

EDITORIAL

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Reflections on twenty-five years of landscape ecology discussion in the German-speaking IALE community

In May 1999, about 30 people from Austria, Germany and Switzerland met in Basel (Switzerland) to found the German Chapter of the International Association for Landscape Ecology (IALE-D) to bring together German-speaking researchers, planners and other people interested in landscape ecology. Now, twenty-five years later, we take this milestone as an opportunity to reflect on the evolution of the topics that have shaped the landscape ecology discourse within the IALE-D community. In this editorial, we (1) present the history of the IALE-D conferences, (2) reflect on the topics addressed by the conference contributions and how they have developed, and (3) offer some initial indications of changes in relevance with regard to technological advances, thematic foci, transdisciplinarity, sustainability issues, and cultural dimensions that can be observed over time. Furthermore, we provide an overview of the articles published in 2024 in Landscape Online, which mainly reflect two emerging topics, which follow the lines of the thematic development of the IALE-D conferences, that is, a focus on urban environments as well as on pressing issues related to global change.

1 Overview of the IALE-D conferences

The International Association for Landscape Ecology (IALE) was founded in 1982 to support international collaboration among landscape ecologists, promoting transdisciplinary research and exchanging experience for analyzing, planning, and managing landscapes. On May 5, 1999 in Basel (Switzerland) the chapter “IALE-D” was found to connect German-speaking researchers, planners, and other interested persons in landscape ecology. During the subsequent official founding of the association, the first step was to vote on the association’s statutes, aiming to promote science, research and education in the field of landscape ecology and its application in practice. One of the central tasks included in the

regulation included the organization of conferences, seminars, and workshops to support the exchange of experience and information as well as the discussion of the latest research results in landscape ecology¹. The first IALE-D conference took place in July 2000 in Nürtingen, Germany. Since then, meetings have been held in 16 different locations across Germany as well as in Austria and Italy (Figure 1). A total of 22 conferences were held annually until the Covid-19 pandemic disrupted this tradition. Between 2020 and 2023, only two events took place, both characterized by online i.e. hybrid formats. In 2024, a larger in-person congress was planned for the first time since the pandemic, aiming to revive the IALE-D conference tradition and create opportunities for broader exchange and engagement.

1 <https://www.iale.de/vereinsatzung.html>

Werner Rolf ^{1*}, Uta Schirpke ²

1) Department of Landscape Architecture and Environmental Planning, OWL University of Applied Sciences and Arts, Germany

2) Institute for Alpine Environment, Eurac Research, Italy

*Corresponding Author Email: werner.rolf@th-owl.de

Werner Rolf
 <https://orcid.org/0000-0001-7040-034X>

Uta Schirpke
 <https://orcid.org/0000-0002-2075-6118>

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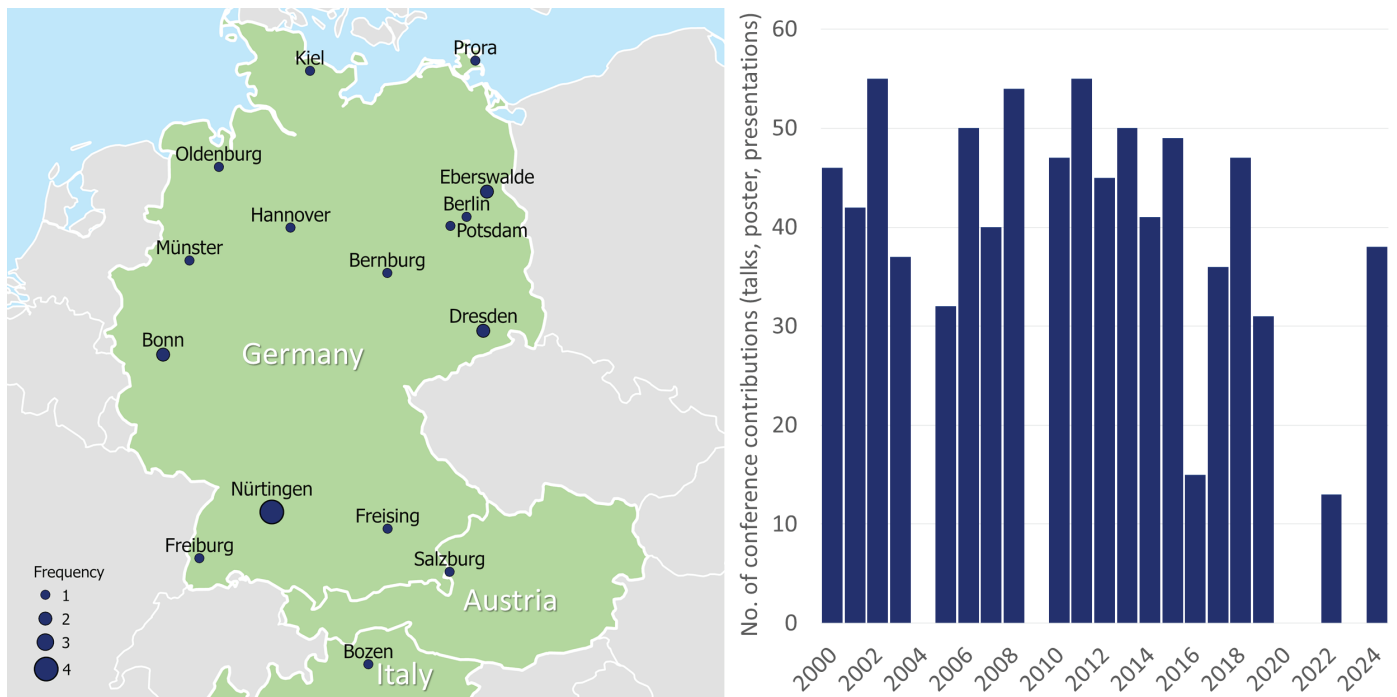


Figure 1. Location of the IALE-D conferences 2000-2024 (left) and number of conference contributions per year (right) - abstract books were not available for 2004, 2009, 2020; in the years 2021 and 2023 no conference took place.

Now, twenty-five years after founding the German IALE Chapter, we take this milestone as an opportunity to reflect on the evolution of the topics that have shaped the field of landscape ecology discourse within the IALE-D community. Similar approaches have been used to examine publication trends in the IALE flagship journal *Landscape Ecology* (Andersen 2008; Wu 2017) and also in the self-published journal *Landscape Online* (Rolf & Schirpke 2022), as well as in relation to IALE congresses in North America (McIntyre et al. 2013) and the UK (Young et al. 2019). Based on the Association's commitment to promoting "exchange of experience and information as well as the discussion of the latest research results in the field of landscape ecology", this reflection invites us to explore the discussions that have developed over the past quarter century. The evolution of these discussions provides an opportunity to examine how landscape ecology has evolved and responded to the challenges over time. Reflecting on the discussions within the IALE-D community, we seek an overview of the key topics, conceptual frameworks, guiding paradigms, and emerging priorities that have influenced our collective understanding of landscape ecology.

To do so, we first analyzed the titles of the conference contributions that have been documented over time². Therefore, we compiled the titles of all conference contributions in a database. Since some of the conferences were organized in bilingual, we harmonized all titles by translating them into English. The data analysis was conducted using word frequency analysis in NVivo version 11. NVivo supports the efficient management and analysis of large amounts of unstructured data (Hoover and Koerber, 2011). Word frequency analysis in Nvivo was conducted taking into account stop words and stemming, both techniques that efficiently support natural language processing and are applicable within Nvivo. Stop words are common words that are filtered out, such as articles, prepositions, and other frequently occurring words that may not contribute significantly to the meaning of the text corpus. To define stop words, we adapted the list provided at GitHub by Diaz (2022) while ensuring that relevant terms for this analysis were not included in the stop word list (e.g. index, indicate). Stemming helps to reduce words to their root or base form. To avoid over-stemming, we primarily used this option to merge singular and plural forms (e.g. city+cities=city, model+models=model) and only merged those terms manually that has

² <https://www.iale.de/archiv-der-iale-d-jahrestagungen.html>

Table 1. Location and topic of annual IALE-conferences 2000-2024.

Year	Conference topic	Location	No. of contributions available for analysis
2000	Future of Central European cultural landscapes	Nürtingen	46
2001	Landscapes as living space	Oldenburg	42
2002	Assessment and development of the landscape	Dresden	55
2003	Land use change	Eberswalde	37
2004	Landscape: Object or Stage?	Nürtingen	-
2005	Space - Time - Problems in the Cultural Landscape	Freiburg	32
2006	Spatial dynamics of human-environmental systems	Kiel	50
2007	Landscape ecology and environmental policy	Freising	40
2008	Global Change and Landscape Response - The feedback from landscapes on global change	Bonn	54
2009	Transformations of European Landscapes	Salzburg	-
2010	What makes landscape valuable? - Ecology, art and economy between evaluation and valorization	Nürtingen	47
2011	MMM - models, monitoring and other quantitative methods in landscape ecology	Berlin	55
2012	Climate change: What to do!	Eberswalde	45
2013	Diverse landscapes biodiversity, ecosystem services and quality of life	Dresden	50
2014	Ecology, resilience and management of our landscape	Bolzano	41
2015	Ecosystem services to ensure sustainable rural development and sustainable resource management	Bonn	49
2016	Landscape ecology timeless	Prora/Rügen	15
2017	Water.Landscape	Münster	36
2018	Changing landscape - understand, plan, realize	Hannover	47
2019	Landscape in climate protection	Potsdam	31
2020	Covid-19 in the context of landscape ecology	Nürtingen (virtual)	-
2022	Current environmental problems and future perspectives	Nürtingen (hybrid)	13
2024	Resilience vs. transformation in urban and rural - what can landscape ecology contribute?	Bernburg	38

culture”, “innovation”, “management”, and “cultural” - to name the most significant changes based on the relative frequency of occurrence with at least ten ranks increase. In the meanwhile, other terms decreased or even disappeared from the list of the top 50, such as “ecology”, “nature”, “evaluation”, “assessment”, “development”, “structure”, “vegetation” and “mountain” - to name some remarkable terms with at least five ranks decrease based on the relative frequency of occurrence.

Although this work only presents a first glimpse at the topics discussed at the IALE-D conferences based on the quantitative appearance of terms and frequency used in the titles of conference contributions, it offers some first hints with regard to technological advancement, thematic foci, transdisciplinary, sustainability issues as well as cultural dimensions that can be summarized as follows:

- While the first conference explored emerging tools like GIS, the more recent conferences leverage cutting-edge technologies like AI, digital

twins, and participatory modeling to transform landscape research and planning.

- While the earlier years focused on ecological theories and frameworks, the later years emphasize collaborative approaches involving multiple stakeholders.
- The most recent years integrate cultural and perceptual aspects of landscapes, such as identity, aesthetics, and participatory mapping more frequently, while the earlier conferences were more focused on ecological and functional issues.
- Over time the discussions shifted significantly towards urban landscapes, green infrastructure, and climate adaptation, while the earlier years concentrated more on rural and traditional landscapes.
- In the earlier period, globalization was viewed as a challenge affecting landscapes. In the later period, sustainability and resilience in the face of globalization and climate change have become central topics.

However, it must be noted the main limitation of this reflection is that these are just some first insights,

of landscape often remains at a representative, cultural, and visual level in rural communes, differing from urban discourses that often focus on climatic and ecological functions of landscape.

The second main topic across articles and aligning with the increasing interest at the IALE-D conferences, are pressing issues related to global change and its effects on human well-being to provide insights for decision-makers and landscape managers. Pointing out the priorities for landslide control and the importance of understanding socio-ecological relationships to support sustainable landscape management, Adjam et al. (2024) analyzed community adaptive capacities in disaster-risk conditions through questionnaires in three sub-districts in Kupang in Indonesia. Similarly, to support resilience and adaptation to future flood hazards and climate change, Moradi et al. (2024) assessed the effects of floods on land cover dynamics in the Central Zagros region in Iran using temporal satellite imagery and applying land-use/land-cover change detection and fragmentation analysis, complemented by fieldwork and interviews to elicit local people's perspectives. With a focus on mountain lakes in the European Alps, Ebner (2024) adopted an interdisciplinary ecosystem service perspective, advancing the understanding of human interactions with mountain lakes and indicating potential social and ecological impacts of anthropogenic pressures. Using remote sensing, socio-economic analysis, and field surveys, Bargali (2024) examined forest fire dynamics and their impacts on vegetation, soil properties, and biodiversity in the Uttarakhand Himalaya region. The results reveal a significant increase in fire frequency and severity over the past decade, threatening ecosystem health and resilience and urge for the need to foster sustainable forest management and fire risk reduction. In context of the environmental economic accounting system (SEEA EA), which measures ecosystem services, tracks changes in ecosystem assets, and links this information to economic and other human activity, Sylla et al. (2024) analyzed the use of historical maps, using naturalness and diversity to understand ecosystem condition. Based on the example of Ślęza Landscape Park in Poland, they analyzed changes between 1883 and 2011 and discuss lessons learned and challenges of local scale SEEA EA applications. Also related to environmental and

anthropogenic changes, in particular the impacts of climate change, Halecki et al. (2024) evaluated the factors contributing to the ongoing changes in and around mangroves on the Yucatán Peninsula in the western Caribbean Sea. Based on satellite images between 1981 and 2020 the results indicate great variations in mangrove coverage, emphasizing the need for urgent action for forest management and restoration efforts.

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Werner Rolf

Department of Landscape Architecture and Environmental Planning, OWL University of Applied Sciences and Arts, Germany

Email: management@landscape-online.org

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