lecture halls. Keynotes were delivered by Prof. Naomi Millner (University of Bristol, UK), Prof. László Miklós (Institute of Landscape Ecology SAS, Slovakia), and Prof. Marc Metzger (University of Edinburgh, UK). Participants gave 323 oral and 96 poster presentations. Sessions and workshops were divided among four themes:

1. Understanding ongoing and emergent drivers and pressures of landscape change,
2. Monitoring the landscape conditions and impact of landscape change,
3. Responding to changing landscapes,
4. Advancing with new data, tools, and methods in landscape ecology.

3 The Congress rationale: Landscape Ecology in a Rapidly Changing World

The IALE 2025 European Landscape Ecology Congress brought together scholars to examine the evolving role of landscape ecology in today's rapidly changing world. The congress addressed how the discipline reflects, studies, and predicts the impacts of change on landscapes and society and considered implications for future landscape development and sustainability.

This year's congress took place at a critical time for both the discipline and the planet. Science itself is under unprecedented pressure worldwide, as political, economic, and environmental crises converge to challenge the integrity and independence of research (Briscoe et al. 2025; Mann & Hotez 2025). In many regions, academic freedom and evidence-based policymaking are increasingly threatened by misinformation, budget cuts, and ideological interference. These challenges demand a renewed commitment to transparency, collaboration, and public engagement.

Against this backdrop, landscape ecology must assert its role not only as a field of research but also as a guide for interdisciplinary solutions to the intertwined crises of climate change, biodiversity loss, and to promote sustainable land use, and a livable environment. Given the unprecedented pressures facing landscapes, the need for a platform that promotes interdisciplinary exchange and innovative approaches to addressing these challenges is more urgent than ever. This congress, therefore, also served as a barometer for evolving paradigms, innovations, and the spirit of collaboration within landscape ecology.

Landscapes in Flux: Drivers and Uncertainties

Landscapes are constantly changing, a process inherent to their nature (Meyfroidt et al., 2016), and to changes in their secondary structure driven by land-use modifications (Miklós et al., 2019). Alongside widely acknowledged drivers such as demographic shifts, urbanisation (Seto et al., 2011), agricultural intensification (Tscharntke et al., 2012), abandonment/extensification (Plieninger et al., 2016), cli-

mate change (IPCC, 2019), and European and local policies (Lambin et al., 2001; Siksnelyte-Butkiene, 2022), a new layer of rapid and unpredictable events has recently emerged, reshaping both society and landscapes. The COVID-19 pandemic (Forster et al. 2020, Hernández et al., 2023), the exponential rise of artificial intelligence and digitalisation (Dwivedi et al. 2023), armed conflicts in neighbouring regions (Solokha et al., 2023), the energy crisis (Borowski 2022, Belaïd et al. 2023), and economic recessions have all unfolded within a relatively short timeframe. These events operate at broad spatial scales, often globally, and directly or indirectly impact landscapes, introducing greater uncertainty in predicting future developments (Nicola et al. 2020, Nundy et al. 2021, Zakeri et al. 2022).

This uncertainty presents fresh challenges for the conceptual, methodological, and applied dimensions of landscape ecology, demanding adaptive and innovative responses. At the same time, it opens new opportunities for professionals and researchers in the field, particularly in leveraging artificial intelligence for landscape planning and problem-solving (e.g. Konya & Nematzadeh 2023, Alotaibi & Nassif 2024).

The congress's first theme — Understanding ongoing and emergent drivers and pressures of landscape change — acknowledges that landscapes are shaped by increasingly complex and interconnected forces, ranging from gradual processes to sudden disruptions (Bürgi et al., 2004; Plieninger et al., 2016). While some landscapes exhibit continuity, change is inherent to their nature, whether gradual or abrupt (Magliocca et al., 2014). The forces driving these changes, such as demographic shifts, urbanisation, agricultural intensification, and climate change, vary significantly across space and time. Understanding these drivers is critical for effective landscape management and planning. The congress addressed these issues through investigations of emergent drivers and the development of new conceptual approaches (Bürgi et al., 2022), providing a platform for experts to identify patterns, anticipate future pressures, and design adaptive strategies.

The second theme — Monitoring landscape conditions and impacts of change — emphasises the importance of historical research, real-time monitoring, and scenario planning to understand how landscapes evolve (Antrop, 2003; Tappeiner et al., 2020). Changes in landscape conditions, such as patterns, processes, biodiversity, and ecosystem services, directly impact human well-being and environmental quality (Wu, 2021). Approaches such as historical landscape research, paleoecological studies, and archaeological investigations provide insights into past dynamics, while landscape visions and scenarios help address future challenges (Crumley et al., 2017; Van Eetvelde & Christensen, 2023). This theme highlights the importance of monitoring landscape patterns, ecological interactions, and cultural values to inform sustainable management practices.

The third theme — Responding to changing landscapes: Innovative Solutions and Governance — highlights the urgency of moving beyond understanding to actionable planning (Hersperger et al., 2021). It emphasises innovative solutions, including nature restoration, sustainable land use, adaptive planning, and governance. Studying the interactions between ecological, cultural, socio-economic, and technological factors provides valuable insights into how landscapes can be managed to address emerging challenges (Smithwick et al., 2023). For example, greening agricultural landscapes and policy-driven restoration efforts (Wang et al., 2025) are key strategies for enhancing resilience. This theme also explores the role of policies, planning, and governance in promoting sustainable land-use practices and improving ecosystem responses to ongoing pressures.

The fourth theme — Advancing with new data, tools, and methods — reflects the field's embrace of technological advancements to transform landscape research and management (Farley et al., 2018; Frazier & Song, 2025; Yu et al., 2025). Innovations such as big data, artificial intelligence, and environmental DNA are revolutionising how we study landscapes. The congress served as a forum to explore these tools, ensuring landscape ecology remains at the forefront of scientific innovation. For instance, advances in remote sensing and land-change modelling enable more accurate predictions of land-use dynamics, which are essential for sustainable land management. By integrating cutting-edge methods,

the field can better address the complexities of a rapidly changing world.

With these themes addressed, the 2025 European IALE Congress, held near the birthplace of IALE in Piešťany, marks a milestone for the continued relevance and adaptability of this discipline. At a time when science and landscapes are under unprecedented pressure, this meeting is more than just an exchange of ideas; it is a commitment to action. By addressing the complex drivers of change, deploying innovative tools and promoting interdisciplinary collaboration, the congress not only reflects the current state of landscape ecology but also points the way forward. In doing so, it reaffirms the crucial role of this field in shaping a sustainable, resilient and equitable future for our rapidly changing world.

4 Mapping the discourse: Bibliometric insights from IALE 2025

We conducted a comprehensive analysis of the scientific discourse at the congress.

Our bibliometric analysis of the 419 submitted abstracts (oral and poster presentations) revealed a diverse and dynamic scientific community (Figure 2). The collective authorship - including lead and co-authors - spanned 36 countries, with the highest contributions from Germany (53), Slovakia (38), Poland (30), and the Czech Republic (24). Italy, Switzerland, Austria, Spain, France, and the Netherlands also showed substantial participation, each contributing between 15 and 22 entries. Beyond Europe, contributions came from China (2), Chile (2), South Korea (2), Indonesia (1), and Australia (1).

Themes are unevenly distributed across countries (Figure 2): Theme 3 (Responding to changing land-

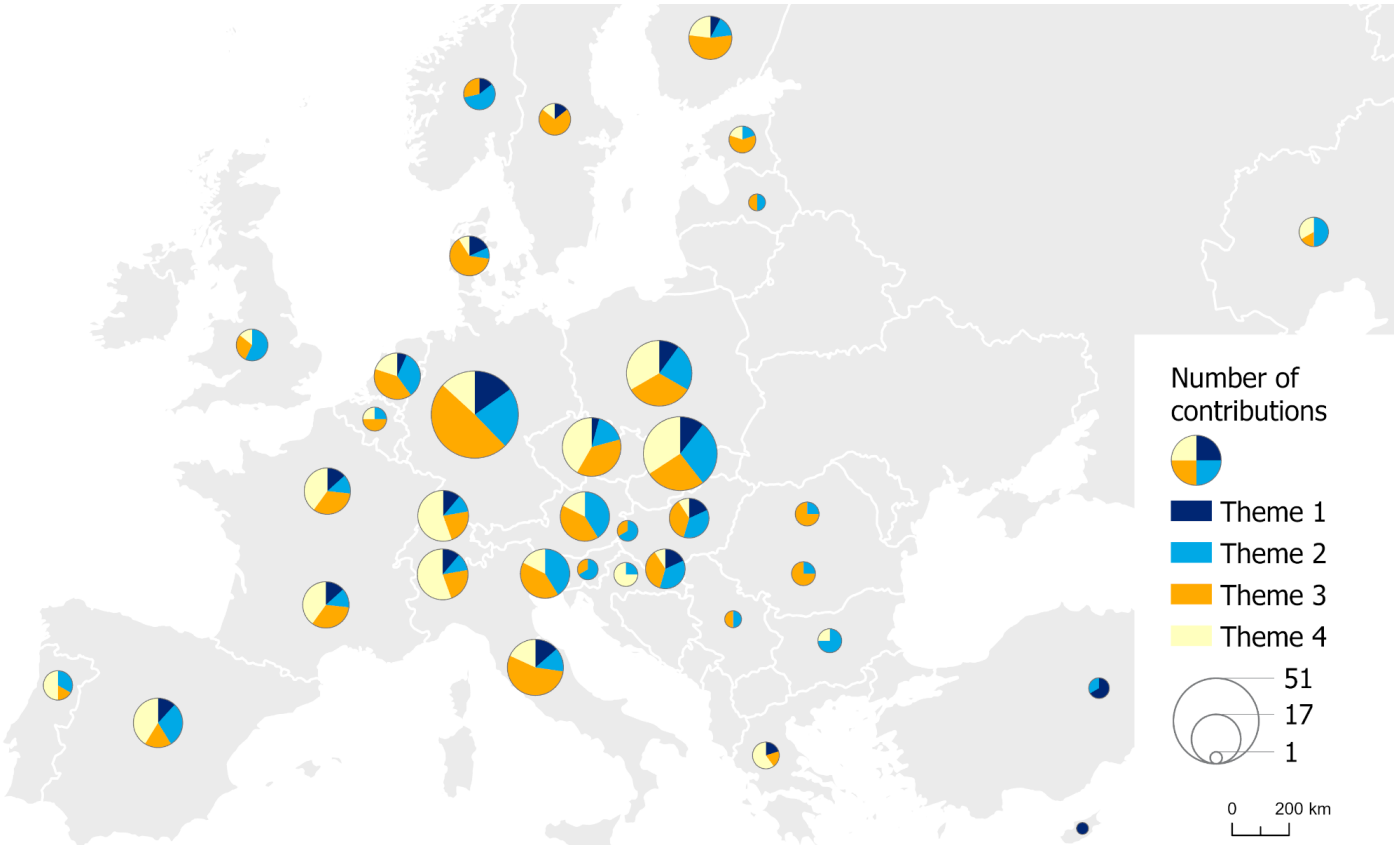

Figure 2. Number of contributions per country, subdivided by theme: Theme 1 - Understanding ongoing and emergent drivers and pressures of landscape change, Theme 2 - Monitoring the landscape conditions and impact of landscape change, Theme 3 - Responding to changing landscapes, Theme 4 - Advancing with new data, tools and methods in landscape ecology. Further contributions not shown on the map: China (Theme 1: 1, Theme 3: 1), Chile (Theme 2: 1, Theme 3: 1), South Korea (Theme 4: 2), Australia (Theme 4: 1), Indonesia (Theme 3; 1).

scapes) – covering governance, policy approaches, nature restoration, sustainable land use, and greening strategies to address rapid and uncertain global changes – is the most frequent overall, particularly in Germany and Italy, while Theme 4 (Advancing with new data, tools, and methods) – integrating Earth Observations, Big Data, AI, and GIS to enhance research and inform more effective landscape management – is especially prominent in Slovakia and Switzerland. Theme 1 (Understanding drivers and pressures of landscape change), focusing on gradual and sudden forces such as urbanization, climate change, political transitions, and land abandonment, and Theme 2 (Monitoring landscape conditions and impacts), assessing patterns, biodiversity, and ecosystem services both historically and currently to predict future challenges, are present in most countries but generally less dominant.

The co-occurrence network of terms used in study titles (Figure 3) reveals a highly interconnected structure centered on the concept of landscape, which represents the most frequent and influential term across the contributions. Surrounding this core, several thematic clusters emerge. One cluster emphasizes urban and green infrastructure, reflecting research on urban ecology and nature-based solutions. Another cluster focuses on ecosystem, restoration, and spatial aspects, indicating attention to ecological processes and spatial planning. A third cluster links biodiversity, climate, land, and agriculture, highlighting the integration of land-use change, biodiversity conservation, and climate-related drivers. Additional terms such as water and management form smaller but relevant subnetworks connected to the central theme. Bridging terms, including biodiversity, climate, and ecosystem, serve as connectors between clusters, underscoring the interdisciplinary nature of landscape ecology research.

The analysis of word clouds (Figure 4) reveals distinct patterns of research priorities across five landscape types (agriculture, forest, urban, water, and mountain), ranging from ecological monitoring in forests to socio-technical solutions in urban contexts. Specifically, research in agricultural landscapes focuses on production systems and land management, with dominant keywords including agriculture, crop, soil, and farmer, complemented by policy considerations and ecosystem service provision. In contrast, stud-

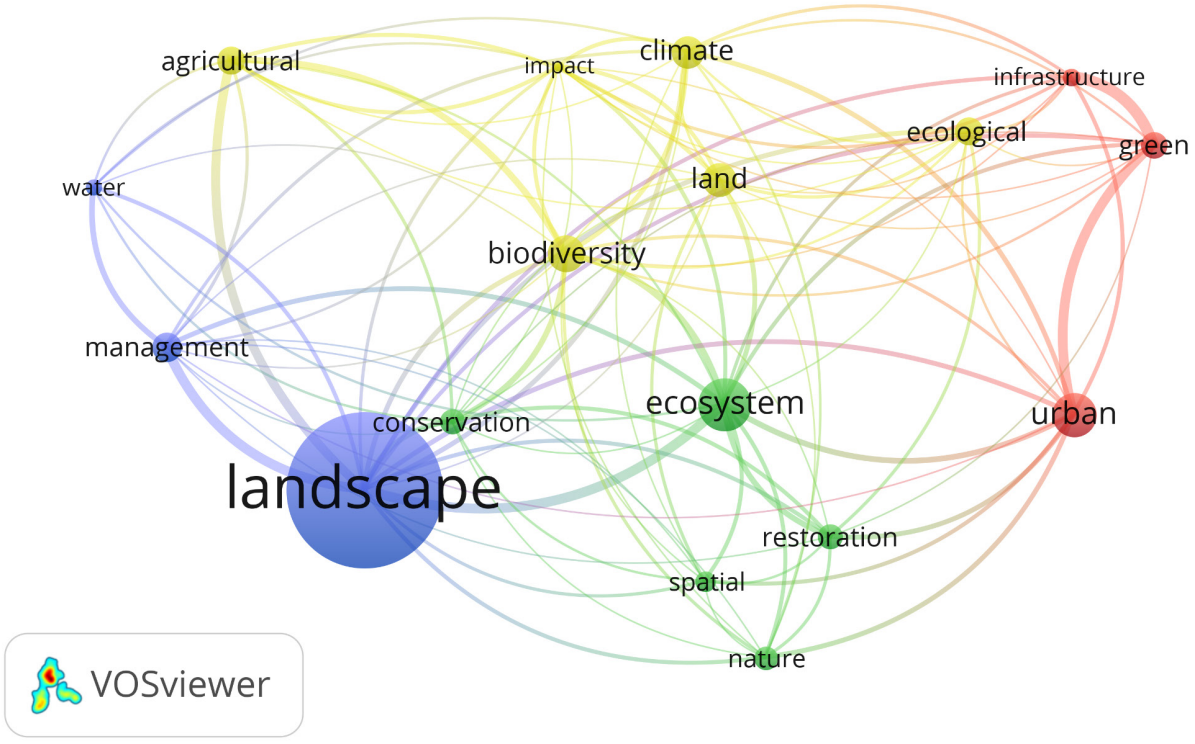

Figure 3. Network diagram of terms appearing in contribution titles (using lemmatization of terms, terms occurring ≥5 times, minimum word length of 4 characters, ≥30 connections among terms, and cluster size ≥3). Generated using nocodefunctions.com and VOSviewer.

Figure 4. Word clouds for five landscape types (agricultural, urban, forest, water, and mountain) generated from contribution abstracts using wordart.com. Words appearing at least 10 times were included (5 times for water and mountain landscapes), excluding common and irrelevant terms (e.g., study, analysis, area, both, more, finding).

ies related to forest landscapes concentrate on ecological integrity and biophysical processes, as indicated by frequent terms such as forest, biodiversity, species, carbon, and climate, alongside references to monitoring and modeling approaches. In urban landscapes, research assesses infrastructure and design, with central terms including urban, green, infrastructure, and nature-based solutions, underscoring priorities in climate resilience, connectivity, and participatory planning. With regard to water the focus is on hydrological systems and resource governance, with prominent words such as water, river, lake, and resource, often linked to climate adaptation and policy frameworks. Finally, research in mountain landscapes includes a strong socio-cultural dimension, reflected in terms such as tradition, knowledge, and collaboration, together with biodiversity conservation and adaptive practices suited to fragile environments.

The bibliometric analysis reveals not only the geographic and thematic breadth of IALE 2025 but also the urgent need for actionable solutions.

5 Key Insights from the Landscape Online, Issue 2025

The 2025 issue of Landscape Online presents a diverse and timely collection of research articles that explore the intersection of landscape ecology, cultural heritage, environmental sustainability, and technological innovation. The contributions address pressing global challenges, including climate change and biodiversity loss, as well as the integration of renewable energy and the preservation of historic landscapes, while offering actionable insights for policymakers, practitioners, and researchers.

The transition to renewable energy is reshaping landscapes worldwide, and this issue features several studies examining its ecological and social implications. Hainz-Renetzeder et al. (2025) critically review the ecological impacts of ground-mounted photovoltaic systems in Central Europe, emphasising the need for standardised monitoring and mitigation strategies to balance energy expansion with biodiversity conservation. Szuta et al. (2025) investigate the implementation of agrivoltaics in Poland, highlighting the potential of photovoltaic farms to meet energy goals while addressing land-use conflicts and preserving rural landscapes. Marpaung et al. (2025) focus on restoring soil fertility and crop yields in volcanic-affected areas of Indonesia, demonstrating how integrated agronomic packages can enhance resilience.

Cultural ecosystem services and the preservation of historic landscapes are central themes in this issue. Kulesza et al. (2025) compare the functionality and spatial organisation of historic parks in Lublin, Lviv, and London, revealing how modern urban needs can coexist with historic value. Kiani et al. (2025) present a comparative analysis of historical garden structures across Persian, Mughal, East Asian, and European traditions, utilising advanced spatial metrics to reveal the socio-cultural values embedded in geometric designs. Rostanski et al. (2025) explore the evolution of the Lipinka Valley brownfield site in Poland, illustrating how post-industrial, wartime, and natural landscapes intertwine to form a unique mosaic of ecosystems that contribute to local identity and biodiversity conservation. Wilkosz-Mamcarczyk et al. (2025) examine the threats posed by urban sprawl to the cultural landscapes of historic villages in Poland and Ukraine, proposing methods to protect the historical fabric of these areas while accommodating modern development pressures.

Also, different landscape types are examined through the lenses of perception, fragmentation, and ecological function. Pardela et al. (2025) investigate how topography, vegetation density, and park attributes affect perceived safety, mystery, and preference in urban parks, offering valuable insights for designing attractive and safe green spaces. Ghouldan et al. (2025) analyse the temporal fragmentation of Morocco's Maâmora oak forest using landscape metrics, documenting the adverse effects of logging, agricultural expansion, and infrastructure development on biodiversity and ecological connectivity. Schultheiß & Konold (2025) present an integrative approach to understanding forest drainage in Germany's Hunsrück-Hochwald National Park, combining historical analysis, LiDAR data, and field surveys to inform climate-resilient conservation strategies. Rolio (2025) contributes a spatially explicit analysis of Agri-Environment Measures (AEM) in Europe, re-

vealing how their effectiveness varies across species, scales, and landscapes, and underscoring the importance of tailored, landscape-level interventions for avian conservation.

The role of art and visual representation in geographic education is highlighted by Korinth (2025), who critically analyses landscape paintings as tools for teaching about climate zones and human-environment interactions. This article bridges abstract geographical concepts with tangible, multisensory learning experiences, advocating for a balanced approach that merges artistic aesthetics with scientific precision.

The impact of land use on carbon storage is a critical topic in the context of climate change. Cachay & Eckhardt (2025) assess aboveground carbon storage in Peru's tropical montane forests, revealing a stark gradient from old-growth forests to croplands and advocating for restoration and agroforestry as mitigation strategies. Their findings emphasise the urgent need to protect and restore forested landscapes to maintain ecosystem functions and mitigate climate change.

The articles in this issue collectively demonstrate the multifaceted nature of landscape ecology, where scientific rigor is combined with cultural, historical, and practical considerations. They emphasise the importance of interdisciplinary collaboration in addressing the dual crises of climate change and biodiversity loss, while also preserving cultural heritage and promoting sustainable land use. As we move forward, the insights presented here can guide policymakers, planners, and researchers in developing holistic, adaptive, and inclusive strategies for landscape management and conservation. This issue of Landscape Online not only reflects the current state of the field but also charts a course for its future, ensuring that landscape ecology remains a dynamic and impactful discipline in a rapidly changing world.

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