



Geodiversity Hotspots: A Proposed Conceptual and Methodological Framework for Defining Geoconservation Priorities

François Bétard

Univ Paris-Diderot, Paris, France (francois.betard@univ-paris-diderot.fr)

For two decades, geoconservation has been driven by the need to conserve geodiversity considering its values or most valuable elements (i.e. geoheritage) facing the internal or external threats to it, mainly associated with human activities causing damages or irreversible destruction of sites. One main difficulty arises in how geoconservation priorities can objectively be identified at larger scales (e.g., state or region levels). Inspired by experiences in biological conservation, I propose a new conceptual and methodological framework for the identification of geoconservation priorities by theorizing and applying the concept of “geodiversity hotspot”. Drawing an obvious parallel with the “biodiversity hotspot” concept first introduced in 1988 by the British ecologist Norman Myers, geodiversity hotspots are here defined as geographic areas that harbour very high levels of geodiversity while being threatened by human activities.

From a methodological viewpoint, a basic analytical procedure is proposed to map geodiversity hotspots at a national or regional scale, that can be used as a tool to support decision-making and land-use planning. The method is based on the numerical processing and mapping of two indices: geodiversity index and degree of potential threat. The geodiversity index is calculated using a GIS environment as the sum of four sub-indices representing the main components of geodiversity, i.e. geological diversity (rocks, minerals, fossils), geomorphodiversity (topography and landforms), pedodiversity (soils and palaeosoils) and hydrodiversity (rivers, lakes, springs. . .). The degree of potential threat is a graduated scale inversely proportional to the level of protection, from high degree of potential threat in areas without any protection status to low degree of potential threat in areas with high protection level (e.g., national parks, nature reserves). The mapping and delineation of geodiversity hotspots can automatically be obtained from a combination of the two main criteria, i.e. in areas where high geodiversity indexes meet with high degree of potential threat.

This area-based approach is discussed along with the risk of neglecting some areas such as “geodiversity coldspots” which may have other types of conservation value. Selected examples from Northeastern Brazil, with a special focus on the Araripe Basin geodiversity hotspot including the eponymous UNESCO Geopark, concretely showcase the conceptual and methodological framework proposed above. Such an example also illustrates the spatial congruence that often exists between geodiversity hotspots and biodiversity hotspots, in a region where very high levels of geodiversity overlap exceptional concentrations of endemic species and present-day biodiversity (Atlantic Forest and savanna-like Cerrado biomes). These observations reinforce the need to assess geodiversity not only for itself, but also to support biodiversity research and actions programs, and should encourage researchers and practitioners to develop more integrated approaches to nature conservation and sustainable land management.