

INTEGRATED APPROACH TO THE USE OF GEOHERITAGE AND GEODIVERSITY IN GEOTOURISM

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Abstract

This paper investigates the role of geoheritage and geodiversity in the context of geotourism and proposes an integrated approach to their sustainable utilisation within regional development frameworks. Existing research is often fragmented, primarily focusing on geosite assessment, geopark development, and interpretation strategies. Geoheritage is defined as the significant component of geodiversity that constitutes the abiotic foundation of landscapes and ecosystems, bearing scientific, educational, cultural, and socio-economic importance. Geotourism is conceptualised as a place-based form of tourism that links Earth's heritage with biodiversity, cultural landscapes, and local identity. The study introduces the ABC framework (Abiotic–Biotic–Cultural) as a conceptual approach for synthesising these dimensions. It underscores a paradigm shift from site-specific approaches toward territorial systems and highlights the critical need for coordinated management and interpretation to promote sustainable geotourism development.

Key words: geoheritage, geodiversity, geotourism, ABC framework, sustainability

Introduction

Geoheritage, geodiversity and geotourism have become central themes in both academic research and territorial development. Tourism increasingly recognises landscapes, geological features, and Earth's history as resources for education, interpretation, and destination development. These concepts are no longer regarded solely as scientific categories but are now seen as elements that support conservation, environmental awareness, and local economies.

Despite extensive research on geosites, geoparks and interpretation, the literature remains fragmented. Many studies concentrate on specific aspects rather than exploring how geoheritage and geodiversity can be utilised sustainably within broader regional contexts.

This paper proposes an integrated framework for the sustainable utilisation of geoheritage and geodiversity, based on the ABC concept (Dowling, 2013). The framework extends its application from interpretative approaches to a territorial-scale model of geotourism and regional development.

The paper clarifies the concepts of geodiversity, geoheritage and geotourism, followed by an analysis of their value dimensions and recent applications. The core section develops an integrated ABC-based framework and discusses its relevance for sustainable geotourism and regional development.

Conceptual Framework

The concept of geodiversity refers to the natural variety of the abiotic environment, including rocks, minerals, fossils, soils, landforms, sediments, hydrological features, and the processes that form and transform them over time (Gray, 2013). Just as biodiversity denotes the diversity of living nature, geodiversity captures the complexity and variability of non-living nature. Importantly, geodiversity is not limited to spectacular or rare features; it includes both outstanding and ordinary abiotic elements that together form the physical basis of landscapes and ecosystems. It is therefore fundamental not only for geological science but also for environmental management, landscape planning, ecological functioning, and cultural development.

Within this broad domain, geoheritage can be understood as the subset of geodiversity that has been recognised as having particular value and significance. Geoheritage may possess scientific, educational, aesthetic, cultural, ecological, or socio-economic importance and is often represented through specific geosites, geosystems, or broader geological and geomorphological landscapes (Brilha, 2016; Reynard & Brilha, 2025). Geoheritage includes not only “classical” geological sites such as stratigraphic sections, fossil localities, caves, volcanoes, and tectonic structures, but also geomorphological forms such as canyons, karst systems, waterfalls, glacial landscapes, and coastal cliffs. In many cases, the value of geoheritage lies not only in its scientific rarity but also in its capacity to tell stories about Earth history, environmental change, and the long-term interaction between nature and human society.

Geotourism is the tourism expression of this relationship. Although definitions vary, most contemporary understandings agree that geotourism is a form of tourism that focuses on geological and geomorphological features, landscapes, and Earth processes, while also emphasising interpretation, conservation, and visitor learning (Hose, 2012). However, modern geotourism should not be reduced to “tourism to rocks” or a narrow specialist niche. Rather, it is increasingly recognised as a broader landscape-based form of tourism in which geo(morpho)logy remains central but is interpreted in relation to ecology, culture, and place identity (Dowling, 2013; Dowling & Newsome, 2018). This distinction is crucial. Geotourism is geoheritage-centred, but it should not be geoheritage-isolated. When approached in this way, it becomes compatible with sustainable tourism principles and capable of contributing to regional development beyond the boundaries of individual geosites.

Results

Geoheritage and geodiversity are resources with multiple, mutually interconnected values relevant to their use in geotourism (Reynard & Brilha, 2025).

Their scientific value lies in their importance for understanding geological processes and the history of the Earth, thereby serving as a fundamental basis for their identification and conservation. Concurrently, they possess considerable educational value, as they facilitate the dissemination and interpretation of phenomena such as landscape evolution, climate change, and geomorphological dynamics to a broader audience.

Aesthetic value plays an important role in tourism attractiveness, as many visually appealing landscapes are directly shaped by geological structure. In addition, geodiversity has ecological value, providing the abiotic foundation for ecosystems and influencing biodiversity patterns. This highlights the need to consider ecological relationships in geotourism development.

Geoheritage is also associated with cultural value, as geological conditions influence settlement, land use, architecture, and local traditions. In many cases, it forms part of cultural landscapes and contributes to regional identity. Moreover, it possesses socio-economic potential, particularly in supporting diversification within the tourism sector and facilitating local development when employed sustainably.

Regarding application, the use of geoheritage in tourism has evolved from a focus on individual geosites towards more comprehensive territorial approaches. Earlier research primarily concentrated on geosite inventories and assessments, establishing methodological frameworks for evaluating tourism potential.

Recent perspectives emphasise geotourism as an integral component of territorial systems, where geological, ecological, and cultural elements are interconnected. This paradigm shift is exemplified by the geopark concept, which integrates conservation, education, and regional development (Gordon, 2018; Pásková et al., 2021). Concurrently, geotourism is increasingly understood as an interpretive and experience-based form of tourism.

Nonetheless, current methodological approaches, publications and research results are often fragmented, focusing separately on geosites, interpretation, or (geo)tourism products. Despite these advancements, a comprehensive, fully integrated territorial framework that links geoheritage, geodiversity, and geotourism within regional development strategies remains limited.

Discussion

The results suggest that geoheritage and geodiversity cannot be effectively utilised in geotourism if regarded solely as isolated attractions or individual tourism resources. Their sustainable utilisation necessitates a broader perspective that reflects their multiple values and their function within interconnected territorial systems.

In this context, the ABC framework offers a valuable conceptual basis for interpretation and planning. It emphasises that geoheritage constitutes the abiotic foundation of landscapes, which is closely interconnected with ecological systems and cultural processes. This approach helps avoid overly narrow, geology-focused interpretations and superficial tourism applications that reduce geoheritage to a purely promotional element lacking deeper meaning.

From an abiotic perspective, effective utilisation of geoheritage demands systematic identification, evaluation, protection, and interpretation. Not all geosites are equally suitable for tourism, and their management must consider scientific significance, vulnerability, and capacity to accommodate visitors. This entails adopting differentiated approaches, ranging from strict protection to regulated visitor access and educational utilisation.

The biotic dimension underscores the relationship between geodiversity and biodiversity. Geological structures, relief, and hydrological conditions influence habitat diversity and ecological processes. Consequently, the development of geotourism must account for environmental sensitivity and avoid

detrimental impacts on ecosystems. Simultaneously, incorporating ecological interpretation can enrich the visitor experience and expand the relevance of geotourism.

The cultural dimension highlights the importance of linking geoheritage with human activities, traditions, and local identity. Geological conditions have historically shaped settlement patterns, land use, and cultural landscapes. Their inclusion in interpretation enhances the significance of geotourism and fosters stronger connections between visitors and place. It also elevates the potential for local community involvement in tourism activities.

The integration of these three dimensions has direct implications for regional development. When implemented in a coordinated manner, geotourism can contribute to economic diversification, education, and local participation, particularly within rural or peripheral regions with limited development opportunities. However, this potential can only be realised through integrated planning, stakeholder cooperation, and long-term management rather than isolated or short-term tourism initiatives.

Overall, the proposed conception (Figure 1) suggests that geotourism should be understood as an integrated, place-based approach rather than merely a collection of individual attractions or products. The ABC framework offers a practical structure for establishing links between geoheritage and geodiversity with ecological and cultural systems, thereby facilitating their sustainable utilisation within tourism and regional development.

2. The ABC integration framework

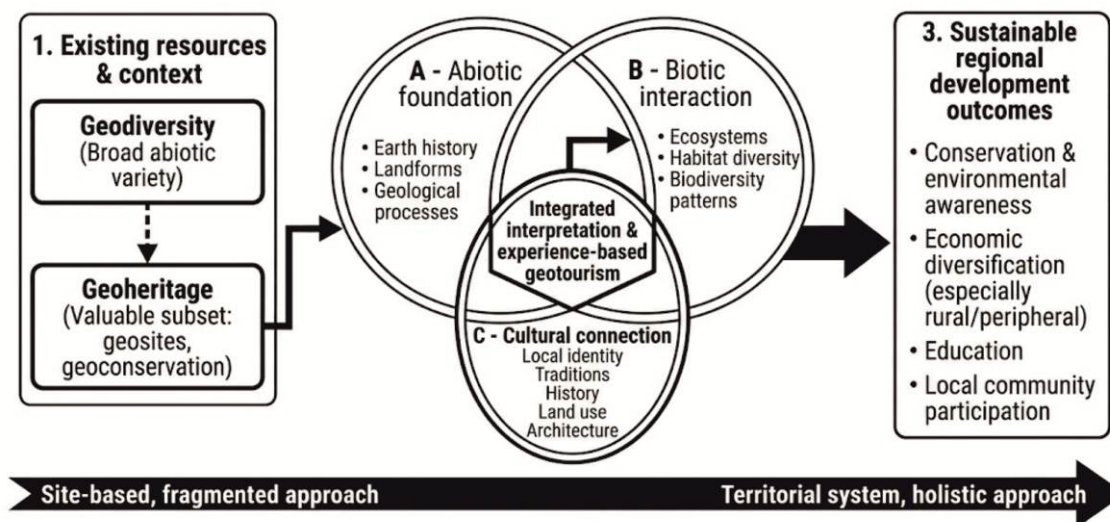


Fig. 1: Conceptual diagram of integrated approach to the use of geoheritage and geodiversity in geotourism

Conclusion

The paper demonstrates that the sustainable utilisation of geoheritage and geodiversity in geotourism necessitates a shift from a site-based, product-oriented perspective to an integrated territorial approach. Despite notable advances in research, their application remains fragmented across geosite assessment, interpretation, and tourism development.

The principal contribution is the utilisation of the ABC framework, which emphasises geoheritage as the abiotic foundation of landscapes interconnected with ecological and cultural systems (Dowling, 2013; Gordon, 2018; Pásková et al., 2021). This perspective supports a more coherent understanding of geotourism.

Geoheritage and geodiversity possess multiple values—scientific, educational, aesthetic, ecological, cultural, and socio-economic—that must be collectively considered in the development of tourism.

Therefore, geotourism should be developed as an integrated, place-based approach that links conservation, interpretation, and regional development, particularly in rural and peripheral regions. The ABC framework offers a practical structure for this integration and for fostering the sustainable utilisation of geoheritage and geodiversity.

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Souhrn

Příspěvek se zabývá využitím geoheritage a geodiverzity v geoturismu a jejich rolí v regionálním rozvoji. Přestože jsou tyto koncepty v odborné literatuře etablované, jejich aplikace zůstává roztržštěná mezi hodnocení geolokalit, interpretaci a tvorbu turistických produktů. Cílem článku je proto představit integrovaný přístup, který tyto oblasti propojuje v širším územním rámci. Geologické dědictví je chápáno jako hodnotná část geodiverzity tvořící abiotický základ krajiny, úzce propojený s biotickými a kulturními systémy. Tyto složky vykazují vzájemně provázané vědecké, vzdělávací, estetické, ekologické, kulturní a socio-ekonomické hodnoty, které je nutné vnímat komplexně. Článek sleduje vývoj geoturismu od zaměření na jednotlivé lokality k integrovanému územnímu přístupu. Moderní geoturismus je chápán jako komplexní forma turismu propojující přírodní a kulturní složky krajiny, což se odráží například v koncepci geoparků. Klíčovým přínosem je aplikace konceptu ABC (Abiotic–Biotic–Cultural), který umožňuje systematicky propojit jednotlivé složky krajiny a lépe porozumět vztahům mezi geodiverzitou, biodiverzitou a lidskou činností. Tento rámec podporuje udržitelný rozvoj geoturismu v rámci regionálních systémů. Z praktického hlediska je nezbytné zdůraznit, že geoturismus by neměl být redukován na izolované produkty či jednotlivé lokality, ale měl by být rozvíjen jako integrovaný, místně specifický přístup propojující ochranu přírody, interpretaci a zapojení místních komunit. Závěrem lze konstatovat, že geoturismus může významně přispět k udržitelnému regionálnímu rozvoji, zejména ve venkovských a periferních oblastech, pokud je založen na koordinovaném a kontextově citlivém využívání geoheritage a geodiverzity.

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