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Sustainable regional growth through astrotourism

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Objectives | Astrotourism is a form of tourism that focuses on the observation and appreciation of the night sky and astronomical phenomena. It involves travelling to places with low light pollution where these can be seen with great clarity and detail. This type of tourism is particularly popular among astronomy enthusiasts. It also attracts people seeking unique experiences in contact with nature and the cosmos. Astrotourism is a segment of nature tourism that allows visitors a direct connection with nature, the promotion of ecological awareness and the minimization of light pollution and its negative effects (Falchi et al., 2011; Fayos-Solá et al., 2014). It is sought by tourists interested in observing and appreciating naturally occurring celestial phenomena (Weaver, 2011), with knowledge and expertise of the celestial part of nature and the unique characteristics of the destination (Eagle, 2014). The most attractive activities are stargazing and star counting, observation of the sky and cloud formation or vibrant sunsets (Jacobs et al., 2020).The main objectives of this research are to characterize the impact of astrotourism on the development of regional sustainable tourism and to understand the feasibility of implementing an astrotourism product in the Arouca region, which has valuable endogenous resources, great geological wealth, and places with low light pollution, thereby facilitating the development of an astrotourism product and enhancing the attractiveness of the destination.

Methodology | The use of the qualitative case study method, combined with direct and participatory observation, allowed the analysis of relevant documents, the comparison of successful practices in similar destinations and direct collaboration with the AGA entity.

Main results and contributions | This study highlighted the crucial role that astrotourism can play in environmental education and the preservation of the night sky. The Arouca Geopark can serve as an important center for raising awareness about light pollution and associated negative impacts, promoting sustainable lighting practices in the region. Thus, the results of this study provide a solid basis for the successful introduction of astrotourism in Arouca, culminating in the elaboration of a project proposal to be implemented. By taking advantage of the potential of the

region's night sky and promoting sustainable practices, Arouca Geopark can stand out as a recognized astrotourism destination.

Limitations | The successful implementation of astrotourism will require significant investment and collaboration, despite the detailed research and documentary analysis that has been carried out. In this case, it will be necessary to establish partnerships with astronomy experts to obtain more knowledge and better measurements concerning light pollution, as well as to develop astronomical stories and explanations to enrich the astrotourism offered in the Arouca Geopark. For future studies, it is recommended to carry out more comprehensive research on the economic impact of implementing this astrotourism project in the Arouca Geopark. This should consider variables such as the creation of local jobs, the increase in tourism revenues and the influence on the region's trade and services. Furthermore, it is crucial to develop detailed marketing strategies considering market segmentation, effective communication channels and strategic partnerships to attract visitors from different regions and markets, consolidating Arouca Geopark's positioning as an astrotourism destination of excellence.

Conclusions | By exploring the basic concepts of tourism, it was possible to understand its role in regional development, particularly the positive impacts of tourism in the Arouca region, highlighting its ability to boost the local economy, create new jobs and promote the conservation of cultural and natural heritage (Folinas & Metaxas, 2020; Smith et al., 2010; UNWTO, 2008). There is a growing understanding of astrotourism, an emerging sector of the tourism industry that involves travelling to places where astronomical phenomena can be observed with specialized equipment. It provides an opportunity to escape urban areas and enjoy the freedom associated with the night sky (Ibbotson, 2021). By studying the characteristics of astrotourism and the factors that motivate visitors to seek out this experience, it has been possible to identify emerging trends and patterns of behavior among astrotourists. This knowledge is crucial in defining strategies for the development of astrotourism in the Arouca region. Carrying out this case study was necessary to gain an in-depth perspective on the subject, to draw conclusions with potential applicability to the context of the Arouca Geopark, and to gather data and information for the development of a prototype project. The main objectives of the study were to characterize the potential contribution of astrotourism to the development of regional tourism and to understand the feasibility of implementing an area dedicated to astrotourism in the Arouca region, which can be said to have been achieved. We have been able to provide a comprehensive analysis of the feasibility and benefits of implementing this project, as well as a proposal for it, thanks to the literature review, documentary analysis, benchmarking analysis, and valuable collaboration with the AGA. The proposed project outlines the most suitable locations for the installation of astrotourism products. It also outlines the activities and experiences to be developed there. In addition, the project

outlines the partnerships to be developed and the promotional plans to be implemented, bearing in mind the profile and motives of tourists visiting the area. Several basic conclusions were drawn from this study: Firstly, the Arouca Geopark has astronomical potential, with areas of low light pollution, points of great geological interest and a rich cultural heritage. These provide a favorable environment for meaningful astrotourism experiences. In addition, this destination is an ideal setting for combining astronomy and tourism due to its strategic location and the commitment of local stakeholders to sustainable development. There is a positive response from the target audience, which is in search of innovation and novelty, adventure, and a connection with nature. The Arouca Geopark is well placed to meet this demand for authentic and immersive astronomical activities and experiences. For the development of astrotourism in the Arouca Geopark, this study has also made a practical contribution. Unique activities and experiences have been suggested, such as night observations, astronomy workshops and star stories. These can be implemented to enrich the visitor experience and create a competitive advantage in the astronomy tourism market. The importance of creativity, imagination and substantial investment in applied research and innovation as pillars of this type of project is also evident from the analysis of the experiences of other astrotourism destinations. Anticipating future trends, establishing strategic partnerships, and programming innovative initiatives should be an ongoing concern. A culture of idea generation should be cultivated and a high level of involvement of partners and the local community maintained. This will ensure that the project is dynamic and adaptable to changes in needs. This work has not only provided valuable insights into the need for environmental awareness and protection of the night sky but has also outlined practical strategies for implementation. The Arouca Geopark is positioning itself as a driving force for change by playing a leading role in educating the public about light pollution and its negative effects. By promoting sustainable lighting practices, it is not only protecting its own natural heritage. It is also setting an exemplary standard for other areas facing similar challenges. This commitment to sustainability not only guides the local community, but also inspires future destinations seeking to balance development and heritage conservation.

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