TOURISM IN COASTAL GEOPARKS IN THE AMERICAS: AN ANALYSIS OF ACTIVITIES IN NATURAL AREAS

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Abstract: The Geoparks are areas with significant geological, educational, and touristic features, which have expanded globally over the last two decades due to the rising appreciation of the geopark concept. Coastal environments have adopted strategies aligned with geopark principles, emphasizing tourism as an essential economic, environmental, and social activity. The blue economy, which focuses on the sustainable use of maritime resources, supports community well-being and ecosystem health, enhances job and income opportunities, and advances geopark goals. This study examined tourism types in American geoparks recognized by the Global Geoparks Network, including Brazil's Southern Canyons Pathways and Canada's Discovery, Cliffs of Fundy, Percé, and Stonehammer. Using a qualitative approach, with bibliographic and documentary analysis and data triangulation, it found that unique geological features enhance tourist appeal. These formations, linked to ancient geological events and fossils, create distinctive tourist experiences, integrating geology and tourism to improve scientific understanding and appreciation of coastal areas. The study highlights that coastal geoparks, by integrating sustainable tourism activities such as geotourism, adventure sports, interpretive trails, and scientific tourism, promote local development and the appreciation of geological heritage. However, caution is required to avoid predatory practices that could compromise biodiversity and geodiversity.

Keywords: Geotourism; Blue economy; Blue Tourism; Coastal Tourism; Nature Conservation.

TURISMO EM GEOPARQUES COSTEIROS NAS AMÉRICAS: UMA ANÁLISE DAS ATIVIDADES EM ÁREAS NATURAIS

Resumo: Os Geoparques são áreas com características geológicas, educacionais e turísticas significativas e expandiram-se globalmente nas últimas duas décadas devido ao crescente apreço pelo conceito de Geoparque. Ambientes costeiros adotaram estratégias para alinharem-se aos princípios dos geoparques, enfatizando o turismo como atividade econômica relevante. A economia azul, que foca no uso sustentável dos recursos marítimos, apoia o bem-estar da comunidade e a saúde do ecossistema, melhorando as oportunidades de emprego e de renda enquanto promove os objetivos dos geoparques. Este estudo examinou os tipos de turismo em geoparques americanos reconhecidos pela Rede Global de Geoparques, incluindo os Caminhos dos Cânions do Sul, no Brasil, e os geoparques Discovery, Cliffs of Fundy, Percé e Stonehammer, no Canadá. Por meio de uma abordagem qualitativa, com análise bibliográfica e documental e triangulação de dados, descobriu-se que características geológicas únicas aumentam a atratividade turística. Essas formações, ligadas a eventos geológicos antigos e fósseis, criam experiências turísticas distintas, integrando geologia e turismo para aprimorar o entendimento científico e a valorização das áreas costeiras. O estudo oferece novas perspectivas sobre como os geoparques interagem com a economia azul, com foco no turismo como objetivo-chave. O estudo evidencia que os geoparques costeiros, ao integrar atividades de turismo sustentável, como geoturismo, esportes de aventura, trilhas interpretativas e turismo científico, promovem o desenvolvimento local e a valorização do patrimônio geológico, mas requerem cautela para evitar práticas predatórias que comprometam a biodiversidade e a geodiversidade.

Palavras-chave: Geoturismo; Economia Azul; Turismo Azul; Turismo Costeiro; Conservação da Natureza.

TURISMO EN GEOPARQUES COSTEROS EN LAS AMÉRICAS: UN ANÁLISIS DE LAS ACTIVIDADES EN ÁREAS NATURALES

Resumen: Los geoparques son áreas con características geológicas, educativas y turísticas significativas, se han expandido globalmente durante las últimas dos décadas debido al creciente aprecio por el concepto de geoparque. Los entornos costeros han adoptado estrategias para alinearse con los principios de los geoparques, enfatizando el turismo como una actividad económica clave. La economía azul, centrada en el uso sostenible de los recursos marinos, apoya el bienestar comunitario y la salud del ecosistema, mejorando las oportunidades de empleo e ingresos y promoviendo los objetivos de los geoparques. Este estudio examinó los tipos de turismo en geoparques americanos reconocidos por la Red Global de Geoparques, incluyendo los Southern Canyons Pathways en Brasil y los Discovery, Cliffs of Fundy, Percé y Stonehammer en Canadá. Mediante un enfoque cualitativo, con análisis bibliográfico y documental y la triangulación de datos, se encontró que las características geológicas únicas aumentan el atractivo turístico. Estas formaciones, vinculadas a eventos geológicos antiguos y fósiles, crean experiencias turísticas distintivas, integrando la geología y el turismo para mejorar la comprensión científica y el aprecio de las áreas costeras. El estudio destaca que los geoparques costeros, al integrar actividades de turismo sostenible como el geoturismo, los deportes de aventura, los senderos interpretativos y el turismo científico, promueven el desarrollo local y la valorización del patrimonio geológico. Sin embargo, es necesario ejercer cautela para evitar prácticas depredadoras que comprometan la biodiversidad y la geodiversidad.

Palabras clave: Geoturismo; Economía Azul; Turismo Azul; Turismo Costero; Conservación de la Naturaleza.

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1 INTRODUCTION

UNESCO Global Geoparks are special places that not only showcase but also celebrate the planet's geological and paleontological heritage, demonstrating the diversity and relationships of Earth's history. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2025), these territories are single, unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education and sustainable development. They adopt a bottom-up approach, integrating conservation and sustainability with local community engagement (Henriques & Brilha, 2017; Pásková & Zelenka, 2018). A key differentiating aspect compared to protected areas, such as conservation units, lies in the strategy to foster territorial development.

This is primarily achieved through the implementation of strategies aimed at encouraging sustainable tourism, with a special focus on geotourism (Farsani et al., 2011). The initiative has been highly successful, evidenced by a significant increase in representation on nearly every continent. This success is mainly due to the active participation of local communities (Azmana et al., 2010; Moreira & Vale, 2018).

In geoparks, geotourism is a widely developed and encouraged form of tourism (Moreira, 2014). This type of nature tourism aims to promote an understanding of Earth sciences, the conservation of geological and cultural heritage, and to provide educational and enriching experiences for visitors (Mansur, 2021). In this perspective, Ólafsdóttir and Tverijonaite (2018) consider that geoparks facilitate the sustainable development of this segment.

Geoparks have promising strategies for environmental, social, and economic development based on the sustainable management of natural areas with geological and geomorphological value, such as mountains, cliffs, and caves, to develop geotourism activities (Morante-Carballo et al., 2023). Moreover, a concern of geoconservation is to protect landscape features and associated landforms, which involves understanding ecological habitats and their boundaries (Thomas, 2012).

Reynard (2008) highlighted the need to develop educational materials for geotourism professionals and to use simplified tools to explain geology and geomorphology. Newsome & Dowling (2006) and Moreira (2014) emphasize that, although rocks and landscapes lack the life of animals and plants, they require clarification to become interesting. With appropriate interpretation, elements of geodiversity[1] can be as fascinating as those of biodiversity.

Moreover, in many coastal geoparks, geotourism intertwines with coastal tourism, expanding the reach of the blue economy. Coastal tourism plays a fundamental role in the blue economy, accounting for 5% of the global gross domestic product (Tegar & Gurning, 2018). This type of tourism depends on the quality of natural ecosystems to attract visitors, but it also puts their own sustainability at risk (Tonazzini et al., 2019). Concepts such as blue tourism can contribute to the development of an ocean economy that integrates sustainable development.

The blue economy concept represents a growth strategy that aims to promote economic development, foster social inclusion, and preserve or improve livelihoods, while ensuring the sustainability of oceans and coastal areas. At the same time, blue tourism highlights local offerings in coastal areas with marinas, is essential to local economies, and emphasizes the importance of sustainable territorial management (Lee et al., 2020; Vázquez et al., 2021).

Thus, this article analyzed nature tourism activities in UNESCO-recognized coastal geoparks in the Americas. This study aims to contribute to the planning and management of geoparks and, additionally, seeks to advance academic understanding of these intersections.

2 METHODOLOGICAL PROCEDURES

2.1 Materials and methods

This study adopts a qualitative approach, focusing on bibliographic and documentary analysis. For this study, all coastal geoparks in the Americas were considered, with four in Canada and one in Brazil.

This type of research enables the exploration of complex themes with various aspects, as is the case with the study of geoparks, blue tourism, blue economy, and geotourism. To conduct the research, various tools and sources were used, such as academic databases, to identify relevant literature on the subject.

Additionally, specific documents, such as the Discovery Geopark application dossier (2019) and related geopark materials, provided detailed information about the territory. An essential part of the research was the literature review, including academic articles, books, theses, and reports on the blue economy, blue tourism, and geoparks, which helped provide a foundation for understanding the topics. Furthermore, the websites of geoparks and bodies, as well as online research on companies in the tourism sector, were consulted. The study also focused specifically on nature tourism, investigating different types of tourism in coastal and marine geoparks, with a focus on geotourism. Therefore, the main category analyzed was the existence of tourism activities in natural areas in these territories.

[1] The natural range (diversity) of geological (rocks, minerals, fossils), geomorphological (landforms, topography, physical processes), soil and hydrological features. It includes their assemblages, structures, systems and contributions to landscapes (Gray, 2013).

To address this issue and increase data reliability, a triangulation strategy was adopted (Denzin, 2007; Flick, 2009). Initially, official sources such as academic literature and websites of the five studied geoparks were consulted. Subsequently, data collection was expanded to include information available on popular digital platforms, such as social networks (Instagram) and business platforms (TripAdvisor), which are globally recognized as robust sources of information on tourist destinations (de Oliveira & Porto, 2016). This approach aims to provide a more comprehensive view of geopark information, drawing on both official sources and digital platforms.

The steps applied were consistent across the five studied geoparks. However, a variation was observed in the amount of information available for each municipality that integrates these territories, due to the diversity and volume of sources accessed. Although the data from this study cannot be generalized to the global context, they provide an analysis of tourism in natural areas located in coastal geoparks in North and South America.

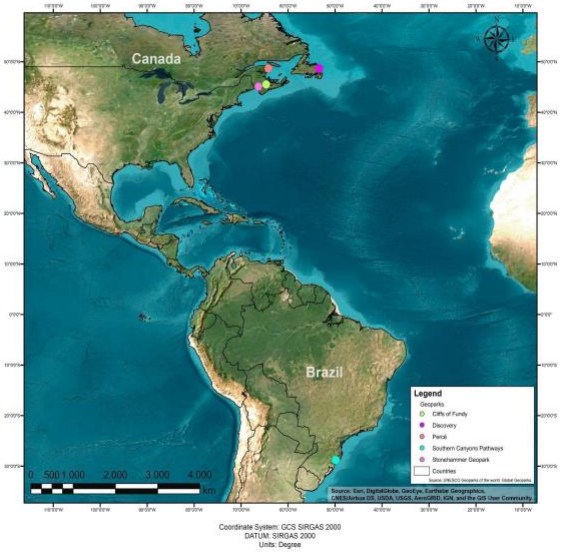
2.2 Study area

There are 20 recognized geoparks in the Americas, distributed across eight countries, with the majority located in the southern continental region. Brazil stands out with six geoparks, followed by Canada with five, Ecuador with three, Mexico with two, and Chile, Nicaragua, Peru, and Uruguay with one each. Among these, five geoparks are located in coastal zones, with four in Canada and one in Brazil (UNESCO, 2025).

A geographical analysis of all geoparks in the Americas was conducted to identify those located in coastal areas. From this analysis, it was determined that there are four geoparks in Canada and one in Brazil, all located in coastal regions. The focus of this work is on the coastal geoparks located in the Americas: Southern Canyons Pathways in Brazil, and Cliffs of Fundy, Discovery, Percé, and Stonehammer in Canada (Map 1). These geoparks offer a range of activities focused on tourism development.

The Stonehammer Geopark, recognized as early as 2010, was the first among these Canadian geoparks to be inscribed into the GGN. It was followed by Percé in 2018, and then by the Cliffs of Fundy and Discovery Geoparks, both verified in 2020. The most recent addition to the network is the Southern Canyons Pathways Geopark, which joined in 2022.

Comparing the areas of the five coastal geoparks in the Americas by order of size, the Southern Canyons Pathways Geopark stands out as the largest, encompassing 2,830.8 km². Following closely is the Stonehammer Geopark, covering a slightly smaller area of 2,500 km². Next, the Discovery Geopark features about 1,150 km² of coastal area. Significantly more compact, the Percé Geopark extends over 555 km², less than a quarter of the size of the two largest geoparks. Lastly, the Cliffs of Fundy Geopark is the smallest, spanning 165 km of coastline. These notable differences in territory sizes highlight the geographic diversity, as well as distinctive features related to ecosystems and cultural aspects.



Map 1. Location Map of Coastal Geoparks in Canada and Brazil.
Source: Prepared by Emerson Farias dos Santos (2023).

The only coastal geopark in Brazil, Southern Canyons Pathways (Figure 1), has extraordinary beauty and geoscientific importance on the southern coast of Brazil, encompassing territories of two states in seven municipalities. The geopark is notable for its concentration of canyons and unique geological landscapes. Its scientific relevance is due to having records of one of the oldest magmatic episodes on Earth, dating back to 135 to 119 million years ago, linked to the division of the supercontinent Gondwana, an event of significant historical and geological importance (Godoy et al., 2012). This feature makes the geopark prominent for geoscientific research and the appreciation of natural heritage.

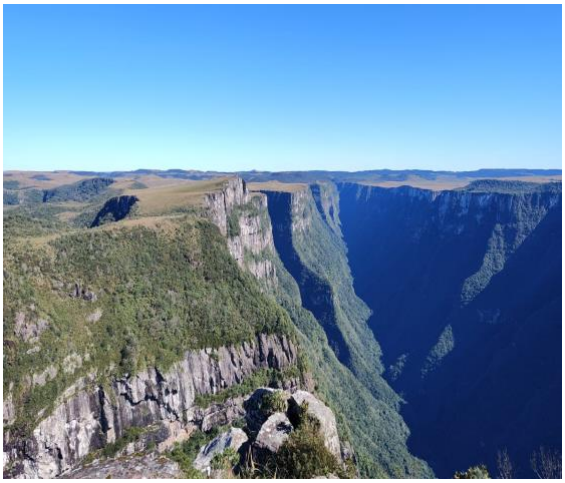


Figure 1. Fortaleza Canyon, located in Serra Geral National Park, Southern Canyons Pathways Geopark
Source: Antonio Cesar Caetano (2024).

The Discovery Geopark is an area of great geological and cultural significance on the Bonavista Peninsula in Canada. The territory covers 1150 km² and has a population of about 8000 inhabitants, with several European heritages, particularly highlighting the Beothuk people, native to the region. The territory has striking geographical features, including elevations reaching 350 meters and deep fjords along the coast (McCallum, 2019).

The Cliffs of Fundy Geopark (Figure 2) is located in Nova Scotia along the north coast of the Bay of Fundy. The Cliffs of Fundy Geopark extends 165 km from Lower Truro to the Apple River. This site is known for having the world's highest tides, which have shaped its unique landscape characterized by cliffs, tidal estuaries, and natural trails. The Geopark is situated in Mi'kma'ki, the territory of a people with an ancestral presence of over 11,000 years, rich in cultural legends. Besides its cultural importance, the region stands out for its geological significance, with evidence of formation and separation, such as the Cobequid Fault, a striking example of Earth's geological dynamism (Cliffs of Fundy Geopark, 2024).

Figure 2. Landscape of the Fundy Geopark
Source: Jasmine Cardozo Moreira (2014).

The Percé Geopark, located on the Percé Peninsula and the maritime extension of Bonaventure Island, is a notable tourist destination whose morphology is due to its position over a system of fragile faults that have gathered rocks of different resistance levels to erosion. This unique geological setting, with formations dating from the Cambrian to the Carboniferous, is currently shaped by coastal marine erosion. With thousands of annual visitors, the site offers an opportunity to disseminate Earth sciences (Briand & Jutras, 2014; Verpaelst & Richard, 2014).

The Stonehammer Geopark (Figure 3) is the first in North America. It covers an area of 2500 km² (Miller & Falcon-Lang, 2012). Various rock types, geological features, ancient environments, and fossils can be found within the territory (Miller, 2018). One aspect that drew stakeholders' attention to establishing the geopark was the potential for economic development through geotourism (Miller & Buhay, 2014).

Figure 3. Zipline of the Stonehammer Geopark
Source: Jasmine Cardozo Moreira (2014).

In the next section, a theoretical review will be presented, followed by the results and discussion. The various types of tourism which occur at coastal geoparks across the Americas will be discussed.

3 THEORETICAL REVIEW

3.1 Blue economy and blue tourism

Tourism depends on oceanic and freshwater resources and plays a significant role in their consumption (Gössling et al., 2012). In this context, the development of recreational, sports, and contemplative activities requires the preservation of water resources to ensure their continued viability. Furthermore, Corbari (2021) highlights that climate change is closely linked to tourism and the Anthropocene.

Faced with increasing environmental and economic challenges, adopting development models that incorporate sustainable development (Costanza, 1999) is essential. Oceans cover about 70% of the Earth's surface and are emerging as important areas for innovation and sustainability. The concept of a sustainable ocean economy, as outlined by the Ocean Panel (2024), involves the responsible use of marine resources to foster economic growth, improve livelihoods and create jobs, while simultaneously preserving marine ecosystems and associated services. In this perspective, the concept of the blue economy arises.

Originating from the 2012 United Nations Conference on Sustainable Development in Rio de Janeiro (UNCTAD, 2014), the blue economy concept is a growth strategy that seeks integration between promoting economic growth, social inclusion, and the preservation or improvement of livelihoods, ensuring the sustainability of oceans and coastal areas (Lee et al., 2020). Institutions like UNESCO, the World Bank, and

the European Commission recognize and define the blue economy from perspectives that emphasize sustainable use of maritime resources, the well-being of coastal communities, and the health of oceanic ecosystems (World Bank, 2017; UNESCO, 2024a). The European Commission, for example, adopts the blue economy as a comprehensive development strategy for EU member states (European Commission, 2018).

The blue economy offers a significant opportunity for socioeconomic prosperity and environmental benefits, especially for coastal countries and communities. According to the OECD (2016), ocean-related activities, generating US$1.5 trillion in 2010, have the potential to double by 2030.

As Wenhai et al. (2019) state, the blue economy not only relates to the global water crisis and marine economy but also encompasses innovative development, serving as an attribute of the general economy, a strategic framework, and a policy, aligning with the land-based recreation economy for marine sustainability. This economy includes industries such as maritime transport, fisheries, and tourism, as well as sectors like deep-sea mining, ocean renewable energy, offshore aquaculture, and blue biotechnology. A notable characteristic is the integrated management across sectors, geographical scales, and land-ocean interactions (Spalding, 2016; Voyer et al., 2018).

According to The Ocean Foundation (2025), deep-sea mining represents an emerging environmental concern due to its substantial impacts on marine ecosystems. Current scientific knowledge remains insufficient to assess its effects on biodiversity comprehensively. Nevertheless, existing evidence indicates a considerable destructive potential, raising serious questions regarding ecological adaptability and environmental ethics.

Voyer et al. (2018) highlight that, at the maritime level, the blue economy conflicts with traditional areas such as oil and gas and the emerging seabed mining industry, as these practices contradict the principles of preservation and sustainability.

Borges (2024) highlights that several concerns underpin the sustainable development of the blue economy, namely: the sustainable use of biodiversity; food security; fisheries sustainability; climate change; marine and coastal tourism; pollution; and international governance and cooperation. The author argues that, for the blue economy to be thriving, innovation in planning and implementation is required, along with genuinely integrated management.

We are currently in the Ocean Decade (2021–2030), a period in which the importance of transformative science is emphasized - science characterized by its participatory, inclusive, collaborative, transparent, co-constructed, and co-developed nature. This paradigm integrates multiple sectors of society and acknowledges generational, gender, geographic, and cultural diversity, bringing together scientific knowledge and traditional knowledge systems (Christofoletti et al., 2021).

From this perspective, the need to foster genuinely innovative processes becomes evident. As highlighted by Christofoletti et al. (2021), innovation cannot occur without recognizing the advances, benefits, and lessons learned throughout previous trajectories. It is not a matter of restarting from scratch, but instead of adapting, incorporating, and applying more diverse, participatory, and transparent approaches grounded in the experiences that have brought us to this point. This is precisely the opportunity afforded by the Ocean Decade.

The blue economy is vital for achieving the Sustainable Development Goals (SDGs) of the UNESCO 2030 Agenda and the Ocean Decade (Hampton & Jeyacheya, 2020), surpassing environmental sustainability and advancing sustainable development across social, environmental, and economic dimensions (Bennett et al., 2022). Among these goals, one of the most closely associated with the blue economy is SDG 14 – Life Below Water, which, according to the UN (2024), aims to "Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.

Mohamed Attia & Fouad Attallah (2023) assert that an important aspect of achieving SDG 14 in Egypt is the development of the blue economy. In the tourism context, the SDGs are fundamental, particularly in relation to the principles of sustainable tourism and climate change mitigation. Tourism, when well-structured and managed, can be a fundamental element in achieving employability, income generation, and the conservation of marine biodiversity and geodiversity.

Blue tourism highlights local offerings in coastal areas with marinas and is fundamental to the local economy, underscoring the need for sustainable territorial management (Vázquez et al., 2021). This type of tourism aims to revitalize local economies, protect aquatic ecosystems, and improve the quality of life of coastal communities (Hanafiah, 2022). Sharafuddin & Madhavan (2020) and Sanguinet & Sass (2022) expand on this concept, associating it with all tourism activities related to oceans, seas, and coasts. The blue economy and blue tourism are interconnected, as the tourism activity focused on oceans, seas, and coasts integrates into the blue economy.

Another concept related to sustainable tourism is the Blue Flag, one of the leading global recognitions for beaches, marinas, and tourist vessels that adopt sustainable practices. To obtain the Blue Flag, various criteria related to the environment, education, safety, and accessibility must be met and maintained. Currently, there are 5,038 recognized beaches, marinas, and tourist vessels in 51 countries (Blue Flag, 2024).

3.2 Coastal Tourism

Water-related tourism includes coastal and marine tourism, both of which are intrinsically linked due to their reliance on marine and coastal resources (Papageorgiou, 2016; Tegar & Gurning, 2018). Within the scope of this article, the segmentation of tourism in coastal, marine, and island areas is characterized and outlined based on the specific nature of the tourist offering or product.

Coastal tourism involves activities on beaches, such as swimming, sunbathing, and surfing, as well as other activities on the coast that benefit from proximity to the sea, such as seaside walks and wildlife watching. On the other hand, marine tourism focuses on water-based activities, such as sailing, yachting, cruising, and water sports, often practiced in coastal waters (Tonazzini et al., 2019).

As defined by the World Tourism Organization (UNWTO, 2019), coastal tourism encompasses tourist activities carried out near the coast, covering water practices like swimming, surfing, and diving, as well as land-based activities such as sunbathing, coastal walks, and appreciation of coastal heritage (including recreations and sports developed along the maritime coastline). Marine tourism, on the other hand, refers to activities based on nautical sports, commonly performed in coastal areas, including scuba diving, underwater fishing, water skiing, windsurfing, visits to marine parks, and wildlife observation, among others (Diakomihalis, 2007; European Commission, 2014).

The growing attractiveness of coastal and oceanic regions has received special emphasis since the implementation of the 2030 Agenda. Blue tourism, an extension of the blue economy, enables the preservation and sustainable management of marine ecosystems, including coral reefs and the marine food chain. These practices contribute to the conservation of coastal resources, fostering coastal tourism that aligns with environmental sustainability objectives (Brears, 2021). A frequently identified challenge in ocean conservation is the neglect of human and social dimensions. The lack of proper consideration of these aspects is pointed out as one of the main reasons for the failure of marine conservation initiatives (Catalano et al., 2019; Stoll-Kleemann, 2019).

Thus, the concept of the blue economy is intrinsically linked to the management of coastal geoparks that support tourism, with particular emphasis on promoting geodiversity and developing geotourism.

3.3 Tourism segments related to coastal tourism

Coastal and island areas offer a wide range of tourism opportunities, some focused on promoting local characteristics, while others aim to cater to specific audiences. In this context, it is important to note that various tourism segments can coexist in these regions simultaneously. In this study, our focus is on activities, not directly on segments related to water-based activities.

It is crucial to highlight that promoting sustainable tourism should be a cross-cutting concern across all these segments, as it is the essential approach to tourism planning and development. Regarding recreation, people are often drawn to coastal areas for various reasons (Lazarow, 2007), such as the provision of food by the sea, an attractive environment, and the diversity of uses and recreational opportunities offered by coastal areas (Hall & Page, 2014).

Tourism segmentation is an important tool for destination marketing, as it helps understand the various motivations that drive tourist behaviour. Specifically, in the context of geoparks, segmentation is a valuable tool for uncovering visitor profiles and for creating personalized experiences that align with the specific expectations and interests of each tourist segment. This segmented approach contributes significantly to optimizing geopark resource management and improving visitor satisfaction, thereby positively impacting the valuation of geological heritage. Examples include adventure tourism, ecotourism, sports tourism, and scientific tourism.

Adventure tourism involves physical activities in locations with specific geographical features, such as mountaineering, trekking, and diving (ATTA, 2013; UNWTO, 2014). Ecotourism focuses on responsible travel to natural areas, emphasizing environmental conservation and the well-being of the local population (UNWTO, 2001; TIES, 2024). Sports tourism involves observing or participating in sports events, such as marathons and surfing (UNWTO, 2019). Scientific tourism, meanwhile, concentrates on data collection and observations for scientific purposes, often through expeditions (Bourlon & Mao, 2011; Bourlon & Mao, 2016; Vialette et al., 2021).

3.4 Geotourism

Geotourism, as highlighted, is an emerging segment of natural area tourism (McKeever et al., 2006), focused on the conservation, education, and appreciation of geological aspects (Moreira, 2014). This segment, distinguished from ecotourism by its emphasis on geodiversity, is considered more "eco-friendly" by Robinson & Roots (2008). Recognized by UNESCO, geotourism is a form of responsible and sustainable tourism with historical roots dating back to the 19th century, including popular geological excursions in England (Macfarlane, 2005) and visits to “show caves” in Australia (Bourne et al., 2008).

The initial scientific definition of geotourism was introduced by Thomas Hose in 1995, defining it as the provision of interpretive services and facilities for geological and geomorphological sites. This definition was expanded by Dowling & Newsome (2006), who emphasized geology and geomorphology as central components. Frey et al. (2006) consider geotourism an occupational and business sector, while Pforr & Megerle (2006) note the concept's complexity and multiple definitions. Hose's (2008) criticism of the National Geographic approach was that it did not

consider previous studies, and Gates (2006) notes that geotourism presents conflicting definitions.

In 2011, the Arouca Declaration, under the auspices of UNESCO, defined geotourism as tourism that supports and enriches a region's identity, incorporating geology, environment, culture, aesthetic values, heritage, and the well-being of residents. Moreira (2008, 2014) treats geotourism as a sustainable tourism segmentation, focused on geological and geomorphological aspects. Hose (2000) categorizes practitioners into dedicated and casual geotourists, broadening the understanding of the target audience and the scope of geotourism.

Geotourism differs from other forms of tourism in its focus on the site's geological characteristics. This segment occurs through the use of geodiversity as a tourist resource (Brilha, 2005; Gray, 2008). As highlighted by Mansur (2021), it is a form of tourism aimed at promoting understanding of Earth sciences, conserving geological and cultural heritage, and providing visitors with educational and enriching experiences. It is important to note that, regardless of the specific activity undertaken, the landscape's geological attributes are the primary motivation and play a fundamental role from a cultural perspective.

Geotourism is implemented across different areas of knowledge and should follow five fundamental principles: a geological basis (geoheritage), sustainability (geoconservation), education (geointerpretation), benefits to local communities, and tourist satisfaction. These principles differentiate geotourism from other forms of tourism, such as ecotourism, cultural tourism, and adventure tourism (Herrera-Franco et al., 2020). It includes a variety of actions aimed at promoting unique tourist experiences, focusing on the appreciation, understanding, and awareness of the importance of geological heritage.

This activity is at the heart of the geopark concept, serving as a tourism alternative that allows visitors to understand the geological aspects of the places they visit while also learning about the diversity of natural and human resources (Drinia et al., 2023). Geotourism in these territories has clear connections with the development of georoutes, geoproducts (Farsani et al., 2011; Rodrigues et al., 2021), geofood (Thjømøe & Gentilini, 2014; Vale et al., 2019; Ramos & Moreira, 2021), and the establishment of collaborations to promote sustainable tourism (Farsani, 2012; Frey, 2021).

4. RESULTS ANALYSIS

In the next session, the results and discussion are presented, in which the types of nature tourism carried out in coastal environments within geoparks across the Americas were analyzed.

Aligned with the principle of the blue economy, geoparks have emerged as prime examples of how natural and cultural resources can be used rationally to promote socio-economic development (Moreira et al., 2021). These territories, integrated into the blue economy, stand out primarily for promoting sustainable tourism, a strategy for economic growth. Furthermore, social inclusion and benefits directed towards local communities are fundamental aspects of these initiatives, reflecting a participative governance approach. In these initiatives, it is recognized that the involvement and support of the local community are essential for sustainable success.

Concurrent with the development of the blue economy and integrated with geoparks' adopted strategies, there has been an increase in interest in nature tourism modalities, including ecotourism and adventure tourism, which have significantly contributed to local economies' revenues. In this context, geotourism has become increasingly relevant, especially in geopark areas. The distinction of this tourism segment lies in its focus on geodiversity, fitting into a broader strategy of awareness and preservation of geological heritage. This approach includes visits to geosites (referred to by UNESCO as sites of geological interest), discovery interpretive trails, and participation in educational activities in museums and geological science centers.

Geopark	Location	Some Tourism Activities	Importance and Initiatives
Southern Canyons Pathways	Brazil	Boat trips, whale and sea lion watching, stand-up paddleboarding, surfing, sport fishing.	Integration of seven municipalities, promotion of sustainable tourism, Georrota project to value geological and cultural heritage, and the largest zipline in the Americas.
Cliffs of Fundy	Canada	Interpretive trails, ecological tours, adventure tourism, wildlife observation, canoeing.	Integrated and inclusive management with diverse communities, rescue of indigenous narratives, learning centers such as the Fundy Geological Museum.
Discovery	Canada	Whale watching, boat tours, guided hikes, bird watching, iceberg watching, kayaking, sailing, canoeing, spelunking, traditional cod or mackerel fishing	Second largest economic driver in the region, notable for seabird watching, focus on geological and paleontological education, commitment to raising awareness about geological risks.
Percé	Canada	Interpretive trails, interactive experiences, horseback riding, observation of northern gannets, canoeing, boat trips, whale watching, snorkeling, scuba diving, ice	Integrates science, culture, and entertainment, values indigenous traditions, frequent scientific and educational activities, 230-meter zip line.

		skating, fishing, stand-up surfing, zip-lining (with views of the Percé Rock).	
Stonehammer	Canada	Canoeing, cycling, hiking, fossil observation, snowshoeing, traditional fishing, kayaking, whale and marine wildlife observation, boat rides, sailing, swimming, ziplining.	Focus on educating about Earth's history, museums and interpretive centers, interactive approach with schools, wide variety of outdoor activities.

Frame 1: Overview of coastal geoparks and tourism activities.
Source: The authors.

4.1 Southern Canyons Pathways Geopark

The Southern Canyons Pathways Geopark displays remarkable geodiversity and geological heritage, and is home to the largest concentration of canyons in Brazil. These canyons feature escarpments reaching up to 1157 meters in height, extending over about 250 km, with altitudes of up to 900 meters (Godoy et al., 2012). The Serra Geral, a vast escarpment with canyons and deep valleys, characterizes the region's geomorphology. The geological history of the Geopark dates back around 250 million years, linked to the sedimentation of the Paraná basin and the breakup of the supercontinent Gondwana (Geoparque Caminhos dos Cânions do Sul, 2024).

This location was the setting for one of the most significant magmatic events on Earth, which occurred between 135 and 119 million years ago, characterized by intense volcanic activity that covered approximately 1.2 million square kilometres and was associated with the fragmentation of Gondwana. The southeastern edge of this volcanic province is distinguished by a set of escarpments, formed by the abrupt cutting of the Campos de Cima da Serra Plateau, composed of verticalized walls of volcanic rock, a geomorphological feature in the area of the canyons (Godoy et al., 2012).

In the Southern Canyons Pathways Geopark, there is a wide variety of activities. The geotourism activities in this geopark include a georoute that traverses the seven municipalities that comprise the area. To fully enjoy this experience, it is suggested that visitors spend 14 days completing it. This experience involves visiting geosites such as waterfalls, paleoburrows, rivers, and canyons, along with various ecotouristic and adventure activities, and appreciating local cuisine (Geoparque Caminhos dos Cânions do Sul, 2024).

Moreover, this segment's actions aim to promote the territory as a sustainable, integrated tourist destination. In this regard, efforts have been made to develop regional tourism, with Sebrae (Brazilian Micro and Small Business Support Service) participating in the drafting of the tourism project to organize the tourism value chain, unite the seven municipalities, and market them in an integrated manner. Another important initiative is the Georrota, conducted in collaboration with Sebrae SC, and scheduled to be officially launched in 2024. This new route involves over 150 enterprises and offers a range of experiences between the mountains and the sea, valuing the region's geological and cultural heritage. Examples of tourist activities include bee tourism, hiking, stargazing, whale and sea lion watching (Caminhos dos Cânions do Sul, 2024).

Adventure and sports tourism includes hang gliding, athletics, ballooning, boat trips, cascading, cycle tourism, hiking, off-road motorcycling, boat tours, horseback riding, paragliding, paramotoring, surfing, stand-up paddleboarding, and sport fishing. Other activities include whale and sea lion observation, as well as geological observation. The geopark boasts a special attraction, the largest zipline in the Americas, located in the Serra Geral National Park in Cambará do Sul. As the first zipline in a national park in Brazil, it starts in this municipality and continues through Jacinto Machado, offering views of the Cânion Fortaleza. With an average speed of 30 km/h, this zipline is designed to be slower, allowing visitors to better appreciate the surrounding nature during the 2 to 10-minute ride.

4.2 Cliffs of Fundy Geopark

In the geological context, the Cliffs of Fundy Geopark is a site of scientific, educational, and touristic significance located in the Bay of Fundy region of Canada. Managed by a diverse organization, including representatives from the municipalities of Cumberland and Colchester, local rural communities, the Mainland Mi'kmaq Confederation, and experts in geosciences, tourism, conservation, art, and culture, the Geopark is a model of integrated and inclusive management (Leslie, 2018; Calder & Leslie, 2019).

The Cliffs of Fundy Geopark (Figure 3) is located in Nova Scotia along the north coast of the Bay of Fundy. It extends 165 km from Lower Truro to the Apple River. This site is known for having the world's highest tides, which have shaped its unique landscape characterized by cliffs, tidal estuaries, and natural trails. The Geopark is situated in Mi'kma'ki, the territory of a people with an ancestral presence of over 11,000 years, rich in cultural legends. Besides cultural importance, the region stands out for its geological significance, displaying evidence of Earth's dynamic geological history, such as the Cobequid Fault, a striking example of the Earth's ever-changing geological processes (Cliffs of Fundy Geopark, 2024). (Cliffs of Fundy Geopark, 2024; UNESCO, 2024b).

This geopark offers visitors a unique opportunity to witness these natural phenomena and explore a variety of geosites. Of these, during the period when the geopark was still aspiring, 43 were identified, of which 20 were already prepared for tourist reception. Additionally, the territory is dedicated to rescuing the indigenous narrative, particularly the legends of Kluscap and the history of the Mi'kmaq people, integrating them into understanding the formation of the Bay of Fundy tides (Calder & Leslie, 2019).

One of the main attractions of the park is the Mi'kmawey Debert Interpretive Trail. Located near Truro, Nova Scotia, this trail leads visitors on an educational journey to the heart of the glacial era of Mi'kma'ki, highlighting biodiversity and human adaptations over millennia. Other notable trails include the Cobequid Trail, which extends for 18 km in Colchester County, and the Thomas' Cove Coastal Reserve, both key sites for the study of terrestrial ecology and coastal geological processes (Cliffs of Fundy Geopark, 2024; Nova Scotia, 2024).

The Geopark also houses various museums and interpretive centers, such as the Fundy Geological Museum and the Mi'kmawey Debert Interpretive Centre, which provide insights into the region's geology, ecology, history, and culture. These spaces function as hubs of learning and scientific dissemination, enriching the visitor experience (Cliffs of Fundy Geopark, 2024; Nova Scotia, 2024).

Complementing the educational offering, the Cliffs of Fundy Geopark offers a range of tourist activities, from ecological tours to outdoor adventures, allowing for deep immersion in the park's natural and cultural landscape. These activities, including horseback riding, helicopter tours, canoeing, and cycle tourism, offer multiple perspectives for exploring this unique geological heritage (Cliffs of Fundy Geopark, 2024; Nova Scotia, 2024).

4.3 Discovery Geopark

The Discovery Geopark plays a significant role in tourism, being the region's second-largest economic activity and contributing 25% to local revenues. This geopark is renowned for offering a wide array of land and sea tours, with a focus on wildlife observation. It stands out globally for whale-watching and offers unique opportunities to observe dolphins, birds, and icebergs. Visitors can choose between private and group tours, including eco-walking, boat trips, cycling, and guided kayak and sailing expeditions (McCallum, 2019).

Furthermore, the Discovery Geopark is a hub for geotourism, with educational activities focused on geology and paleontology, conducted in collaboration with companies, non-profit organizations, and research institutions. The region attracts researchers for educational excursions, conferences, and professional development programs, and also hosts scientific conferences and events (McCallum, 2019).

This geopark is also a top destination for birdwatching, recognized as the capital of seabird observation in North America. It is home to 35 million seabirds, including 25,000 boobies and 500,000 puffins, as well as other species such as black guillemots, kittiwakes, common terns, and little auks. Furthermore, the geopark provides adventure activities such as kayaking, canoeing, spelunking, sailing, boat tours, and traditional cod or mackerel fishing (Discovery Global Geopark, 2024). A significant aspect is the commitment of local tour operators to raising awareness of the region's geological risks and incorporating these geological stories into their activities. This could be a key factor in mitigating environmental disasters (McCallum, 2019).

Furthermore, the international significance of the Geopark Discovery stems primarily from the Ediacaran period and the exceptionally well-preserved fossils it preserves. By providing a physical context for paleontological preservation, the coasts and coastal formations of this geopark are important for understanding the evolution of early biota, making them unique sites for the development of scientific, educational, and touristic activities, based on the geomorphological characteristics (McCallum, 2019).

The area, renowned for its stunning coastlines, provides visitors with breathtaking views of diverse coastal formations, including caves, arches, and sea stacks, where dynamic geomorphological processes can be observed at the boundary between land and sea. Newfoundland and Labrador, part of the geopark, stands out as one of the few places in the world where it is possible to see icebergs passing by, most of which originate in Western Greenland (McCallum, 2019).

4.4 Percé Geopark

The Percé Geopark stands out in the field of geotourism, offering an educational and fun experience that integrates science, culture, and entertainment. Visitors can take a virtual journey through 500 million years of geological history, providing interactive learning. The experience extends to children with a marine-themed park and 18 km trails on Mount Ste-Anne and Mount Blanc, where geological discoveries and outdoor adventures merge (Percé, 2024; Geoparc de Perce, 2024).

One of the most notable geomorphological features of the Percé Geopark is its location at the center of the great Appalachian orogenic chain, which extends along the Atlantic coast of North America. The formation of this mountain range and the associated magmatic and tectonic events are linked to the opening of the Atlantic Ocean during the Jurassic and Cretaceous periods, approximately 150 million years ago. Over the last 20,000 years, during the last Ice Age, the Quebec segment of this chain was subjected to the erosive action of glaciers, shaping the current landscape (UNESCO, 2024c).

The terrestrial landscape of the Percé Geopark showcases a variety of relief forms, while the marine environment presents a wide range of landscapes, including cliffs, islands, beaches, and bays. This area encompasses several ecosystems, contributing to the region's rich diversity of fauna and flora. This area contains several ecosystems, which confer the region its diversity in fauna and flora. The most notable and famous natural phenomenon is the world's largest accessible colony of Northern Gannets on Bonaventure Island (UNESCO, 2024c).

The Percé Rock has a natural opening, considered one of the largest in the world. The Geopark

hosts rock records of 170 million years of regional geological history in an area of just 40 km². The rocks, which are minimally metamorphosed, allow for the observation of various geological phenomena, such as sedimentation, fault processes, deformation, erosion, sedimentary transport, landslides, fossils, and coal deposits, the latter being the only one known in the province of Quebec (UNESCO, 2024c).

The cultural dimension of the Geopark is highlighted by the night projections of the "Legend of Gluskap", in partnership with the Micmac Nation of Gespeg, valuing indigenous traditions. The geopark's "Scientific Mornings" offer opportunities to learn about geology, while the Desjardins Play Area provides fun with its maritime theme (Geoparc de Perce, 2023). In the sports realm, the park stands out with activities such as cycling, emphasized by the Blue Route Network (Blue Route, 2024), and sporting events like "Not Since Moses."

Moreover, activities such as horseback riding, canoeing, and hiking trails are popular, enriching the tourist experience (Québec by the Sea, 2024). The municipality of Percé expands these options with activities like athletics, tree climbing, bobsleigh, reverse bungee jumping, walking, cruises, ice climbing, snorkelling, scuba diving, bird and whale watching, boat trips, ice skating, fishing, stand-up surfing, zip-lining, and yukigassen.

A highlight is the 230-meter zip line, offering unique views of the Percé Rock. Beyond recreational activities, the Geopark is a focal point for the scientific community. Geologists and academics explore its geological aspects, and study trips are frequent, such as those held in Halifax, focusing on the interpretation of local geological processes (Dewar & Miller, 2010). This combination of entertainment, culture, and science gives the Percé Geopark a prominent position in geotourism, creating a wide range of experiences that promote an understanding of geology, while providing visitors with cultural enrichment and adventure.

4.5 Stonehammer Geopark

The Stonehammer Geopark represents a notable milestone in the field of geotourism, integrating visits to museum institutions such as the New Brunswick Museum and promoting events that highlight geological heritage. As described by Miller & Buhay (2014), it connects protected areas and geological trails through a common approach, creating a unique educational and recreational experience.

This geopark features rock formations spanning the Precambrian to the Triassic, which record geological events such as the opening and closing of oceans, the collision of landmasses, the emergence of complex life on Earth, and the advance and retreat of glaciers. This special site allows phenomena like the Reversing Falls, where the Saint John River reverses its course due to the high tides of the Bay of Fundy, to be a notable example of the interaction between hydrology and geomorphology. Other examples include Precambrian stromatolites, which represent one of the earliest records of life on Earth. (Miller & Falcon-Lang, 2012; Stonehammer UNESCO Geopark, 2024; UNESCO, 2024d).

The New Brunswick Museum is a vital institution in the territory of this geopark because, among other reasons, since its foundation in 1842 as the Gesner Museum of Natural History, it has developed an impressive collection of 50,000 geological and paleontological specimens. This organization adopts an interactive approach, especially for students from 1st to 5th grade, exploring biodiversity and Earth's history. Using audiovisual resources and specimen analysis, students learn about marine life, fossil formation, climate change, and evolution, using examples from New Brunswick's natural history (New Brunswick Museum, 2024).

Furthermore, the Stonehammer Geopark offers a variety of outdoor activities, allowing visitors to discover the region's geological richness firsthand. As highlighted by Miller and Falcon-Lang (2012) and Miller et al. (2013), the geopark features 60 geosites spanning a geological history of billions of years, including significant discoveries such as the world's first Precambrian fossil and the earliest known Precambrian stromatolites, known as Archaeozoon acadiense. Visitors can explore these special sites through activities such as canoeing, cycling, and hiking, becoming active participants in discovering geological history (Stonehammer Geopark, 2024).

In addition to these geological opportunities, it stands out for its diverse attractions, as reported by Stonehammer Geopark (2024). The Interpretation Center, for example, provides knowledge of Earth's history through fossil specimens and daily educational programs. During the summer, the St. Martins Sea Caves and the Reversing Falls offer free educational programs, where ambassadors inform visitors about these natural wonders. The region is also beautiful for those interested in nature, with guided hikes, horseback riding, kayaking, and even geocaching, enriching the educational and recreational experience in the park (Stonehammer Geopark, 2023). In this geopark, a wide variety of adventure and ecotourism activities are also offered, including spelunking, fossil observation, whale and marine wildlife observation, bird watching, boat and bicycle rides, traditional cod or mackerel fishing, and sailing, all integrated within a context of geological and ecological observation.

The region is distinguished by its extensive array of outdoor activities, such as camping, horseback riding, kayaking, climbing, geocaching, swimming, ziplining, and snowshoeing. For those who prefer ecotourism practices, the park offers immersive experiences such as guided walks through the Reversing Falls and the GeoHeritage Walk in Uptown Saint John. During July and August, visitors can engage in activities such as free cultural and historical interpretations at emblematic sites, including the Reversing Falls and the St. Martin's Sea Caves. A highlight of the region is the Brundage

Point River Center in Grand Bay-Westfield, accessible to people with disabilities. Nearby is the Heritage Trail, a picturesque 13.5 km trail that connects to the famous TransCanada Trail, providing an ideal setting for hiking and cycling, complemented by a Regional Visitor Information Center that offers additional resources to visitors (Stonehammer Geopark, 2024).

4.6 Data discussion

The concept of geotourism has gained prominence, particularly in geoparks, where this practice is inherently linked to the development of tourism activities focused on geology. From the conception of a geopark to its validation by UNESCO, one of the core premises is the promotion of geotourism. These spaces are crucial to the realization of these activities, highlighting their importance as drivers of local development.

The significance of geoparks in coastal regions is often recognized due to biodiversity. However, with UNESCO's recognition, they gain international relevance, particularly for the value of the geosites. These areas, with significant geological diversity, offer unique experiences linked to integrated strategies of tourism, education, and conservation. Geological features include cliffs, beaches with fossil traces, stromatolites, and marine caves.

In these territories, geotourism can be developed in various ways, not limited to marine geodiversity. Tourism activities may include adventure sports, interpretive trails, and wildlife observation, allowing interaction between biological and geological explanations and fostering visitor awareness of the importance of ecosystem conservation. Additionally, museums and science centers are spaces for informal visitation, enabling a deeper understanding of these territories' specific characteristics.

Scientific tourism is a particularly relevant segment and can be more strongly stimulated in these areas through its integrated approach to geotourism, geoconservation, and geoeducation, including activities such as specialized guided tours, data collection, monitoring, eco-volunteering, and scientific study. Notably, in geoparks, scientific tourism is not only for academic purposes but also encompasses recreational and voluntary aspects, enhancing the tourist experience through a combination of leisure and learning, while contributing to nature and citizen formation.

In coastal geopark areas of North and South America, activities such as scuba diving are uncommon, possibly due to factors like water turbidity that affect marine visibility. However, in regions with better visibility, diving can be a main attraction. In Canada, most GGN member geoparks are in marine areas, reflecting the geological value of the Canadian coast. Additionally, the country has seven areas identified as potentially joining this network. The synergy between conservation, education, and tourism actions can drive regional socioeconomic development. Specifically, coastal tourism, including fishing and nautical activities, positions this region as a sustainable tourist destination, facilitating additional efforts to publicize the importance of geological heritage and to advance the blue economy.

The Southern Canyons Pathways Geopark in Brazil, recently designated by UNESCO, stands out for integrating two states and for encouraging joint activities, such as a georoute that covers all municipalities in the territory. It also offers substantial sports and adventure tourism, positioning it as a regional reference tourist destination. Brazil, with only one coastal geopark, has the potential to expand this category into new territories in the GGN. An example is the Cliffs and Lagoons Geopark Project of RJ, which has promoted geoscience education and dissemination, conservation of geological heritage, and sustainable tourism for over a decade.

Tourism activities aligned with blue economy principles emerge as important tools for mitigating the negative impacts of climate change. This tourism approach, founded on conscious and integrated management, recognizes and values the environmental, social, and economic dimensions intrinsic to coastal and marine ecosystems. By adopting sustainable practices, tourism not only minimizes its ecological footprint but also positions itself as a proactive phenomenon in addressing environmental challenges. Furthermore, this strategy provides an opportunity to transform tourism into an alternative source of income, replacing activities harmful to the environment.

This new perspective in tourism implies reevaluating conventional practices, placing sustainability and socio-environmental responsibility at the center of planning and execution for tourism activities. Incorporating these principles aims to foster a more harmonious relationship with nature and encourage the development of a more resilient, diversified local economy. Thus, tourism, aligned with blue economy ideals, becomes a catalyst for sustainable development, balancing local communities' economic needs with the conservation of essential marine and coastal ecosystems for the planet's overall health.

Despite its growing relevance, the blue economy, particularly in the context of tourism, should be approached with caution. The ocean is one of the last bastions of the world still partially unexplored by humanity. In this sense, it is essential to align public use strategies and establish rigorous monitoring of tourism activities.

Furthermore, sensitive or already degraded areas should not be considered for this purpose. Although tourism can serve as an alternative source of income, it is imperative to assess its impacts on biodiversity and geodiversity carefully, always prioritizing the preservation of nature.

Although the blue economy is a promising strategy for boosting local socioeconomic development,

it is essential to recognize that certain aspects of this concept, such as ocean mining, are not aligned with sustainability principles. Therefore, it is vital to approach this concept with caution when associating it with improvements in living conditions for local populations, as such associations are often linked to predatory practices. It is necessary to avoid turning this connection into a mere slogan that fails to reflect reality.

It is considered that, however promising the blue economy's perspective may be, it is fundamental to understand the limits of the development it promotes. Tourism may indeed be configured as a complementary strategy to other forms of development; nevertheless, it is necessary to identify who the actual beneficiaries of ocean resources are and to assess whether local communities are effectively included in this process.

It is not possible to affirm that the blue economy is sustainable when certain business groups benefit at the expense of local populations. Likewise, such a narrative cannot be sustained if the exploitation of the ocean floor proceeds. In this case, the blue economy risks becoming merely another fallacy within the discourse of sustainability.

In this context, it should be emphasized that although geoparks have an intrinsic vocation to value the geological aspects of a territory, the development of activities in coastal and marine areas requires special attention to disturbances to marine fauna. If the visitor's experience is justified solely by environmental awareness, there is a risk of falling into another fallacy, masking negative impacts under the guise of environmental education.

In this regard, it is necessary to emphasize that the so-called blue economy should not instrumentalize the discourse of sustainability to justify the expansion of tourism without the effective implementation of conservation practices. The ocean cannot be reduced to a mere tourist commodity, disregarding its ecological, cultural, and social dimensions, which are intrinsic to its integrity and to the well-being of coastal communities and biodiversity.

Finally, it is recognized that the blue economy has the potential to improve these areas. However, the concept must be carefully analyzed and implemented to ensure that development is effective across all dimensions – social, environmental, and cultural – and not merely restricted to economic growth.

5 FINAL CONSIDERATIONS

This study underscores the growing significance of the blue economy and geotourism in coastal geoparks, highlighting how these concepts contribute substantially to sustainable development and the achievement of the United Nations Sustainable Development Goals. A qualitative approach shows that these geoparks provide not only economic opportunities for local communities but also play an important role in environmental education, the preservation of geological heritage, and sustainable tourism.

The analysis of coastal geoparks in the Americas demonstrates their vital role in developing geotourism activities that are integrated into conservation and geological education strategies. It is observed that the territorial extent of geoparks directly influences the complexity of integrated management strategies, particularly in promoting tourism across various municipalities.

For instance, the Southern Canyons Pathways Geopark, spanning two Brazilian states and seven municipalities, faces the challenge of integrating a georoute to provide broader knowledge of the region's geological characteristics. This particular geopark offers a variety of activities focused on nature and adventure tourism. Similarly, the Stonehammer Geopark distinguishes itself by providing non-formal educational spaces, such as the New Brunswick Museum, contributing to the teaching and dissemination of geosciences.

The Cliffs of Fundy Geopark is another exemplary model, hosting several museums and science centers within its territory. This geopark also features trails such as the Mi'kmawey Debert Interpretive Trail, which delves into the history of the indigenous peoples, alongside other ecotourism and nature tourism activities, showcasing its commitment to preserving and promoting the region's natural and cultural heritage.

The Percé Geopark, on the other hand, focuses on activities that highlight the region's ancestral history, with exhibitions on the Micmac people that underscore the area's cultural importance. This geopark is also known for its ecotourism and adventure tourism activities. The Discovery Geopark stands out for its whale-watching and, like the others, emphasizes geotourism with an educational perspective.

In recent years, these special natural resource settings have been intensely dedicated to promoting education, the dissemination of geosciences, conservation, research, and sustainable tourism. Fundamental to the success of these initiatives is the inclusion of local communities, playing a key role in creating attractions that highlight local history and traditions. The inclusion of ethnogeological routes not only can enrich the tourist experience but also offers a more integrated and holistic view of geology and culture in these settings. Moreover, when aligned with geoparks, museological initiatives play a crucial role in raising awareness of the importance of geological heritage. This integrated approach is complemented by scientific tourism in coastal geoparks, which stands.

The oceans, as yet underexplored natural resources, offer unique opportunities for discoveries, particularly when well-integrated into the development of geotourism and scientific tourism. Geological knowledge can be disseminated in various ways, including exhibitions, field activities, thematic routes, and even virtual experiences exploring the ocean floor.

The blue economy, linked to sustainable tourism, plays a crucial role in socio-economic development through strategies that consider social, environmental, and economic factors. In this context, geoparks can serve as a model for a new paradigm of planetary development.

A society that is encouraged by the pursuit of knowledge is better prepared to achieve sustainability, actively contributing to mitigating climate change and environmental disasters. Geoparks represent a new way of understanding and managing a territory, aligned with a geocentric perspective, that has the potential to promote positive change in values in the medium and long term, conserving and celebrating the history of Earth and society.

This study underscores the need for further investigation and comparison across geoparks to identify and replicate best practices. Future research should encompass a comprehensive analysis of the environmental and social impacts of geotourism and the blue economy, along with strategies for community engagement and sustainable management.

Additionally, the study examines tourist activities in natural areas across America, with a focus on the attractions available in geoparks. While this analysis offers valuable insights into visitors' motivations, it highlights the need for managers to conduct more targeted research that assesses visitor profiles, satisfaction, and awareness. Such research will provide a deeper understanding of how to enhance local attractiveness.

Furthermore, it is essential to emphasize the need for more in-depth studies that validate the evidence presented in this research through additional data sources. To achieve this, conducting interviews with managers of these areas is recommended, which would provide a more comprehensive understanding of tourism activities in natural areas within coastal geoparks. The limitations of this study include the need to validate the information obtained from the researched geoparks.

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CRediT author statement.

Term	Definition	Author 1	A2	A3
Conceptualization	Ideas; formulation or evolution of overarching research goals and aims.	✓	✓	
Methodology	Development or design of methodology; creation of models.	✓		
Software	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components.			
Validation	Verification, whether as a part of the activity or separate, of the overall replication/ reproducibility of results/experiments and other research outputs.	✓	✓	

Term	Definition	Author 1	A2	A3
Formal analysis	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data.			
Investigation	Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection.	✓		
Resources	Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools.			✓
Data Curation	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse.			
Writing - Original Draft	Preparation, creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation).	✓		
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