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ABSTRACT BOOK

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Gonzalo Lozano, Javier Luengo, Ana Cabrera and Juana Vegas

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Inventories of geomorphological heritage: a review of the Brazilian scientific publications

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Introduction

In the last decades, many methods to select and assess geoheritage have been developed. Whereas the geoconservation is based on several actions, the inventory is considered the first and crucial step to promote the use and conservation of geosites (Brilha 2016). Since the first research on geoheritage studies, Physical Geographers and Geomorphologists stand out as the geoscientists involved in promoting the early investigations in the topic, highlighting the importance of the geomorphological features (Coratza and Hóblea 2018).

The literature review carried out by Mucivuna et al. (2019) presented an overview of methods of inventory and quantitative assessment of geomorphosites based on available papers in the international database. The authors stressed that the criteria to select geomorphosites are often unmentioned in the papers. Despite that, the methodological procedures are often described and have a common pattern, including the literature review, interview with researchers, analysis of maps and fieldwork.

Geoheritage and geoconservation are widespread topics in Brazilian scientific production (Romão and Garcia 2017; Ruchkys et al. 2017). However, an overview of studies dealing particularly on geomorphological heritage is still missing. Considering the importance of including the specificities of geomorphological heritage in the Brazilian inventories and the discussion about specific methods for assessing it, this work aims to analyse the scientific research on geomorphological heritage in Brazil and the methods used in the inventory.

Methodological procedures

The selection of scientific publications on geomorphological heritage in Brazil was made based on the following procedures:

- i. The bibliographic review was carried out using the following keywords in the title: *patrimônio geomorfológico*, *geomorfossítio*, and *local de interesse geomorfológico* and the correspondents in English: geomorphological heritage, geomorphosite, and site of geomorphological interest. The following online databases was used to select the publications: Journal Portal of the Coordination for the Improvement of Higher Education Personnel (CAPES), Brazilian Digital Library of Theses and Dissertations (BDTD), CAPES Digital Bank of Theses, Science Direct, and the Google Scholar.
- ii. The scope of this research was restricted to analyse thesis, dissertations, and peer-reviewed papers. Despite being an important source of information about research on geomorphological heritage, conference proceedings were excluded since many of them are not available online. Additionally, there is some difficulty to access these data, as there is no platform that gathers the proceedings of different events. To avoid a biased approach based on limited national events, we chose not to include them in our survey.
- iii. The bibliographic review was finished on March 2021, and around 40 publications were selected and analysed. The criterion used to include research in our analysis is related to the description or not of a systematic inventory of geomorphosites in the Brazilian territory.

Results and discussions

The results showed that 14 scientific publications on the topic were carried out between 2013 and 2020, with a relative increase since 2015 (3 publications), 2017 (4 publications), and 2020 (5 publications). Gaps in this scientific production were verified in 2014, 2016 and 2018, and only one publication per year was found in 2013 and 2019. In addition to these researches, 2015, 2017 and 2020 stand out due to the development of Brazilian quantitative methods to assess geomorphological heritage.

Concerning the geographic distribution, there are concentrated in six states of Brazil: Northeast (Paraíba, Piauí, and Rio Grande do Norte), Southeast (Minas Gerais and Rio de Janeiro), and South (Paraná). Half of the analysed publications are dissertations and thesis, showing the development of the topic in Brazilian post-graduate programmes.

The analysis of the methods applied in the inventories showed that the main procedures used were literature review, fieldwork, and analysis of satellite images and maps. These procedures were also identified as the most common in the review carried out by Mucivuna et al. (2019). Some procedures are less frequently used, such as the creation of a working group to select the geomorphosites and the definition of frameworks or categories in the geomorphological context. Although the use of definite criteria for selecting geomorphosites provides clarity and a more objective procedure, many authors do not explain the reasons to include or not a specific geomorphosite in the inventory. The results show that nine publications are more transparent with the criteria applied. The main criteria used for the selection of geomorphosites were: i) scientific relevance and some aspects associated with, such as scientific knowledge, representativeness, rarity, and integrity; ii) touristic and didactic potentials, analysed through attributes such as accessibility, aesthetic, infrastructure, visibility, and safety; iii) cultural and ecological interests, which are related to the local geomorphology and geology. On the other hand, a criterion used in the exclusion process was the high degree of anthropisation.

The small number of scientific publications found in our survey is probably associated with the relatively recent character of geoheritage research in Brazil. Being the first thesis published in 2007 (Romão and Garcia, 2017), only in 2013 some research began to focus on the specificities of geomorphological heritage. The analysis of publications concerning geomorphological heritage in Brazil was crucial to emphasise the increase of interest in the topic, especially after 2017. Procedures such as the adaptation of international methods and the proposition of new ones, which are being commonly in Brazilian research, reflect the efforts of the scientific community to develop inventories of geomorphosites.

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