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Evaluation of Geotourism Potential of Karst Landforms Using the Renard Method(Case Study: Azarshahr Township)

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Abstract

Background and Objective: Geomorphosites are a novel concept in tourism studies, emphasizing unique locations with scientific, ecological, cultural, aesthetic, and economic values. In recent years, geotourism and geomorphotourism have emerged as highly appealing concepts, attracting a diverse range of individuals with varied interests, as well as governments, environmental groups, and conservation organizations. The aim of this study is to evaluate the geotourism potential of karst landforms in Azarshahr Township using the Reynard method.

Methodology: For this purpose, field surveys were conducted to assess two main criteria: scientific value, added value, and a composite value. The scientific value comprises conservation status, rarity, representativeness, and paleogeographic significance, while the added value includes cultural, historical, religious, geohistorical, and economic values. The composite value encompasses global significance, educational value, threats, and management measures.

Results and Findings: The findings revealed that the geomorphosites in the region scored highest in the main criteria as follows: scientific value (0.53), composite value (0.47), and added value (0.34). Among the sub-criteria, educational value (0.79), paleogeography and geohistory (0.75), and threats (0.70) received the highest scores. In terms of geotourism potential, the examined landforms—travertines, springs, and caves—demonstrated the highest capacity to attract tourists across the three evaluation criteria (scientific value, added value, and composite value).

Keywords: Azarshahr, Geotourism potential, karst landforms, scientific value, added value.

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Extended Abstract

Introduction

Geotourism or tourism has expressed new solutions for explaining and describing earth sciences and recognizing the natural capital of each region (Abedini et al.: 1402). Geotourism is a contemporary and modern phenomenon that has been known around the world since the late 1980s. In recent years, geotourism has become a very attractive concept that attracts a wide range of people with different interests, as well as governments, environmental groups and conservation and preservation groups (Ghanouti et al., 2012). Geotourism is often considered a form of nature-based tourism, mainly geomorphological. Geotourism relies on places of interest to geologists. Geotourism can be a powerful tool for sustainable development, but if not managed effectively, it can be a direct threat to geological heritage (Newsom, Dowling6, Liu7, 2012). Interest in geotourism is growing rapidly around the world, but little has been published about its opportunities, impacts, and implications for protected areas (Dowling and Newsom, 2010). Geotourism and geomorphotourism are specific forms of tourism in which geosites and geomorphosites are the focus of tourist attention. A geosite can be a landscape, a group of diverse landforms (landforms), or a single landform, a rock outcrop, as well as fossil beds or a particular fossil. It is one of the new areas of study in the earth sciences and tourism studies that is based on the recognition of special geomorphological sites (Reynard, 2007). Karst zones react differently in the face of diverse effective factors and the complexity of their mechanisms in relation to each other and with regard to their role in the evolution and sensitivity of karstification (Abedini et al., 2015). Geological and geomorphological diversity plays a key role in the environment and human activities. This set of relationships between geology, natural processes, shapes, landscapes, soil and water, and meteorology is essential for the distribution of habitats, species, and the provision of many natural resources essential for the economic growth of society.

Research method

This research was conducted with the Reynard method to prioritize the tourist attractions of Azarshahr County. Therefore, in terms of purpose, it is of an applied type, and in terms of nature and method, it is of a qualitative research type, and in terms of data collection, it is a field documentary study. In each research, specific materials and methods are used based on its subject and objectives. In the present research, first documentary studies (library studies), a review of published scientific research, geological and topographic maps were conducted. Then, field visits, identification of geomorphological features, surveys of geological and geomorphological researchers, indigenous people, and tourists were conducted to evaluate and analyze the geomorphosites of Azarshahr karst forms using the Reynard method (scientific value, added value, and combined value). Each of the three sections is classified into other sub-criteria. The quantitative value range of each sub-criteria is between zero and one, with zero representing the lowest value and one representing the highest value.

The main discussion

In this regard, the fuzzy ideal option similarity technique was first described, and then the data was analyzed: In the ideal option similarity method, objective and subjective indicators and criteria can be used simultaneously (Pour Taheri, 2009: 114) and in addition, since the TOPSIS model gives the best results in relation to ranking (Faraji Sabqbar, Reza Ali, 2009: 81), this method is known for ranking selected tourist attractions. Fuzzy ideal option similarity is a method in which the matrix elements or weights belonging to each indicator are expressed in a fuzzy form, which is itself an argument for the reason for using the fuzzy Delphi method in the evaluation of indicators (because the fuzzy Delphi method gives the

results in a fuzzy form). To perform TOPSIS operations in a fuzzy manner, different methods can be used, the most common of which is the ((Chen and Huang)) method.
The results of the model implementation showed that, based on the criteria and calculations, the mineral spa, located inside the city of Bostan Abad and in the Eski Kand neighborhood, which is one of the tourist attractions of East Azerbaijan province in all seasons, ranked first with a score of 530, and Qorigol Lake (meaning dry wetland), which is located 15 kilometers west of the city of Bostan Abad, adjacent to the village of Yousef Abad. With a score of (0.527) in second place, Ghar Agh Bulaq, which is located in the south of Qarachaman village in Bostan Abad county and is a type of stalactite cave, with a score of (0.478) in third place

Conclusion

Karst landforms of Azarshahr city have special and extraordinary features in terms of geomorphosite diversity. In this study, an attempt was made to use the method of Renard et al. to evaluate a selection of geomorphosites (travertines, springs, cairns, limestone cobblestones and cracks, dolines and caves) to determine sustainable tourism capabilities, investment priorities, and limitations. Based on the results obtained, in terms of importance and value, the geomorphosites of Azarshahr karst landforms have a great scientific value compared to the added and combined value, which is due to the lack of accommodation facilities and facilities of the Ministry of Construction, investment, appropriate management and protection, the existence of a systemic and forward-looking attitude, and information and advertising databases. Comparison of the obtained values shows that the overall scientific value (0.53) of the geomorphosite is higher than the combined value (0.47) and added value (0.34), which indicates a lack of investment and proper management to maintain and attract tourists for economic income. In all three scientific, added and combined values, travertines, springs and caves are prioritized with an average score of (0.70), (0.49) and (0.44), respectively. In the sub-criteria, educational value (0.79) and ancient geography (0.75) have the highest importance and religious value (0.25) and artistic and literary value (0.25) have the lowest importance. In terms of completeness, being significant, rarity, ancient geography, ecological impact, aesthetic, cultural and economic value, global value, educational, threats and management measures are the priority of geotourism potential. Among the criteria, education and ancient geography have the highest importance due to the importance of geomorphology for educating students and scholars, showing past climates (glacial and pre-glacial periods), and religion, art, and literature have the lowest importance due to their low scores in terms of prominence in mythology, mysticism, art and literary books, painting, and sculpture.

Declarations

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References

Abedini, M. Cheraghi, M., Eqbal, M. R (2015), Investigation of effective factors in the formation of sinkholes in karst formations using a multivariate linear regression model in ArcGIS and SPSS environment (Case study: Bisotun-Parav unevenness, Geography and Environmental Planning. 26(4) 62-41.

Abedini, M., Nazari-Gazik, Z., (2014), Analysis of land subsidence rate and its effects on tourism geomorphosites of Shandiz tourist city, Khorasan Razavi, Quarterly Journal of Quantitative Geomorphology Research, 12(4), 171-192.

Abedini, M., Sheikh Mohammadi, B., Pasban, A., (2013), Evaluation and analysis of geotourism potential of Germi city using long-range and ecological models, Tourism Space Journal, 12(12) 48, 1-24.

Ahmadi, H. (1999), Applied Geomorphology, Volume 1, Water Erosion, Compiled by Tehran University, 688 pages.

Ahmadi, H. Faiz-Nia, S. (1992), Quaternary Formations, Compiled by Tehran University, 607 pages.and Management, Chapter 11,372-400

Baioni ,D.Tramontang ,M ,2015, Evaporite karst in three interior layered deposits in Iani Chaos, Mars,Geomorphology 245 (2015) 15–22

Bayati-Khatibi, M. (2009), Geotourism, a new approach to utilizing geomorphological attractions (case study of Ghar-e-Kordestan), Scientific and Research Journal of Geographical Space, 10(29) 50-27

Carrión-Mero, P., Sánchez-Zambrano, E., Mata-Perelló, J., Jaya-Montalvo, M., Herrera-Franco, G., Berrezueta, E., ... & Morante-Carballo, F. (2024). Geosites assessment in a volcanic hotspot environment and its impact on geotourism, Santa Cruz-Galapagos Islands, Ecuador. International Journal of Geoheritage and Parks, 12(1), 147-167.

Comanescu , L.Nedelea,A.Dobre,R,2011,Evaluation of geomorpho-sites in VisteaVally(Fagaras Mountains- Carpathians Romania)International Journal of the Physical Sciences. 6:1161-1168

Dewar ,K,2015 , Geotourism: the tourism of geology and landscapes and Global geotourism perspectives ,Book reviews,Journal of Heritage Tourism 177-179

Dowling ,R.Newsome ,D,2011, Global geotourism perspectives, Book Reviews / Tourism Management 32 :1484–1490

Fakhri, S and Alizadeh, M. Rahimi, S (2012), Evaluation of tourism potential of Makran coast geomorphosites using the Reynard method, First National Conference on Makran Coast Development, Chabahar Maritime University, Konarak.

Fathi, M and Ashrafi, Z. Khaliji, M (2013) Evaluation of tourism potential of historical buildings in Tabriz, Quarterly Journal of Geography and Urban Planning, Zagros Landscape, 5(18) 123-107

Geographical Organization of the Armed Forces (1987); Topographic Map of Shiramin with Scale 50000:1

Geographical Organization of the Armed Forces (1987); Topographic map of Azarshahr with a scale of 50000:1

Geographical Organization of the Armed Forces (1991); Topographic Map of Tabriz, Sheet NJ380, Series with Scale 10250000

Ghadirzadeh, A (2002); Geological map of Azarshahr with a scale of 1:100000, Geological Organization of Iran

Ghadirzadeh, A. Soltani, S (2008), Investigation of the possibility of hidden water-bearing dissolution cavities in the Azarshahr region, Water and Environment Journal, (70) 726-19

Ghanbari, A. Hejazi, A (2013), Evaluation Geotourism potential of geomorphological sites in Kandovan village, Housing and Environment Journal, (141) 122-108

Ghanbari, A. Roustaei, S. (2012) Evaluation of geotourism potential of Azarshahr County using the Prolong method, Scientific-Research Quarterly of New Attitudes in Human Geography, 4(4) 33-49

Ghanvati, A., Karam, A. Fakhari, S. (2012) A review of the trends of geotourism developments and the models used in Iran, Geographical Quarterly of the Land, 9(34) 75-91

Hose,Thomas A. ,2012, 3G's for Modern Geotourism,Geoheritage 4:7–24

Jadari-Eyvazi, J. Mehri, M. (2012), Geotourism evaluation of geomorphological sites in Marand County using the scientific and added value method, First Iran Tourism and Nature Tourism Conference.

Jalali, T. Abedini, M. Balazadeh, M. (2012), Evaluation of Geotourism Capabilities of Azarshahr Using the SWAT Method, First Conference on Sustainable Development in Arid and Semi-Arid Regions, Abarkooh

Lucie ,K ,2013 Geomorphosite assessment for geotourism purposes. Czech Journal of Tourism, 2(2), 80-104.

Mahmoudi, F. (2010) Structural Geomorphology, Payam Noor Publications, 152 pages.

Moghimi, Ebrahim et al. (2012) Geomorphotourism and feasibility assessment Road geomorphosites using the Perry-Yara method (Case study: Qom-Kashan Expressway), Applied Research in Geographical Sciences, 12(27)183-165

Mukhtari, D. (2010) Evaluation of ecotourism potential of geomorphic sites in the Asyab Kharabeh watershed using the Prolong method, Quarterly of Geography and Development, (18) 27-52

Najafi Esmail, Ahmadi Dehrashid, and Parsa. (1402). Identifying geotourism potentials and developing a strategic plan for the prosperity and development of sustainable geotourism (Case study: Dehgolan County). Geographical Studies of Mountainous Areas, 4(1), 127-148.

Newsome, D. Dowling, R. Leung, Y,2012, The nature and management of geotourism: A case study of two established iconic geotourism destinations, Tourism Management Perspectives 2–3 : 19–27

palaeoenvironmental reconstructionsGeomorphology 229 (2015) 1–2

Panizza , M,2001, Geomorphosites: Concepts,methods and examples of geomorphological survey, Chinese Science Bulletin Vol. 46,pp2-4

Pelfini , M. Bollati, I,2014, landforms and geomorphosite ongoing changes:concepts and implications for geoheritage promotion, quaestiones geographice 33(1):131-143

Pereira,p. Pereira,D.Ceatano,M.Braga,A,2007,Geomorohosite assessment in MontesinhoNatur al park(Portugal) ,Geographica Helvetica jg. 62 /Heft 3

Pralong,J-P,2005,A method for assessing tourist potential and use of geomorphological sites method pour evaluation du potential et de utilization touristiques de sites geomorphologiques,geomorphologie:relief ,processes,environment.Vol.3,pp:189-196

Reynard, E. Coratza,P. Giusti ,C,2011, Geomorphosites and Geotourism, Geoheritage 3:129–130

Reynard, E,2007, A method for assessing «scientific» and «additional values» of geomorphosites,Geographica Helvetica Jg. 62 /Heft3,:148-158

Rostaei, S. et al. (2012), Comparative Evaluation of Geomorphological Capabilities of Marand and Varzeghan Waterfalls Using the Scientific and Added Value Method, Quarterly Journal of Tourism and Future Perspectives, 3 (40) 60-51

Sari Saraf, B. (1988), Geomorphological Research of the Western Range of Sahand, Master's Thesis, University of Tabriz

Sellier ,D,2015, A Deductive Method for the Selection of Geomorphosites:Application to Mont Ventoux (Provence, France) , GeoheritageDOI 10.1007/s12371-015-0144-1

Shayan, S. Vazare, G. Khalili, S. (2012), Evaluation of the added scientific value of tourist sites based on the Renard method (Case study: Gyan Hill, Nahavand Plain), Journal of Tourism Planning and Development. 1 (2)23-8 .

Stokes,T.Grffiths,P.Ramsey,C,2010 ,376 Karst Geomorphology, Hydrology,
Taghipour, K. and Mohajal, M. (2013) Structure and formation of travertine ridges in Azarshahr, Iranian Geological Quarterly, 7(25) 15-33
Tamang, L., Mandal, U. K., Karmakar, M., Banerjee, M., & Ghosh, D. (2023). Geomorphosite evaluation for geotourism development using geosite assessment model (GAM): A study from a Proterozoic terrain in eastern India. International Journal of Geoheritage and Parks, 11(1), 82-99.
Tavusi, M. Razavi, S. A. (2004), Geophysical report on the RS method for exploring hidden cavities in the Pirchopan region, Geological Organization of Iran.
Waele.D,J , 2015, Karst geomorphology: from hydrological functioning to
Yamani, M. Negehban, S. Rahimi, S. (2012) Geomorphotourism and comparison of geomorphosite evaluation methods in tourism development (Case study: Hormozgan Province), Journal of Tourism Planning and Development, 1(1)104-83