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How protected are geosites in protected areas? An analysis from the geoheritage of the state of São Paulo, Brazil

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Introduction

Conserving geoheritage is a mission related in the first place to the conservation of geosites. Once selected, a diagnosis on the specific needs regarding conservation should consider potential use, physical and setting characteristics and sort of possible threats (Prosser et al. 2018). In this sense, criteria such as statutory protection and proximity to potentially damaging areas are often used to quantify the risk of degradation (Brilha 2016, García-Cortés and Carcavilla-Urquí 2009). In protected areas (PA), conceived to be key pieces of nature conservation strategies, these indicators seem to reach the most satisfactory conditions concerning the maintenance of the relevant elements of geodiversity that legitimise the geosite. But, is this really true?

Protected areas are well recognised tools to achieve the conservation of nature. Several international PA designations exist, such as the Convention on Biological Diversity (CBD), the World Heritage and Ramsar conventions and UNESCO's programmes Man and the Biosphere and Global Geoparks. Besides these global strategies, regional and local programmes, sometimes integrated as networks, exist all around the world. The recent concept of Other Effective Area-Based Conservation Measures (OECMs, Maxwell et al. 2020) is an approach to be also considered.

In Brazil, there are 3.202 protected areas at both international and regional contexts and terrestrial and marine environments (UNEP-WCMC and IUCN 2021). In the state of São Paulo, the inventory of geoheritage identified 137 geosites within 8 geological frameworks, many of them potential candidates for the national inventory (Garcia et al. 2018, Ribeiro et al. 2021). About half of these sites are located in areas without any statutory protection (Higa 2019). This study aims to answer the following questions: 1) What proportion of geosites are included in one or more protected areas? 2) To what extent do these designations ensure the conservation of the geosites?

Methods and results

The geosites were analysed according to the following programmes: 1) International initiatives - UNESCO Man and Biosphere Programme - MAB (Biosphere Reserves), Global Geoparks and World Heritage List, the Ramsar Sites; 2) National and local initiatives - the National System of Protected Areas (SNUC, Federal Law 9985/2000); the Forestry Code (Federal Law 12.651/12); the Protected Heritage (Decree Law 25/1937); the Indigenous areas (1988 Constitution, Federal Law 6001/73, Decree 1775/96) and the State Geological Monuments (Resolution 64/2011). We also analysed their inclusion in Geopark Projects, linked to the Geological Survey of Brazil (SGB-CPRM) and in the list of the Brazilian Commission of Geological and Paleobiological Sites (SIGEP, in Portuguese).

Our results show that more than 70% of the geosites are located in public spaces. About half of them present at least one statutory figure, either international (Fig. 1A) or national/regional (Fig. 1B), but nearly 20% of them are included in more than four superposed PA. Additionally, from the 137 geosites, 21 are published in both geoparks projects and SIGEP.

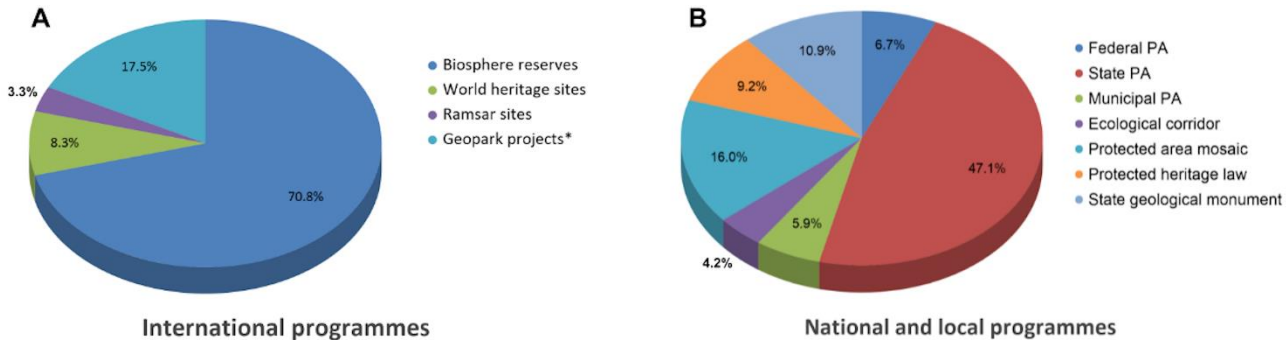

Fig. 1. Situation of the geosites of the inventory of geoheritage of the State of São Paulo, Brazil, regarding their location in International PA (A) and National PA (B). Note that many sites are included in more than one PA. *Sites included in geoparks projects, which are not Global Geoparks (only as reference).

Discussion and conclusions

About 90% of the terrestrial protected areas in the state of São Paulo are located along a 100 to 150 km-wide zone by the coast, which are coincident with the oldest geological units, represented by Precambrian rocks. The majority of the area (about 70%) is composed of sedimentary and volcanic sequences, associated with highly damaging agribusiness activities in the countryside. Even when protected by any statutory criteria, some geosites may be very vulnerable, being subjected to several anthropic threats. In the case of the SNUC, the PA are classified as strictly protected and sustainable use, being the effectiveness of the protection greater in the former, with a significant impact on the risk of degradation of specific geosites, especially considering the vulnerability factor. One example is the geosite "Jaraguá Gold Excavations", located within two biosphere reserves and a local heritage site. Being settled in an area extremely threatened by uncontrolled occupation in the city of São Paulo, most of their remnants were already destroyed. However, apart from some particular examples, the location of a geosite regarding protected areas doesn't seem to have a significant impact on its risk of degradation, which is related mainly to its fragility and to specific laws, such as the Forestry Code. This brings attention to the role of the PA in the conservation of geosites and moreover, on the institutionalisation of these areas as efficient instruments to be used in environmental public policies.

References

Brilha J (2016) Inventory and quantitative assessment of geosites and geodiversity sites: a review. Geoheritage 8(2):119–134. https://doi.org/10.1007/s12371-014-0139-3.

Garcia MGM, Brilha J et al. (2018). The inventory of geological heritage of the State of São Paulo, Brazil: methodological basis, results and perspectives. Geoheritage 10(2):239-258. https://doi.org/10.1007/s12371-016-0215-y

García-Cortés A., Carcavilla Urquí L., (2009). Documento metodológico para la elaboración del inventario español de lugares de interés geológico (IELIG). Instituto Geológico y Minero de España, Madrid, v. 12, 61 p.

Higa KK. 2019. Geoconservação no estado de São Paulo: panorama geral e diagnóstico de uso e proteção dos geossítios do inventário do patrimônio geológico. MSc Dissertation, IGc/USP.

Maxwell SL, Cazalis V, Dudley N. et al. (2020). Area-based conservation in the twenty-first century. Nature 586:217–227. https://doi.org/10.1038/s41586-020-2773-z

Prosser CD, Díaz-Martínez E, Larwood JGH (2018) Conservation of geosites: principles and practice. In: Reynard E, Brilha J (ed) Geoheritage: assessment, protection, and management. Elsevier, pp 193-212.

Ribeiro LMLA, Garcia MGM, Higa K. (2021). The geological heritage of the state of São Paulo: potential geosites as a contribution to the Brazilian national inventory. Journal of the Geological Survey of Brazil 4(SI 1). https://doi.org/10.29396/jgsb.2021.v4.SI1.5

UNEP-WCMC and IUCN (2021). Protected Planet: The World Database on Protected Areas (WDPA) and World Database on Other Effective Area-based Conservation Measures (WD-OECM) [Online], April 2021, Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net.