

EXPERIENCES AND STRATEGIES OF EDUCATION AND CONSERVATION WITHIN GEOPARKS: A BIBLIOMETRIC REVIEW

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Abstract

UNESCO Global Geoparks are characterized by their contribution to the conservation of natural, geological, and cultural resources of the regions where they are located. Geoparks also represent an important figure within the sustainable development of the regions, so strategies around economic growth, conservation, and promotion of education are a fundamental part of their *raison d'être*. This study aims to identify the main trends in educational and conservation processes in geoparks worldwide. The methodological approach is based on the review of 114 articles from a search equation in the Scopus database, analyzing the results through a series of quantity, quality, and structure indicators. The search period is between 2005 and 2023, so there are recent advances in implementing educational aspects in geoparks. Other results point to the participation of several Asian and European countries as the most predominant, as well as a trend in the implementation of educational processes focused on earth sciences, environmental sciences, and social sciences. Sustainable development and conservation education programs are major players in the findings of this study. In this way, geoparks work as centers for developing conservation dynamics, developing economic and social aspects driven by educational initiatives, and disseminating knowledge to the communities and visitors. The geoheritage tourism sector integrates educational practices into developing experiences to raise awareness among the community and visitors.

Keywords: Geoparks, education strategies, sustainable development, conservation.

1 INTRODUCTION

UNESCO Global Geoparks are one of the projects within UNESCO's approach to education, science, and culture. Geoparks represent unique and unified geographic areas in which sites and landscapes of international geological importance are managed with a holistic concept of protection, education, and sustainable development. UNESCO and its actions for promoting the Sustainable Development Goals permanently integrate aspects related to education, conservation, and care of the regions' natural and cultural resources (UNESCO, 2020).

Geoparks are identified as territories with a series of characteristics related to finding beauty sites or rarity concerning geological heritage, thus having special importance for the scientific community and the community that inhabits the region. Geoparks use various aspects of their heritage to encourage awareness of the effects of climate change, conservation of natural and heritage resources, sustainability, responsible tourism, and risk reduction due to natural disasters, among other important issues facing society (UNESCO 2016). This figure then manages the territory from the geological heritage that makes it unique, aspects of natural heritage for conservation processes, and cultural heritage that is important for developing a social approach.

The geological wealth found in the different regions of the world makes geoparks become spaces for recognizing the characteristics, singularities, and beauty that enclose these territories, thus highlighting the geodiversity and the importance of its conservation. It is not surprising that there are several geoparks in different latitudes, mostly in China and European countries (Tsakiri et al., 2020; Cai & Wu, 2019), and even more projects to be part of this global network. One finds then proposals such as the one in the northwestern desert of Egypt (Khalaf & El-Kheir, 2022), in Chile in the Biobío Littoral (Ferraro et al., 2021), or in the Santa Elena Peninsula in Ecuador (Herrera-Franco et al., 2020), among many others. These projects have something in particular in common, sustainable development, geotourism, and geological diversity, as aspects of great importance for their development and contribution to the objectives of UNESCO geoparks.

Within geoparks, holistic dynamics of environmental protection, geological and cultural heritage conservation, education for locals and visitors, and participatory economic development are managed (UNESCO, 2015; Cui et al., 2021). These dynamics are part of the objectives that geoparks, as places of uniqueness and conservation, promote through educational programs that are implemented directly and indirectly within the territory and its tangible and intangible heritage (Han et al., 2017).

Tourism represents one of the pillars of the geoparks in promoting the socioeconomic processes of the regions. In particular, geotourism is defined as integrating the territory's characteristics, including geographic, cultural, heritage, aesthetic, and welfare aspects of the communities that inhabit it (Hose, 2012). In geotourism processes, education is important because it promotes practices responsible for the territory, its resources, and customs. This fits directly with the principles of geoparks and is associated with sustainable tourism, managing to develop strategies that promote the conservation of resources and benefit the inhabitants of the territory and tourists (Shekhar et al., 2019).

The geopark is then an actor within the dynamics of sustainable development, as it represents a place where a flow of knowledge is generated, knowledge is generated and disseminated around issues of resource protection, the importance of geological and cultural heritage, as well as the economic dynamics derived from sustainable tourism (Klarin, 2018). Thus, any action that contributes to the sustainability of these geosites through development strategies leads to the protection of the representative heritage present in a country or region (Herrera-Franco et al., 2020).

Educational factors related to heritage become relevant in order to be able to teach through different contexts, dynamics that integrate the culture of the territories, the history it contains, the identity and values that are specific to the regions that make up the heritage geoparks, from the cultural, identity, values and academic aspects of history (Guillén et al., 2020). Each geopark has a unique educational experience due to its unique characteristics and changing dynamics. In addition to this, there are research practices around geological and natural features that are not only part of the landscape but are also part of the heritage, so education, in general, is an indispensable tool for sustainable development in geoparks and the dissemination of different values for visitors and inhabitants of the regions.

Given that geoparks as engines of sustainable development have become popular and have had a great reception by users and governments, it is necessary to know the progress that has been developed in terms of education and conservation, as pillars of these territories. This study then develops an analysis of the advances from an investigative approach in which it is possible to understand how the scientific community behaves and what the trends are.

2 METHODOLOGY

In order to analyze how geoparks have developed their strategies around the themes of education and conservation within their territories, a literature review was developed in a quantitative research framework, which is characterized because the data collected are rigorous and reliable due to their collection with systematic and accurate procedures (Binda & Balbastre, 2013). Bibliometrics is then the methodological tool used for the analysis of the information as this allows to make a study of the phenomenon, since most of the studies of this type offer an analysis of citations of the research field, usually in the form of ranking of the most cited studies, authors or journals in the examined area (Zupic & Čater, 2015). To have the information,

the specialized database Scopus is used, starting from the formulation of the following search equation:

TITLE ("geopark") AND TITLE ("educación" OR "geo-education" OR "learning" OR "development")

From this search 114 results are obtained that will be the basis of the analysis to be developed, through the office automation tool, Excel; and the software specialized in bibliometrics, VOSviewer (Van Eck & Waltman, 2010). The analysis focuses on the thematic relevance in terms of productivity, as well as authors, countries, journals and keywords. In this way, quantity variables were identified, related to the number of publications; and quality variables, around the number of citations, as well as the relationships obtained between topics.

3 RESULTS

The following is an analysis of the different documents obtained through a series of indicators that study the phenomena related to academic production, quality through the associated citations and the structures formed by the different relationships that are developed.

3.1 Annual productivity

Fig. 1 shows that research on education and conservation strategies within geoparks has been growing since 2005. Although it remained at a production of 1 article per year, from 2010 to 2011 an increase in the number of publications can be observed even though for the years 2012 and 2013 a considerable decrease was seen, from 2015 to 2017 it remained at an amount of 7 publications per year, increased to 8 and 11 for 2018 and 2019 respectively and growing considerably in 2021 and what has elapsed of the year 2022 with 18 articles published so far. Among the most relevant articles published in the last year, there is the one by Fassoulas et al. (2022), who in their work perform the presentation and analysis of some digital tools developed in order to promote and expand the generation of awareness and knowledge regarding the importance of Unesco Geoparks. Specifically, in this research, they present the development of three interactive digital maps that present the different sites of historical and cultural importance, as well as the different tourist attractions, including a web page and the inclusion of virtual reality tools and geolocation for the recognition of the Psiloritis geopark in order to help the interpretation of the nature and culture of the place, this work already has a citation this year.

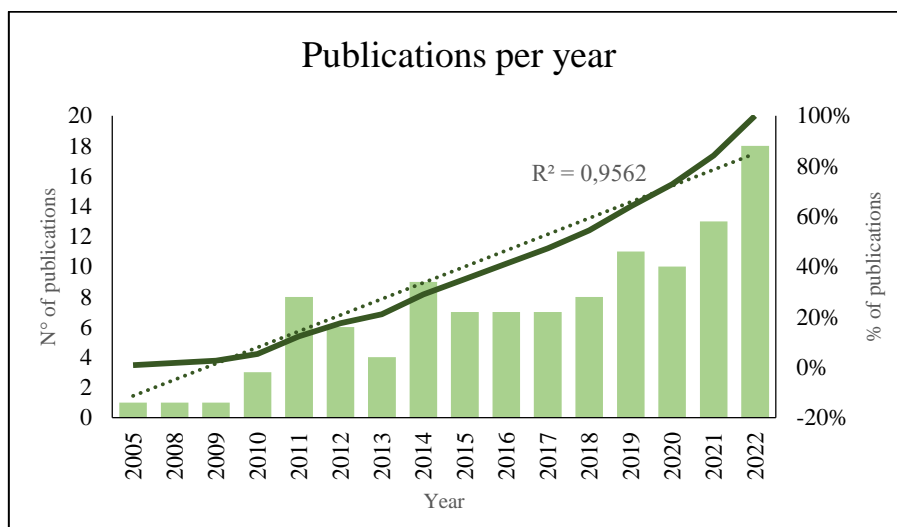


Figure 1. Annual productivity

Then, there is the work of Li et al. (2022), who evaluate the synergy presented by the index of three groups of attributes of the conservation and development of natural territories. Thus, the index of naturalness, functionality, and territoriality in the Diehong Bridge Scenic Area (DBSA) of the Jiuxiang Gorge Cave Geopark of Yunnan Province (China). Although these two articles have different approaches, both highlight the importance of educating society regarding the care and conservation of natural territories, highlighting that, in recent years, mainly since the pandemic caused by Covid-19, the effects of climate change have been more noticeable, as highlighted in the works of Fassoulas et al. and Skibiński et al., (2022; 2021).

3.2 Indicators associated with authors

Regarding authors' production on education and conservation strategies and experiences within geoparks,

Fig. 2 shows that the author with the largest number of publications on the topic is Komoo I., with five articles to date. One of his most relevant papers with 54 citations is "Public education in heritage conservation for geopark community," where the authors address the importance of generating strategies for the establishment of public education programs and awareness initiatives aimed at both ensuring community participation in the development of Langkawi Geopark, as well as in the generation of community management actions (Azman et al., 2010). Similarly, the article entitled "The Langkawi Global Geopark: Local community's perspectives on public education," with 24 citations, highlights the importance of generating education strategies that allow the integration of the community in the development and constitution of the Geopark, this being consistent with the recognition of this as heritage (Azman et al., 2011).

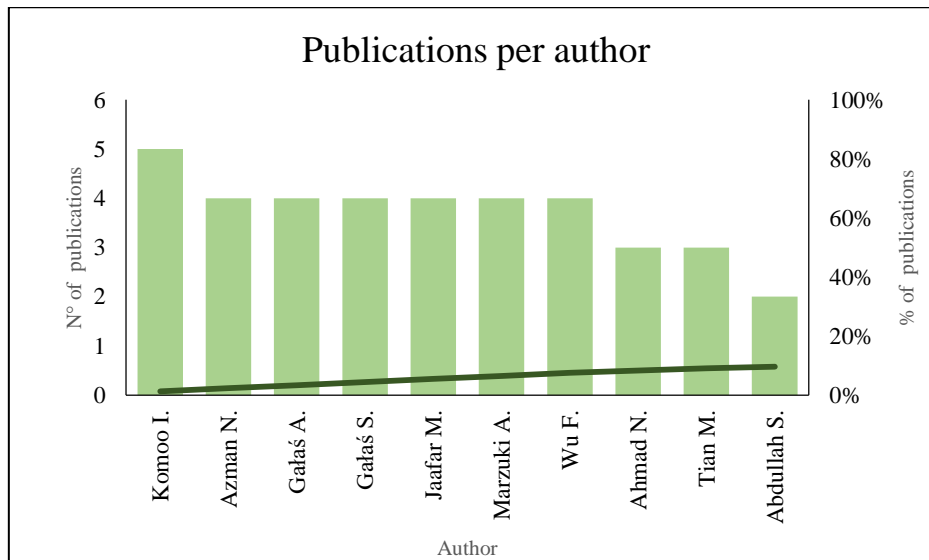


Figure 2. Publications per author.

The following authors with the highest number of publications have four articles each. Among these are Azman N., Galaś A., Jaafar M., Marzuki A., and Wu F. Among these, there is the article "Conditions of development of volcanic attractions in the planned Colca and Andagua volcanoes geopark in southern Peru" by Galaś & Galaś (2017), which analyzes the Colca Canyon area and the Valley of the volcanoes located in the Western Cordillera in the department of Arequipa, as a site with potential to be recognized as a UNESCO Geopark and with academic interest due to the different geological attractions it possesses. On the other hand, there is also the work developed by Jaafar et al. (2014), who carried out a study of the satisfaction of tourists visiting the Kilim Geopark in Malaysia regarding the services offered by the community, taking into account that one of the main focuses of the Geopark is the education of the community in factors such as heritage and environmental conservation.

3.3 Indicators associated with journals

Regarding publications by the journal in Fig. 3, Geoheritage has the largest number of publications on the subject, with 16 articles in total. One of the publications with the highest number of citations, 37 citations in total, is the work by Burlando et al. (2011), which highlights the existence of an interpretation center of the Beigua Geopark in Italy, where they focus mainly on the development of ornithological research and educational programs in which temporary and permanent exhibitions are held. Also, another article where interpretation centers are presented as a valuable aspect for developing knowledge about geoparks is the opportunity for scientific dissemination (Han et al., 2018). In this sense, the authors highlight establishing a structured network of educational and interpretive programs to carry out scientific outreach and promote geotourism in Huangshan Geopark in China (Han et al., 2018). Next is the Conference of Geology Resource Management and Sustainable Development, with six publications so far, followed by GeoConference Surveying Geology and Mining Ecology Management, which has five publications. For the latter Geopark development in the Slovak republic - alternative possibilities is one of the articles with the most citations so far (5 citations) and highlights that Geoparks aim to support the economic growth of their areas, as well as the education of the local and foreign population in geology, ecology and nature protection as a whole (Balaz et al., 2014).

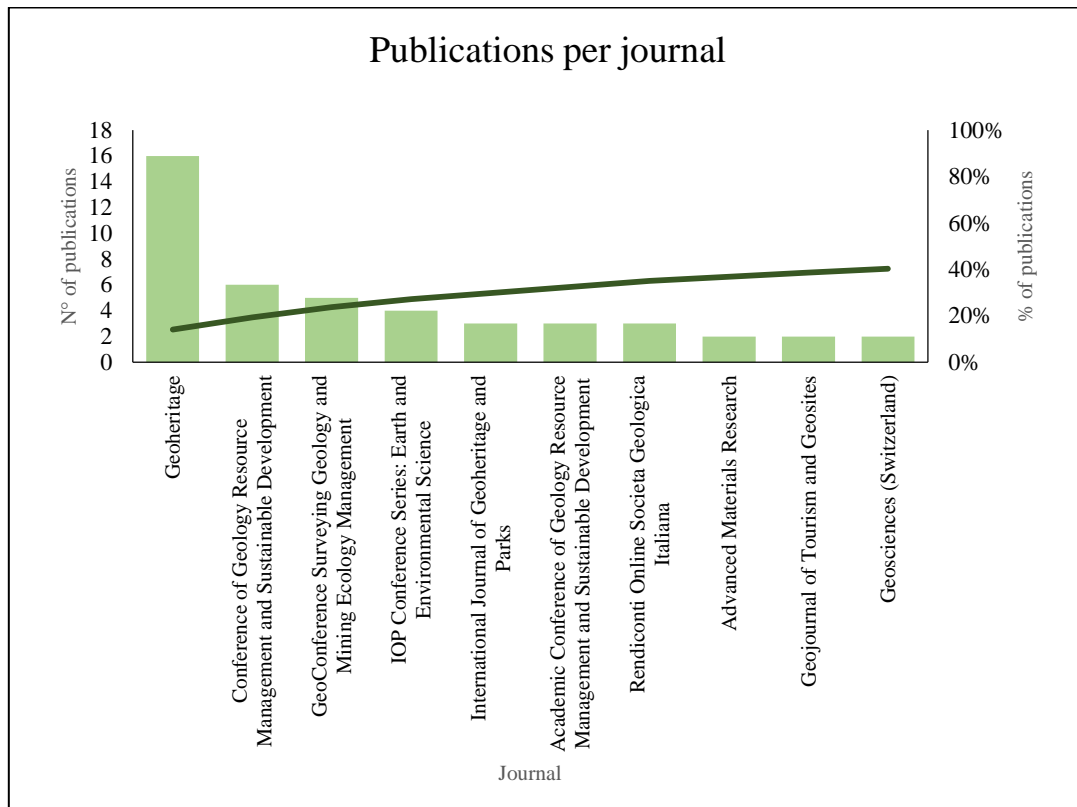


Figure 3. Publications per journal.

3.4 Indicators associated with countries

Regarding publications by country, Fig. 4 shows that China has the highest number of publications, with 25. Among the most recent articles, with ten citations, is the work by Rodrigues et al. (2021), which focuses on the innovation of geoparks from the generation of geoproducts as tools that allow education and communication used in Geoparks, telling stories, illustrating landscapes, teaching curiosities and bringing memories in communities and visitors. Then, there is Indonesia with 13 publications. In one of their publications, the authors Hakim et al. (2022) point out that training and education of best practices in the context of sustainable agriculture ensure a balanced role in economic, social, and environmental aspects. Next is Malaysia, with 12 publications so far, for which, in the article by Said et al. (2021), various aspects of the Mersing Geopark were evaluated, such as; nature conservation, community and community economy through geotourism activities, and public education.

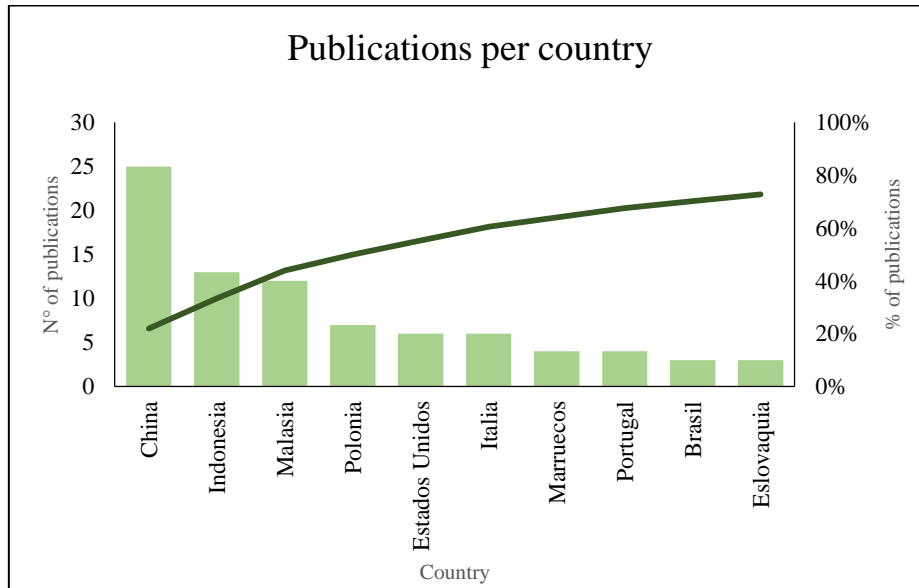


Figure 4. Publications per country

4 DISCUSSION

In terms of key terms, Fig. 5 shows the terms geotourism and sustainable development, for which, as indicated by Piranha et al. (2011), geotourism has become a strategy for tourism-related development, especially with the emergence of geoparks based on geodiversity with special emphasis on sites of special aesthetic and scenic value, and highlighting the vast potential for improving the local economy. In this sense, educational processes are integrated from training guides and personnel in the territory and developing strategies for the education of visitors..

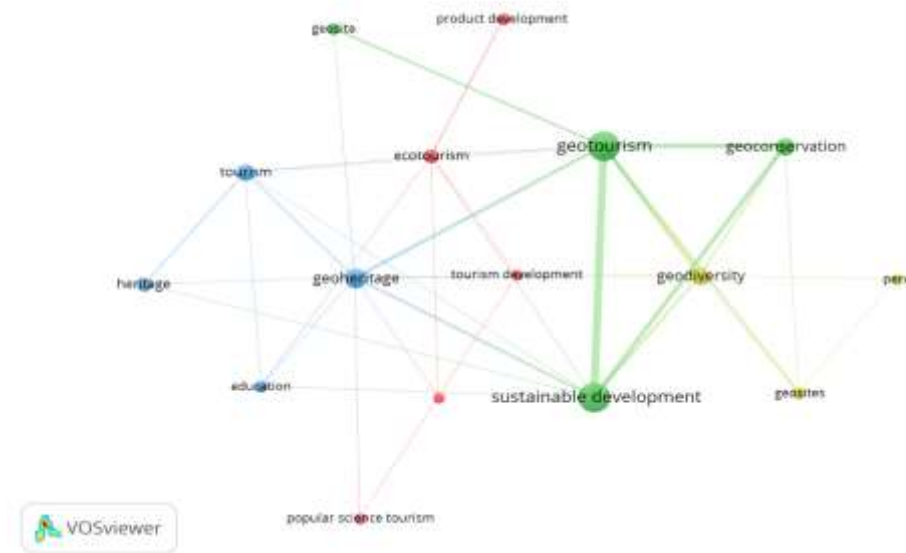


Figure 5. Network of keywords

In addition, Herrera et al. (2018) state that it is necessary to maintain geodiversity and natural heritage while still supporting current tourism activities by promoting the conservation and enhancement of resources in a territory for sustainable development in rural communities. Another relevant term is geoconservation, where Ríos et al. (2020) propose that establishing a site as a geopark is a strategy that allows geoconservation, starting from a holistic view between knowledge dissemination, exploration, and awareness creation. In addition, Wang et al. (2019) highlight that geoparks also become a geopatrimony of great scientific value that

is of interest for both education and tourism and favors the promotion of geodiversity, geoconservation, and geotourism.

Education has a direct relationship with geological heritage, promoting its importance within the cultural and social processes of the region. In this way, tourism based on geological heritage manages to promote destinations by offering experiences characterized by having an informative aspect so that visitors can interact with history and culture (Azman et al., 2011). Advances are found in terms of the development of programs to encourage geological and cultural heritage through programs that encourage the conservation of traditions and resources, such as the experience in India developed by Shekhar et al. (2019), where it is evident that the educational actions of the geopark allow the generation of positive impacts of inhabitants and visitors on the importance of the heritage in the geopark.

5 CONCLUSIONS

The topic is of interest to the academic community due to the growth that could be observed, as well as how it has been developed since 2005, which is in line with the boom that geoparks have had as conservation and sustainable development figures.

Asian countries are the ones that have made the greatest progress in this area because China is the main country in the subject, and it is the one that also has the largest number of geoparks in its territory. European countries also stand out due to their experience in managing geoparks within the network of geoparks in these regions.

Geoparks work as centers for developing conservation dynamics, economic and social aspects driven by educational initiatives, and dissemination of knowledge to the communities and visitors.

Sustainable development and geotourism are two aspects of great importance for the geoparks, being issues that holistically energize knowledge strategies and continuous work within the communities that benefit from the activities of the geoparks.

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