

Geotourism as an alternative for sustainable development

El geoturismo como alternativa para el desarrollo sostenible

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Abstract

Geotourism is a tourism modality that has gained relevance due to its connection with sustainable tourism, offering a wide range of recreational and cognitively enriching experiences. In Cuba, although the government stimulates this type of tourism, and studies are being conducted to identify and highlight the heritage value of geosites, its visibility as a sustainable alternative remains insufficient to achieve a significant boost within the country's tourism offering. Reversing this situation and promoting the broad and sustainable use of geosites on the island is a task that must be grounded in scientific foundations. Accordingly, a literature review was carried out to demonstrate the role geotourism plays in sustainable development, from an integrative perspective of science, technology, and society. The analysis conducted showed that geotourism can be an effective tool to preserve a region's natural and cultural resources and generate economic benefits. However, for it to be truly sustainable, it must responsibly consider the environmental, social and cultural impacts it can generate. In addition, scientific activity linked to geotourism must evaluate the current conditions and social perceptions of the environment, while promoting an ethic of preservation shared between tourism providers and consumers. It is concluded that it is essential to develop studies aimed at analyzing the role of science, technology and society in the implementation of geotourism, in order to identify the key factors that have an impact on its consolidation as a sustainable development strategy.

Keywords: geotourism, sustainable development, sustainable tourism

Resumen

El geoturismo es una modalidad turística que ha adquirido relevancia por su vínculo con el turismo sostenible y la amplia gama de experiencias recreativamente y cognitivamente enriquecedoras que ofrece. En Cuba,

aunque el gobierno estimula este tipo de turismo, y se desarrollan estudios que identifican y resaltan el valor patrimonial de los geositos, su visibilidad como alternativa sustentable es insuficiente para lograr un impulso significativo dentro de la oferta turística cubana. Revertir esta problemática demanda una estrategia fundamentada en el conocimiento científico. Por consiguiente, se realizó una revisión de la literatura sobre el tema para demostrar el papel que desempeña el geoturismo en el desarrollo sustentable, desde una perspectiva integradora de los aspectos de ciencia, tecnología y sociedad. El análisis realizado evidenció que el geoturismo puede ser una herramienta eficaz para conservar los recursos naturales y culturales de una región y generar beneficios económicos. No obstante, para que sea verdaderamente sostenible, debe considerar de forma responsable los impactos ambientales, sociales y culturales que puede generar. Además, la actividad científica vinculada al geoturismo debe evaluar las condiciones actuales y percepciones sociales del entorno, promoviendo una ética de preservación compartida entre oferentes y consumidores turísticos. Se concluye que es imprescindible desarrollar estudios orientados a analizar el papel de la ciencia, la tecnología y la sociedad en la implementación del geoturismo, a fin de identificar los factores clave que inciden en su consolidación como estrategia de desarrollo sostenible.

Palabras clave: geoturismo, desarrollo sostenible, turismo sostenible

1. INTRODUCTION

Cuban government is currently promoting the use of natural, social, cultural and economic potentialities for income generation and diversification of activities, such as tourism, from a sustainable perspective. This motivation has led to an increase in research oriented towards geological heritage valorization in the last decade.

Authors such as Abreu-Fernández (2019), Reyna-García (2020) and Cáseres (2021) have carried out studies highlighting the heritage value of geosites, which serve as a basis for the promotion of geotourism in the country. As a result, by October 2022, a total of 484 geosites were officially designated throughout the island, pursuant to 16 resolutions published in the Official Gazette of the Republic (MINEM, 2024). These documents also show their distribution by province, among which outstand Pinar del Río and Holguín as the ones holding the greatest amount of these sites (Figure 1).



Figure 1. Distribution by province of geosites formally declared in Cuba.

However, only 6% of this total (29 geosites) are actively used for touristic purposes (Carmona-Tamayo & Extremera-San Martín, 2022; Peláez, 2022). What's more, Ecotur, an agency specialized in nature, rural adventure and accessible tourism, promotes only about 10 routes exploiting various geosites (Franquiz-Domínguez, 2022).

Thus, offers related to geotourism remain in an irrelevant arena compared to other more promoted modalities, such as sun and beach tourism (Salinas-Chávez et al., 2019). Taking into account that the latter modality is not fully aligned with the Sustainable Development Goals (SDGs), under which today's society intends to progress, it turns to be contradictory not to pay more attention to the touristic growth offered by our geodiversity.

It is important to note out that geotourism, which is defined as a modality that adheres to sustainability principles, is beginning to take its first steps, although in a limited way, towards its consolidation among the established tourism modalities characterizing the Cuban destination. Upon analyzing its characteristics, it is clear it is relevant to achieving several SDGs, such as #1, 8, 11, 12, 12, 15 and 17 (UN, 2024a). This is an alignment that can, in turn, favor the competitiveness of Cuba as a destination.

Nonetheless, ensuring a significant place to geotourism within the island's tourism offer and promoting the sustainable use of geosites represents a complex and multidimensional task that involves multiple processes. These must be based on scientific foundations that provide knowledge and justify the need to promote this type of tourism in the country.

Consequently, a review of the most relevant literature on the subject was carried out to demonstrate the role played by geotourism in achieving sustainable development. This study was carried out adopting an integrating perspective of the aspects of science, technology and society and its role to

facilitate the generation of scientifically supported theoretical-practical alternatives to promote this tourist segment in Cuba.

2. METHODS

In order to carry out this research, an exhaustive literature review was carried out. Under the application of methods such as analysis-synthesis, induction-deduction, historical-logical, and hypothetical-deductive, relevant previous studies on geosites, geotourism and sustainability. These were compiled from relevant databases such as Scielo, Redalyc, universities thesis repositories, prioritizing the ones produced during a five-years period (2019-2023) and with highest quote relevance. These methods allowed the establishment of a solid conceptual framework which led to an analysis that supports the discussion on geotourism importance.

In addition, a theoretical-integrative approach is adopted that considers interactions with science, technology and society, facilitating the understanding of geotourism and sustainability relationship. This integrative approach allows addressing the complexity of sustainable development from multiple dimensions, including social, economic and environmental ones.

A critical analysis of current policies related to tourism in Cuba was also conducted, assessing how these can be aligned with SDGs established by the UN. These theoretical methods contribute to a deeper understanding of geotourism role within sustainable development and its potential to benefit local communities.

3. SUSTAINABLE DEVELOPMENT FROM THE PERSPECTIVE OF TOURISM

Sustainable development is defined as the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs. This approach is based on the concept of sustainability, which can be understood as a multidimensional process that affects socioeconomic, territorial and environmental structures, establishing a dynamic interrelationship between nature and society (Carreño-Meléndez & Carrasco-Aquino, 2018).

Other authors conceive sustainability as the capacity to integrate the environmental, economic and social aspects to favor quality of life improvement; focused mainly on economic and capital growth, with the capacity to last in time, without causing difficulties for development (Garzón-Baquero & Bellon-Monsalve, 2023). While other authors such as Arslan et al. (2022) and Hariram et al. (2023) suggest that sustainability involves, in general terms, promoting economic and material progress while safeguarding the environment. It emphasizes the thoughtful and responsible use of natural resources—not only while ensuring their availability for future generations,

but also while creating a balance between human needs and environmental well-being, ultimately benefiting all stakeholders.

In reference to this topic, Tibacuy et al. (2022), after studying the evolution of the concept of sustainability and other notions associated with it such as sustainability and sustainable development, alludes to the characteristics below as the ones defining it and differentiating it from the rest of the terms:

- Factibility
- Triple impact
- Efficiency
- End of poverty
- Economic activity
- Maximum re-use
- Automation
- Damage prevention
- Oportunity
- Human wellbeing
- Prosperity

Sustainability in essence is an approach related to the action of man towards the environment, environmental, economic, social balance and efficiency in the use and management of natural resources and requires a logical and reliable support that provides a connection between the practical executions that allow transforming this vision into objective reality (Gomes et al., 2020). Therefore, it has three basic elements: economic growth, social inclusion and environmental protection (UN, 2024b).

From an integral perspective, sustainable development should consider the interaction of economic, social, environmental, political and value dimensions, which strengthen the conditions of environment through the natural resources responsible use. This consideration is especially relevant in a sector such as tourism, which tends to be intensive in the use of these resources. The effectiveness of this approach depends on the collaboration of subsystems within a territory, which must work together to regulate human impact on the environment, particularly in areas affected by tourism activity (Zarta-Ávila, 2018).

Therefore, knowledge management, as well as the application of scientific results and innovations, are essential for aligning tourism sector with the

sustainable development principles. It is essential that tourism is nurtured by the precepts of sustainability and the relationships established between the several tourism modalities implemented in different territories.

In this sense, research practices can be linked, among other aspects, to digital advances, problems that threaten human survival and transformation of knowledge into merchandise (Parra-Cárdenas & Duque-Cruz, 2020). In addition, it is essential to consider the impact of globalization on tourism studies, given that this trend is characterized by a growing interrelation between countries, facilitating the flow of people, goods, services and capital, as well as fostering cultural exchange, improvement and prominence (Shao et al., 2023).

Vilchis-Chávez et al. (2023) point out that specialized literature underlines the need for a commitment that allows sustainability to evolve from an institutionalized discourse to an effective awareness of the responsible actors, encouraging their active collaboration in concrete actions. This highlights the urgency of generating research to support the social responsibility of geotourism.

Currently, studies on tourism activity are increasingly related to the implementation of new technologies and promotion and marketing strategies. However, it is crucial to call the attention upon involving society, including authorities, communities, tour operators and travelers within the framework of a national sustainable development policy, considering the values to be promoted. In this context, it is fundamental that tourism processes are aligned with the principles of sustainable development, as proposed by Parra-Cárdenas and Duque-Cruz (2020). These approaches are not only applicable to promotion, but also to all processes associated with tourism.

Thus, the empowerment of tourism under the principles of sustainability is not limited to the integration of new technologies that improve sustainable destinations marketing, as this process itself must involve society to ensure cultural and environmental values are respected. It also implies collaboration and knowledge management among the various stakeholders which, in turn, involves and has an impact on the social commitment and awareness of all responsible actors to implement concrete actions that promote sustainable tourism practices.

Hence, sustainable development in tourism requires a holistic approach that integrates diverse social, economic and environmental dimensions in its constant interaction with science and technology. These are essential guidelines for promoting a tourism model that respects both local communities and the environment.

4. GEOTOURISM FROM A SUSTAINABLE PERSPECTIVE

Geotourism is defined as a tourism modality that is closely related to nature tourism and ecotourism, both of which are increasingly aligned with the sustainability paradigm. This approach responds to the growing interest in preserving the environment, connecting with nature and the imperative need to use and protect the natural resources available to the tourism sector.

First defined in 1995 by Thomas Alfred Hose (Hose, 2012), geotourism has gained relevance in the context of sustainable tourism, which is characterized by its emphasis on balancing social, economic and environmental objectives (World Tourism Organization, 2002). This tourism modality focuses on the sustainable exploitation of local communities' roots and customs, and promoting knowledge of the natural characteristics and resources of a region (Hernández, 2006).

Carcavilla et al. (2011) define it synthetically as "a type of tourism based on the knowledge, conservation and interpretation of the abiotic attributes of nature". This focuses on highlighting the geological heritage and biodiversity of a territory, so it is based on the use of geosites of interest as a resource for their scientific, naturalistic, cultural, recreational and didactic value.

According to Dowling & Newsome (2006), geotourism is defined as "sustainable tourism whose main objective is to experience geological features in a cultural and environmental context, appreciating their conservation and generating local benefits". Meanwhile, Hurtado (2010) describes it as a "sustainable development strategy that contributes to the diversification of local economy through sustainable use of its geological and/or mining heritage as a tourist resource of environmental quality, in terms of education, conservation, scientific research and social inclusion".

The latter authors assert that geotourism contributes to the sustainability and enrichment of the geographic and geological character of a place, as well as its heritage and aesthetics. This translates into a sustainable development of local communities from a cultural and social perspective, as a result of the tourist use of their geodiversity.

A distinctive feature of geotourism is it does not limit to developing in natural environments, as is the case with ecotourism, but also manifests itself in spaces modified by human activity (Dowling & Newsome 2018) such as mines that are no longer exploited. This brings to it a broader spectrum of resource use that, in a not so distant past, lacked economic, social, heritage and/or natural value.

In essence, geotourism focuses on the geology and nature of a place, seeking to promote the conservation and sustainable development of the region's natural and cultural resources. By integrating nature, geodiversity, culture,

science and society, it represents an alternative that allows the sustainable use of multiple resources in the same locality.

In addition, it can be considered as a form of tourism that pursues to integrate science and technology into the tourism experience. This is achieved through promotion of education and research in geology and natural sciences, as well as the implementation of sustainable technologies in tourism management. In this way, opportunities are opened up for a wide range of enriching experiences that encompass fun, knowledge, behaviors and emotions.

In this context, studies with a sustainability approach offer valuable tools such as socioeconomic and environmental analysis, integrated management and landscape interpretation, which allow for the evaluation of geotourism and its relationship with sustainability. These tools can facilitate the generation of additional income for the local population, improve the living conditions of communities and promote integrated rural and urban development that protects and rationalizes the use of natural and cultural resources.

They are also useful for analyzing the interrelationship between geotourism and sustainable development, as they provide an understanding of how technology and society interact with the environment and how these interactions can influence the sustainability of a region. They can also help to identify the social and cultural factors affecting geotourism development and decision making related to the conservation of natural and cultural resources.

5. THE RELATIONSHIP BETWEEN GEOTOURISM AND SUSTAINABLE DEVELOPMENT

Geotourism and sustainable development are highly relevant topics that involve the interrelationship between society, technology and the environment. Although research associated with tourism usually includes aspects that promote sustainability, these elements sometimes do not acquire the necessary relevance since the economic dimension is often prioritized and reflected in the actions implemented in tourist destinations (Vilchis-Chávez et al., 2023).

However, in the context of geotourism and sustainable development, taking into account these three aspects can provide an understanding of how technology can be used to promote sustainable development and how society can influence the use of such technology to achieve this goal. For, it is not possible to lose sight of the fact that this tourism modality is linked to sustainable development by seeking to generate economic and social benefits for local and regional communities, while protecting and conserving the geological heritage and promoting integrated land management.

Following the study of the bibliography previously referenced in this article, as well as other materials from authors such as Gobierno Vasco-Departamento de Medio Ambiente (2011), Mattioli et al. (2016), Núñez-Franco et al. (2020), Andrade-Alcívar (2021), Salgado-Martínez et al. (2021), Mori-Huaman et al. (2022), some ways in which geotourism is related to sustainable development are presented:

- Resource conservation: Geotourism can contribute to the sustainable development of a region by promoting the conservation of natural and cultural resources.
- Economic benefits: This modality can generate development and economic benefits for local communities, providing supplementary income, jobs and business opportunities, which improves the living conditions of people in rural and urban environments.
- Community participation: Encourages the participation of local communities in tourism management, which can improve the quality of life and promote social equity.
- Policy collaboration: For sustainable management, it is essential to work together with local communities and government authorities, developing policies and practices that promote the conservation of natural and cultural resources, while generating economic benefits for communities.
- Education and research: Geotourism promotes education and research in geology and natural sciences, improving the understanding of a region's natural and cultural resources, as well as the development of sustainable technologies for tourism management.
- Landscape interpretation: It acts as a tool for the interpretation of landscapes and the valorization of the territory, managed by the host community.

Geotourism promotes integrated land management, which involves the collaboration of various disciplines, such as geology, geography, archaeology, biology, economics, management, tourism, environment, agriculture and forestry. This integration allows for the protection and conservation of geological heritage while promoting the sustainable development of local and regional communities.

In summary, geotourism is related to sustainable development in its three dimensions: economic, sociocultural and environmental. From the economic dimension, geotourism can be a socioeconomic strategy that contributes to local development and diversification of the economy. In the sociocultural sphere, it is presented as a tool to promote and strengthen local culture, fostering social inclusion and community participation in decision-making.

From the environmental dimension, it seeks the conservation and sustainable use of geological and natural resources, promoting environmental education and awareness of the importance of conserving the geological heritage.

However, it is crucial to consider that geotourism can also have negative impacts on the environment and local communities if not properly managed. For example, mass tourism can lead to the degradation of natural and cultural resources, and the lack of participation of local communities can generate conflicts and inequalities.

6. CONCLUSIONS

- Geotourism can be an effective tool to promote the conservation of a region's natural and cultural resources, while generating economic benefits without compromising the ability of future generations to meet their own needs. However, it is essential that its development be carried out in a responsible and sustainable manner, considering the environmental, social and cultural impacts that tourism can have on the region.
- In its close relationship with the sustainable development approach, scientific activity in the context of geotourism must assess not only the current conditions to carry it out. It must also link this evaluation to the perception of natural and cultural environment, adopting an attitude of preservation and ethics that involves those who offer tourism products and services and those who receive and consume them.
- Therefore, in the geotourism arena, studies that pay close attention to key aspects such as the role of science, technology and society are needed, in order to contribute to the analysis and substantiation of the relationship between geotourism and sustainable development. This will make it possible to identify the social, cultural, economic and technological factors that influence its implementation and decision-making related to the conservation of natural and cultural resources.

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Información adicional

Conflicto de intereses

Los autores declaran que no existen conflictos de intereses.

Contribución de los autores

YBN: concepción de la idea, búsqueda y revisión de literatura, selección de métodos de investigación, aplicación de métodos de investigación, recopilación de información, confección de tablas, gráficos e imágenes, confección de base de datos, redacción del original (primera versión), coordinador de la autoría, traducción de términos o información obtenida, revisión de la aplicación de la norma bibliográfica aplicada. **ACP:** concepción de la idea, búsqueda y revisión de literatura, confección de instrumentos, recopilación de la información resultado de los instrumentos aplicados, asesoramiento general por la temática abordada, revisión de la aplicación de la norma bibliográfica aplicada, revisión del artículo. **YVM:** búsqueda y revisión de literatura, recopilación de información, asesoramiento general por la temática abordada, aceptación de la versión final. **CRBM:** asesoramiento general por la temática abordada, revisión y aceptación de la versión final.

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