

Advancing Geotourism in a Time of Global Uncertainty

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The Special Issue *Geotourism: The Tourism of Geology and Landscape* has brought together a diverse set of perspectives that collectively illustrate the rapid evolution of geotourism as both a research field and a practical approach to sustainable tourism development. As tourism systems worldwide grapple with the limitations of mass tourism, increasing geopolitical unpredictability, and the growing urgency of environmental and social responsibility (OECD, 2018; Giourgali et al., 2024), geotourism has emerged as a compelling alternative—one that places geological landscapes, Earth processes, and local communities at the heart of visitor experiences (Dowling, 2013).

Recent developments in geotourism, as reflected in the contributions to this Special Issue, demonstrate a clear maturation of the field. Geotourism is no longer understood solely as niche tourism focused on geosites or geological interpretation. Instead, it is increasingly framed as an integrated development model that links geoheritage conservation with education, destination branding, community empowerment, and regional economic resilience. Sánchez-Cortez et al. (2023), the authors of *Characterization of Geoheritage and Geotourism Potential of the Fluvial-Glacial Landscapes in the Culebrillas Lagoon (Ecuador)*, systematically inventory and evaluate the geological, geomorphological, cultural, ethnographic, and biological features of the Culebrillas Lagoon hydrographic system in the Ecuadorian Andes, revealing its significant geotourism potential rooted in unique fluvio-glacial landforms and deep cultural heritage linked to Inca and Cañari civilizations and the Qhapaq Ñan (Inca road system). By applying a mixed methodological approach—including field surveys, qualitative assessments, and mapping—the authors propose integrated interpretive trail networks and activity strategies that leverage both natural landscapes and cultural narratives to promote sustainable geotourism development, support environmental conservation, deepen scientific and heritage appreciation, and provide a framework for community engagement and tourism planning in the region. The expanding global network of UNESCO Global Geoparks continues to play a central role in geotourism transformation, offering tested frameworks for combining conservation, tourism, and sustainable development across diverse geographic and cultural contexts (Malatyinszki et al., 2025). These geoparks function as living laboratories where innovative approaches to interpretation, governance, and stakeholder collaboration are actively explored (Martini et al., 2021).

At the same time, this Special Issue highlights the growing sophistication of geotourism practices. Advances in outdoor geoscience communication, interpretive design, and storytelling facilitate more engaging and inclusive visitor experiences, translating complex Earth science concepts into accessible narratives rooted in landscape and place (Stewart & Nield, 2013). Community-centered approaches are increasingly recognized as essential, with local residents acting not only as hosts or guides but also as co-creators of



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geotourism products and custodians of geological and cultural heritage (Arrage, 2024). In parallel, the development of geodiversity-based branding, quality labels, and marketing strategies reflects an effort to position geotourism destinations more clearly within competitive tourism markets while maintaining strong sustainability commitments (Rodrigues et al., 2021). The work of Gou et al. (2024), *Understanding the Determinants of Geologically Responsible Behaviour among Geotourists: A Multi-Destination Analysis*, makes a substantial contribution by advancing understanding of geologically responsible behavior among geotourists through a comparative, multi-destination analysis of three UNESCO Global Geoparks in the Greater China region. Drawing on extensive on-site survey data and structural equation modeling, the study moves beyond traditional satisfaction-based tourism models by identifying environmentally responsible attitudes as the primary driver of responsible behavior in geological heritage settings. A key contribution lies in demonstrating that place attachment and visitor satisfaction influence geotourist behavior indirectly, by shaping environmental attitudes rather than directly determining responsible actions. This finding has important implications for geotourism management, emphasizing the critical role of geoscience interpretation, guided tours, and high-quality educational materials in fostering stewardship and conservation-oriented behavior. By empirically linking visitor attitudes, interpretation strategies, and geoheritage protection outcomes, the study strengthens the theoretical and practical foundations of geotourism as a tool for sustainable tourism development within UNESCO Global Geoparks and beyond.

Despite these advances, the contributions to this Special Issue also reveal significant gaps in knowledge and practice that warrant further attention. One persistent challenge lies in the limited empirical evidence assessing the long-term economic, social, and environmental impacts of geotourism initiatives. While many studies highlight positive outcomes, there remains a need for comparative, longitudinal research that critically examines trade-offs, unintended consequences, and power dynamics within geotourism development, particularly in fragile or highly visited geological heritage settings, such as the Chinese UNESCO Global Geoparks, which has potential case studies from more than 20 years of history (Xu & Lei, 2025).

Another notable gap concerns the uneven geographic distribution of geotourism research. Much of the existing literature remains concentrated in geoparks and destinations with established institutional support, leaving underrepresented regions—particularly in the Global South—less visible in academic discourse. This limits our understanding of how geotourism strategies function under different governance systems, economic constraints, and cultural contexts, and how transferable current models truly are. This Special issue brought together three contributions from India, Ecuador, and South Africa. Matshusa and Leonard (2023), the authors of *Geoheritage Threats in Southern Africa*, make an important contribution to geotourism scholarship by critically examining the threats facing geoheritage resources in Southern Africa and their implications for sustainable tourism development. By identifying key pressures on national parks, such as mining, urban expansion, infrastructure development, inadequate governance, and limited public awareness, the study highlights how geoheritage degradation directly undermines the long-term viability of geotourism destinations. The authors emphasize the disconnect between geoheritage conservation and tourism planning, demonstrating that geotourism potential remains underutilized in the absence of integrated management frameworks. Importantly, the paper reinforces the role of geotourism as a tool for geoheritage protection, public education, and local economic development, while calling for stronger policy alignment, community engagement, and institutional support. In doing so, it advances understanding of how safeguarding geological heritage is fundamental to building resilient, inclusive,

and sustainable geotourism systems, particularly in regions facing intense development pressures.

Climate change emerges as both an opportunity and a challenge for geotourism, yet remains insufficiently explored (Migoń, 2024). While landscapes provide powerful evidence of climate processes and change, more research is needed on how geotourism can actively contribute to climate adaptation, mitigation, and risk communication, as well as how climate impacts themselves may alter the viability and management of geotourism destinations. Similarly, the potential role of geotourism in strengthening community resilience to natural hazards is promising but still underdeveloped in both theory and practice. In *Climate Change and Geotourism: Impacts, Challenges and Opportunities*, Gordon (2023) provides a comprehensive literature review on how climate change affects geotourism, highlighting both risks to geoheritage assets—such as the degradation of geomorphological features and altered visitor experiences—and the need for adaptation strategies within geotourism planning and management; he identifies that, apart from glacier-based geotourism, climate change impacts have been insufficiently addressed in geotourism research, and calls for integrating broader tourism scholarship to better understand supply-side and demand-side challenges, including visitor motivations, destination image shifts, and geoethical concerns such as carbon footprints, thereby advancing a more resilient and sustainable geotourism framework that acknowledges environmental change while leveraging geotourism's potential for education, conservation, and sustainable development.

Issues of inclusivity and accessibility also require deeper investigation. Although geotourism aspires to be a socially just and inclusive form of tourism, there is limited research on how geosites and geotourism experiences can be effectively adapted for a growing elder population, people with disabilities, marginalized groups, and diverse cultural audiences. Addressing these gaps is essential if geotourism is to align fully with broader sustainability and equity goals. In their paper *Inclusive Tourism Adopted to Geosites: A Study in the Ajodhya Hills of West Bengal*, Ghosh et al. (2023) make a good case integrating the principles of inclusive (accessible) tourism into the planning and management of geosites, addressing a critical yet underexplored dimension of sustainable geotourism. Using the Ajodhya Hills of West Bengal as a case study, the authors demonstrate how geotourism potential is closely linked to accessibility, particularly for differently abled and elderly visitors, without compromising the scientific, aesthetic, and cultural values of geological heritage. The study introduces an innovative attraction–accessibility model to classify geosites and prioritize inclusive development, supported by extensive fieldwork, GIS analysis, and visitor perception surveys. By proposing site-specific planning measures such as ropeways, elevators, guided interpretation, and community-based services, they highlight how inclusive infrastructure can expand geotourism markets, enhance visitor experiences, and generate local socio-economic benefits. Overall, the research advances geotourism discourse by framing accessibility as a core component of responsible geotourism development and aligning geotourism practice with the Sustainable Development Goals and social equity objective.

Future research in geotourism should address several critical gaps to strengthen both theory and practice. Longitudinal and comparative studies are needed to evaluate the long-term social, economic, and environmental impacts of geotourism initiatives, including potential trade-offs and unintended consequences, particularly in fragile or heavily visited geoheritage sites. Expanding research into underrepresented regions, especially in the Global South, would enhance understanding of how geotourism strategies function under diverse governance systems, economic conditions, and cultural contexts. The intersection of geotourism and climate change remains underexplored, calling for studies on the effects of climate variability on geosites, visitor experiences, and destination management, as well as the role of geotourism in climate adaptation, mitigation, and risk communication.

Community-centered research is essential for examining co-creation, local empowerment, and resilience building, while inclusive and accessible geotourism requires investigation into strategies that accommodate elderly, differently abled, marginalized, and culturally diverse visitors without compromising scientific, aesthetic, or cultural values. Finally, future work should focus on linking geodiversity-based branding, interpretation, environmental education, and responsible visitor behavior with sustainable tourism planning, conservation outcomes, and stakeholder collaboration, providing a comprehensive framework for resilient and equitable geotourism development.

In conclusion, this Special Issue *Geotourism: the Tourism of Geology and Landscapes* underscores that geotourism stands at a critical crossroads. Its growth reflects a wider societal shift toward more meaningful, place-based, and responsible tourism experiences (Frey, 2021). However, realizing its full potential will require continued interdisciplinary research, stronger evaluation frameworks, and closer collaboration between scientists, tourism practitioners, policymakers, and local communities. By confronting existing knowledge gaps and embracing complexity, geotourism can continue to evolve as a powerful tool for conserving geological heritage, enriching visitor understanding of the dynamic Earth, and supporting resilient, sustainable destinations for future generations.

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