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Editorial

Geotourism

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Abstract: Geotourism is one of the newest concepts within the field of tourism, and primarily focuses on promoting geological and geomorphological features in landscapes as tourist attractions. This new niche market segment within tourism is based on the conservation of geoheritage and geodiversity through appropriate sustainability measures and management. Geotourism is, however, a broad concept which encompasses many aspects of a range of tourism activities, such as transport, accommodation, destination amenities, recreation, planning, and management. A testament to the rapid growth of geotourism worldwide is the expansion of membership of the UNESCO Global Geoparks Network, from 20 geoparks when it was founded in 2004 to 140 in 2018 (Global Geopark Network: http://www.globalgeopark.org/homepageaux/tupai/6513.htm). Concurrent with the growth of geotourism, there has been an explosion in the number of scientific publications on issues related to the subject over the past few years. To date, the major focus of these publications has been on geotourism as an economic driver with respect to rural development. This special issue of Geotourism presents a collection of 11 scientific contributions that underpin the intimate connection between geotourism and its geological resources, while at the same time highlighting the broad scope of geotourism. These contributions increase our understanding of how geotourism has evolved over time, as well as its setting out what challenges it faces in the future.

Keywords: geotourism; geoheritage; geoconservation; geodiversity; geology; geomorphology; geotourism planning; sustainable geotourism management; geotourists behaviour

1. Introduction

Recent years have seen the number of international tourists' arrivals to be hitting a new record year on year, a trend which is likely to continue in the near future. The proliferation of airlines, and resultant increased competition, have reduced travel costs and rendered previously difficult-to-access destinations more easily accessible. As a result, many sites that feature unique geological heritage and history are, today, more accessible than ever, and attract a greater number of visitors seeking out new experiences and exotic destinations. Improved accessibility also provides opportunities for the tourism industry [1–3]. Geotourism that primarily focuses on geological and geomorphological features in landscapes as tourist attractions has over the course of the past decade been one of the fastest growing market segments within tourism [4–6]. The expectation is that geotourism will continue to grow at a rapid pace worldwide, stressing the critical importance of increased knowledge and understanding of its various impacts from a broader perspective. Generally speaking, geotourism addresses the theories and practicalities involved in managing attractions which have a high geological value, emphasizing the need for more integrated research in fields related to geology, geography, geomorphology and tourism. With this in mind, the goal in putting together this special issue was to gather a selection of articles on recent works and cases with a focus on understanding how geotourism has evolved over time; future challenges facing geotourism; geoconservation management; sustainable management of geotourism; geotourism spatial planning and design; tourism impact at different types of geological

site; geotourism in relation to geological hazards and geomorphological changes; geotourism and public perception; geotourists as a market niche; and geotourist behaviour.

The resultant special issue of *Geosciences*, entitled "Geotourism", comprises 11 open access papers presenting a broad spectrum of research related to geotourism. These are summarized in Table 1. Notably, word cloud analysis of the papers' keywords (Figure 1) indicate that the majority of the included papers share a mere three keywords, namely 'geotourism', 'geoheritage' and 'landscape'. All of the remaining keywords presented are exclusively used in just one of the selected papers, a fact which reflects the interdisciplinary nature of geotourism as a research subject. This accords with the observations of Dowling & Newsome [7,8], who stress that geotourism always communicates geoheritage, describing its landforms and processes, and furthermore that landscape is the largest context of geotourism. This further underlines the broad scope of geotourism as an industry and the importance of increased knowledge and understanding of the complex interaction between the different impact factors and their causal relation in order to be able to manage long-term geotourism in a sustainable manner.

Figure 1. Word cloud analysis of all keywords used in the included papers.

Table 1. Papers presented in the "Geotourism" Special Issue of *Geosciences*.

Paper Reference & DOI	Title	Location of Authors (According to Affiliation)	Scientific Domain (According to Affiliation)
Ólafsdóttir & Tverijonaite [4]; doi:10.3390/geosciences8070234	Geotourism: A Systematic Literature Review	Iceland	Geography and Tourism Studies
Gordon [9]; doi:10.3390/geosciences8040136	Geoheritage, Geotourism and the Cultural Landscape: Enhancing the Visitor Experience and Promoting Geoconservation	Scotland	Geography and Sustainable Development
Prendivoj [10]; doi:10.3390/geosciences8090329	Tailoring Signs to Engage Two Distinct Types of Geotourists to Geological Sites	Philadelphia, USA	Educational Leadership and Management
Martins & Pereira [11]; doi.org/10.3390/geosciences8100381	Residents' Perception and Assessment of Geomorphosites of the Alvão—Chaves Region	Portugal	Geography and Spatial Planning
Planaguma & Martí [12]; doi:10.3390/geosciences8080295	Geotourism at the Natural Park of La Garrotxa Volcanic Zone (Catalonia, Spain): Impact, Viability, and Sustainability	Spain	Geography; Earth Sciences
Helgadóttir & Sigurðardótti [13]; doi.org/10.3390/geosciences8100376	The Riding Trail as Geotourism Attraction: Evidence from Iceland	Iceland	Rural Tourism; Business
Lugeri & Farabollini [14]; doi:10.3390/geosciences8080291	Discovering the Landscape by Cycling: A Geo-Touristic Experience through Italian Badlands	Italy	Environmental Protection and Research
Meini et al. [15]; doi:10.3390/geosciences8100368	Geotourism Perspectives for Transhumance Routes. Analysis, Requalification and Virtual Tools for the Geoconservation Management of the Drove Roads in Southern Italy	Italy	Biosciences
Christian [16]; doi.org/10.3390/geosciences8080273	The Caribbean's Geotourism Potential and Challenges: A Focus on Two Islands in the Region	Alabama, USA	Biological and Environmental Sciences
Cappadonia et al. [17]; doi:10.3390/geosciences8070253	Malta and Sicily Joined by Geoheritage Enhancement and Geotourism within the Framework of Land Management and Development	Italy	Earth and Sea Sciences; Chemical and Geological Sciences
Mero et al. [18]; doi:10.3390/geosciences8060205	Geotourism and Local Development Based on Geological and Mining Sites Utilization, Zaruma-Portovelo, Ecuador	Ecuador; Spain	Geology

2. Overview of the Special Issue Contributions

A comprehensive review of scientific literature on geotourism published in the past two decades is provided by Ólafsdóttir & Tverijonaite [4]. Their results demonstrate the popularity of geotourism as a new research topic and highlight an exponential increase in research on geotourism over the past two decades. Their results furthermore show that the vast majority of this literature (98.8%) is based on an empirical approach to assessing geoheritage and its potential for tourism development, and as such emphasises the importance of broadening the scope of research on geotourism. By contrast, researchers do not pay nearly as much attention to geotourism stakeholders such as tourists and local communities, and only a very small number of studies examine geotourism in the context of sustainable development.

Gordon [9] examines how the links between geoheritage and cultural heritage can be developed in a way that enhances the visitor's experience and promotes geoeducation and geoconservation. He points out that the connections between geotourism and the cultural landscape provide opportunities to promote the values of geoheritage to a wider public. He further stresses that the assessment of geoheritage assets, values and benefits within a cultural ecosystem services framework can enable a more holistic approach to geotourism which acknowledges the connections between people, geoheritage and the landscape. As such, adhering to good geoethical practice is an essential element of geotourism both for providers and for participants.

Prendivoj's [10] paper focuses on the mechanics of on-site interpretation and how they can best serve visitors potentially interested in the geosciences. She stresses the central role of interpretive signs in tourism planning, noting that a single sign serves as the sole ambassador for an attraction. That fact means that each interpretive sign functions as a silent liaison between the visitor and what they hope to obtain from their visit. She criticizes what she calls "forests of signs" characterised by a large number of signs containing far too much text that nobody reads, and states that their only impact is to be "repellent and disturb the landscape". As such, her ambition is to refine the format of signs to ensure that the message is read, and that the desired outcome is achieved. In order to achieve this goal she investigates existing geotourist typologies in order to organize visitors into different market segments or target groups so as to better cater to each group's expectations. Her findings present four conceptual geotourist target groups: geotourists lite, mass geotourists, social geotourists and classic geotourists. Each group requires an individually-tailored interpretive panel concept in order for geoconservation to be successful.

In Martins & Pereira's [11] paper, the focus is on multidimensional evaluation of geomorphological heritage and its valorisation in relation to the cultural landscape in Portugal. Their methodological approach embraces models for analysing and calculates local residents' geomorphological values, such as value of use, preservation value, management value, scientific value, ecological value, cultural value and aesthetic value in order to better understand the local populations' perception of the different values of geomorphosites. The results suggest that the major relief features have the greatest geomorphological value.

Planagumá & Marti [12] describe how the different measures implemented in the La Garrotxa Volcanic Zone, currently one of the most visited geosites in Catalonia, Spain, have contributed to sustainable geotourism. Their results show that scientific research that provides good knowledge of the natural values of the area, combined with the establishment of good training and education programs aimed at local populations and visitors in order to raise their awareness, make the greatest contribution to positive social and economic impact. Tourism development that is based on short, low-quality visits, concentrated in time and space, has on the other hand led to serious overcrowding problems in the La Garrotxa Volcanic Zone, resulting in a collapse of services and significantly lowering the quality of visitor experience. The authors conclude that, if well-managed, the use of geo-conservation as a tool for sustainable tourism results in economic and social improvements to the area, not only in terms of tourism, but also regarding the global image of the area.

Helgadóttir & Sigurðardóttir's [13] paper focuses on the trail as an experienced geological attraction for horse-based tourism, and particularly long rides. They argue that the trail is a geotouristic phenomenon, since riders choose particular trails based on their geological and geomorphological qualities such as soil and landforms. Their findings, based on interviews with domestic horse tourists and horse tourism entrepreneurs, indicate that the riding trail and its surroundings can be defined as a geosite, and equestrian tourists as casual geotourists and as such important stakeholders in the conservation and use of geosites, and furthermore that the trails seem to have values of their own, including scientific, educational, cultural heritage, scenic and touristic values.

Meini et al. [15] focuses on cultural landscape of transhumance routes, or the ancient paths connecting highland and lowland pastures in the Mediterranean regions, in order to both preserve them and reuse for geotourism purposes. In their paper, the concept *transhumance* is defined as a complex of seasonal migrations over a wide area between territories with different altimetry and climatic characteristics practiced by a stable population in order to secure fodder for herds of livestock. The authors make use of cartography, remote sensing and geographical information systems to analyse historical sources on transhumance routes in the landscape, and illustrate the steps and instruments necessary to organize, enhance and communicate transhumance routes for geotourism development. The results reveal their methodological approach to be effective in identifying the best-preserved areas, what constitutes reasonable geo-conservation, and the usability of the ancient routes. Furthermore, they propose a solution to the need for a "neo-humanistic" culture in the dialogue between the scientific disciplines addressing earth and landscape issues.

The feasibility of incorporating geotourism as a component of Caribbean islands' overall drive towards nature tourism is explored in Christian's [16] literature review, which focuses on the geotourism potential of two Caribbean islands, the Commonwealth of Dominica and St. Lucia. He seeks to identify and describe their primary geotourism assets and presents a framework for a regional geotourism development strategy. He furthermore discusses the tourism potential of these assets, and proposes marketing and promotional strategies to differentiate these assets and opportunities in the marketplace. He concludes that, in order to succeed, geotourism requires a building up of regional support and coordination. An integrated planning approach, the monitoring of environmental impacts and the geo-education of residents and visitors are thus critical dimensions which must be incorporated into any geotourism strategy and programme for the region.

Cappadonia et al. [17] explore the potential of Malta and Sicily to significantly contribute to the understanding of their geomorphological history. Their research proposes a procedure for the selection and assessment of geosites that, besides being spectacular and attractive to tourists, may offer significant elements that help people to appreciate the geomorphological history of both islands. The methodological approach used includes: (i) selection of geosites based on three criteria, namely: morphogenesis, spatial distribution and temporal scale; (ii) numerical assessment of geosites; and (iii) ranking of geosites based on their management and tourism ratings. Their results provide the basic knowledge necessary for joint conservation actions and policies in Malta and Sicily. Their methodological approach has furthermore proven to be an effective tool for territorial analysis, and is likely to be a crucial tool for land management purposes in other areas.

The major focus of Mero et al.'s [18] paper is qualitative and quantitative assessment of mining sites in the Zaruma-Portovelo mining district in Ecuador. Their methodological approach comprises four stages: (i) compilation and inventorying of all geosites within the study area; (ii) thematic cartography, (iii) assessment and classification of the elements of geological mining interest; (iv) SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis as well as TOWS (Threats, Opportunities, Weaknesses, Strengths) matrix preparation, with a view to identifying strategies which guarantee the viability of geotourism. Of the sites identified as being of geological interest (27 in total, of which 11 were of special mining interest), 77% proved to be of high or very high interest in scientific terms. Their susceptibility to degradation is furthermore found to be high or very high in 30% of cases.

The SWOT-TOWS analysis reveals the possibility of applying action strategies in order to facilitate the compatibility of geotourism with current productive activities in the area.

3. Key Message for Future Research

The contributions published in this SI illustrate the vibrant research currently being carried out into this new niche segment within tourism. A common theme in all of the contributions is the rapid growth of geotourism, its great potential as well as its environmental and cultural impact. The results presented all indicate an increasing need for geotourism to be managed. However, as demonstrated by Newsome et al. [19], management of a given tourist destination may prove to be ineffective and may even result in a management footprint that can have a significant negative impact in its own right. For such management to be successful, further research on geotourism is therefore needed. This conclusion is supported by Prendivoj's [10] paper, which argues that in the 'ABC' (abiotic, biotic, cultural) approach to the environment, it is the underlying geotourism element, the 'A' element, that is the least well understood. This is the case despite the fact that abiotic factors are fundamental to our understanding of the environment, and of any tourism connected with it.

With regards to geotourism management, the major emphasis should be on stimulating geoconservation. However, as Gordon's [9] paper states, it is crucial that we do not interfere with geocoservation purely for commercial gain. Geotourism should instead be used as a tool to encourage an understanding of geological heritage. It must be integrated with best practice management so as to preserve and enrich the visitor experience and protect the resource which attracted the visitor in the first place. Geotourism management should first and foremost focus on the quality of the visitor's experience, since the success of geotourism in delivering its goals of geoheritage education, sustainable development and geoconservation is ultimately dependent on this experience. Accordingly, if visitors have a deeper awareness of and connection with geoheritage they are much more likely to value it and help to manage it sustainably [9]. It is therefore critical that future research on geotourism looks more deeply into visitors' perceptions and opinions; cultural ecosystem services and their role and potential in influencing visitor motivations, expectations and behaviours; geotourism stakeholders and their causal relations; environmental impacts of geotourism on geoheritage; and the impact of geotourism on local communities and their wellbeing. Increased knowledge and understanding of these aspects is critical in order to manage geotourism in a sustainable manner in the future.

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