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GEOHERITAGE AND GEOCONSERVATION: THE CHALLENGES

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The set of chapters that constitutes this book covers all the major topics related to geoheritage and geoconservation that have been intensively developed over the last three decades (see [Larwood et al., 2013](#)). It would simply not have been possible to write this book 20 years ago, involving so many experts dispersed on all continents and with such different work experiences.

This closing chapter intends to give some hints about the future of geoheritage and geoconservation in three stages of intervention: international, national and local. The starting point is the establishment of a baseline concerning the present status of these topics, in these same three stages, based on the personal perspective of the authors and taking into account not only the previous chapters but also many other published works.

THE PRESENT SITUATION

INTERNATIONAL STAGE

The establishment of the International Geoscience and Geoparks Programme by UNESCO in November 2015 sets a global recognition of geoheritage by a prestigious international institution, well-respected by the vast majority of countries. This move forward strengthens the position of UNESCO regarding its support of the Global Geoparks Network, ongoing since 2004. The Global Geoparks Network with its 127 members (as of August 2017) gives a worldwide visibility to the importance of geoheritage, its conservation and sustainable management. Geoheritage is also vital in another UNESCO initiative: the Convention Concerning the Protection of the World Cultural and Natural Heritage, established in 1972. Presently, 90 properties in 50 countries are included in the World Heritage List due to the outstanding universal value of geoheritage, taking into account criterion (viii) of this convention.

In spite of recent advancements in the International Union of Conservation of Nature (IUCN) policy, there is still a lack of recognition of geoheritage in the international nature conservation

community. The three IUCN resolutions approved in the last three editions of the IUCN World Conservation Congress (Barcelona, 2008; Jeju, 2012; Honolulu, 2016) due to the lobbying work of IUCN members dedicated to geoheritage were an important step forwards (Brilha et al., 2016; Herrero et al., 2013). Other major initiatives were implemented by the IUCN's World Commission on Protected Areas (WCPA), namely with the establishment of a Geoheritage Specialist Group in 2014, which has produced a relevant chapter about geoheritage and geoconservation in protected areas, published in a manual for park managers (Crofts et al., 2015). Through its World Heritage Programme, IUCN is the advisory body on nature to the UNESCO's World Heritage Committee and is responsible for the assessment of new World Heritage applications that involve natural criteria, including the geoheritage-related criterion (viii) already mentioned.

The International Union of Geological Sciences (IUGS) has been taking a meandering path concerning geoheritage. After the initial Global Indicative List of Geological Sites initiative (GILGES), established in 1989/90 and later converted into the Global Geosites Project in 1996 (Wimbledon, 1996), the IUGS activity on geoheritage almost ceased in 2003. A new Geoheritage Task Group was created in November 2010 and in September 2016 it was merged with the Stone Heritage Task Group originating a new International Commission on Geoheritage with two sub-commissions: 'Heritage Stones' and 'Heritage Sites and Collections'. The International Geographical Union (IGU) also has a Commission on Geoheritage since 2007.

At the European Union (EU) level, geoheritage and geoconservation is still in the 'dark ages'. The whole EU nature conservation policy is based in just two directives – Birds and Habitats – which are sealed to anything else that is not directly related with biodiversity conservation. This narrowed and limited perspective of what should be a modern vision of nature conservation constitutes a major drawback to the development of geoconservation in European countries. With no EU policy on geoheritage and geoconservation, no funding is available to protect sites or to develop research.

Academia has probably been the most reactive body in recent years concerning these topics. The number of papers indexed by Scopus with the keywords 'geoconservation', 'geoheritage', 'geosite', 'geopark', or 'geotourism' has increased seven times in the last 10 years. In spite of the difficulty in calculating a precise figure, the number of Masters and PhD theses around the world focusing on these topics is certainly increasing, as is the number of scientific events. All major international and national geological and geographical scientific events have today thematic sessions on geoheritage. The creation of the scientific journal *Geoheritage* in 2009 was a major achievement and today it is the main international journal on the topic.

Finally, concerning international NGOs and scientific associations with experience on geoheritage and geoconservation, the European Association for the Conservation of the Geological Heritage (ProGEO) and the International Association of Geomorphologists (IAG) deserve a special mention. ProGEO has been promoting all topics related to geoheritage since 1993, namely promoting national inventories at the European level (Wimbledon and Smith-Meyer, 2012), pushing the topic inside IUCN and in other organisations, and also promoting the dissemination of scientific research based on its above-mentioned scientific journal *Geoheritage*. IAG has a working group on geomorphosites since 2001 with a vast amount of work done concerning the conceptualisation, evaluation, cartography, management and dissemination of geomorphosites (Reynard et al., 2009; Reynard and Coratza, 2013; Reynard et al., 2016).

NATIONAL STAGE

The status of geoconservation at the national level is very variable. There are countries with a good legal framework to protect geoheritage, with site inventories at the national scale and with public administrations responsible for the management of the most important sites. This rather positive perspective contrasts with countries where none of this exists and, of course, there are countries in an intermediate situation.

Even in countries where solid work has been carried out over several years, geoconservation is never a priority. This means that during periods of economic crisis, like the one that many countries are facing nowadays, geoconservation is one of the first national strategies to suffer cuts and disinvestment. The staff of national agencies dealing with geoheritage is reduced, some agencies are restructured or even closed and the number of projects for infrastructures or conservation actions is severely affected.

In general, nature conservation agencies that are responsible for the implementation of national policies and also for the management of protected areas are mainly focused on the conservation of fauna and flora (Brilha, 2002). This is due to the lack of awareness concerning the importance of geoconservation and also to the absence of international policies that could influence, from top to bottom, the conservation programmes in each country.

The dimensions of the geoconservationist community in each country are usually small. In general, these communities are constituted by a few geoscientists from universities and natural science museums, geological surveys and other national agencies, and also some postgraduate students. Due to the low critical mass, these small communities are very vulnerable to fluctuations in the work capacity of the leaders and therefore the outcomes of the geoconservation work is uneven.

In some countries with active geoparks, the activities carried out in these territories — geoconservation, education and geotourism — are sometimes the only ones that keep geoconservation alive in the respective country.

LOCAL STAGE

Depending on how the public administration is organised, in some countries there are good examples of geoconservation implemented by local administrations (the designations vary in each country, such as municipalities, counties, city councils) (Brilha, 2008). Quite often, local politicians are keen to conserve a certain geosite aimed at some publicity and visitors. However, local initiatives are totally dependent on personal efforts and sometimes they are not very consistent through time (for instance, the democratic change of representatives after local elections may block ongoing or planned initiatives).

BUILDING THE FUTURE

After setting up the general picture of geoconservation at the international, national, and local levels, which of course is always a generalisation that does not include particular cases, some challenges are presented below, following the same three levels of intervention. Answers to these challenges should not be expected, the aim is rather to point out possible trends for the future evolution of geoheritage and geoconservation.

INTERNATIONAL STAGE

The biggest challenge is to raise awareness of geoconservation in all relevant international institutions, hoping that this movement may then infiltrate, from top to bottom, to national and local public administrations.

Being a new UNESCO programme, there are quite a few open questions concerning geoparks: (1) How will geoparks adapt to 'live in this new ecosystem', now that they are formally under a UN organisation governed by the political interests of so many countries? (2) How can geoparks be sustainably expanded into new countries, maintaining the same principles and high-quality standards? (3) How can a unified application of the evaluation criteria be guaranteed, taking into account so many differences at the natural, cultural, social, political and economic levels, among different continents and countries? (4) How can a global network of an increasing number of members from countries with so many socioeconomic differences be maintained?

It is necessary that, definitively, the IUCN accepts geodiversity and geoheritage as fundamental parts of nature, recognising that both play a decisive role in the *natural capital* and in *ecosystem services*. IUCN members dedicated to geoheritage must persuade other members to be sympathetic to these principles, in order to obtain specific results and targets addressed to these topics in the next quadrennial IUCN Programme. The IUCN's WCPA needs to create clear guidelines regarding how to manage geodiversity and geoheritage in protected areas and give definitive instructions for these principles to be applied in all protected areas' systems around the world. In addition, there is a need for the IUCN to define precise methods/criteria to support an unbiased assessment of new World Heritage applications, in what concerns criterion (viii).

The recent establishment of the IUGS's International Commission on Geoheritage offers a new opportunity to set strategies, working groups and projects that envision the development of the scientific knowledge of geoheritage, the increase in its visibility worldwide, the launch of international networks, among others. It is also very important that this commission can produce guidelines and criteria to support the assessment of new UNESCO Global Geoparks applications made by geological experts on behalf of IUGS, concerning the international relevance of geoheritage of each territory.

For European countries, the challenge is to have an EU nature conservation policy that includes geoheritage, together with fauna and flora. Either adapting the two existent directives mentioned before, or creating a new directive or strategic programme, a change is absolutely vital for geoconservation in Europe. This change would also allow the possibility of funding for geoconservation projects, at the European and national levels. In addition, it would also be very important to include geoheritage as a fundamental element in Environmental Impact Assessment guidelines.

NATIONAL STAGE

The challenges for geoconservation in each country are different depending, in the first place, on the present level of development of this topic. Also, the existence of asymmetries between countries regarding socioeconomic development should be mentioned. It is not expected that countries with serious problems with guaranteeing the basic needs to the population like food, water, sanitation, health, safety and education will spend their scarce public resources on protecting geoheritage. Therefore, the challenges described below are addressed to an average country.

It is important to reinforce the work capacity of nature conservation agencies, mainly in what concerns the possibility of hiring experts on geoconservation and to include geoconservation strategies in the management of protected areas. Obviously, it is also of paramount importance to have a national geoheritage inventory concluded (this does not mean closed, as such inventories must be always available to integrate new geosites) and certified by the national geoscientific community. Accordingly, the importance of statutory protection for the most relevant geoheritage and of an appropriate legal framework should be pointed out.

The funding for geoconservation projects should be based not only on public resources but also private companies should be involved and invited to contribute to these projects, as already happens for some biodiversity conservation initiatives.

In general, it is also a challenge to increase the critical mass of geoconservationists in each country and, more importantly, to promote jobs for young geoconservationists, some of whom are carrying out postgraduation studies on these topics.

Finally, concerning geoparks, some questions must be discussed in each country, such as: (1) How many geoparks should exist in the country? (2) How should new UNESCO Global Geopark applications be selected and promoted? (3) Should geoparks be a 'showroom' of the national geodiversity or, on the contrary, should several geoparks exist in the same country with similar types of geoheritage? (4) How should tourists be attracted to geoparks when there is already a powerful tourism offer in the same country for much more popular destinations such as 'beach and sun' or 'snow'? The answers to these questions are of course related to several factors, such as the area of the country and the relation to the total area of existent geoparks, the country's geodiversity index, accessibilities, population, etc. However, it is important to underline the need for each country to establish a strategy regarding geoparks because the number of tourists that feed geoparks is limited and therefore the more geoparks that exist in the country, the less visitors they receive individually.

LOCAL STAGE

Geoconservation at the local level should be much more developed in the future. Local communities need to be engaged in geoconservation, involving local administrations, community representatives, schools, local businesses, and NGOs. In order to build these local networks, geoconservationists need to do much more regarding geoheritage interpretation. As the majority of society has low geoscientific literacy, education and interpretation are fundamental tools in order to raise awareness of the importance of conserving and managing geoheritage.

CHALLENGES FOR THE RESEARCH

Finally, we present some brief comments about possible paths to be traced by researchers in geoheritage and geoconservation. During the last couple of decades, most of the research was focused on methods for the inventory, assessment and mapping of geosites, together with procedures to better use geoheritage for education and geotourism. In general, all these studies have been performed on already known sites and in protected areas. However, there is a lack of works carried out in some areas of the world with few studies and on specific thematic contexts. For instance, soil sites and sites with active geological and geomorphological processes are very poorly studied so far.

As urban areas are getting larger all around the globe, sites in the urban context also need to be better understood and managed.

Regarding site management, it is also very important to reinforce our knowledge about how certain sites evolve under increasing pressures, either due to visitors or to natural processes, including the effects of climate change. Monitoring techniques must be improved using all of the technological development available today, which will allow better site conservation in the future.

To conclude, we still need to increase our knowledge about the extraordinary history of our planet, registered in particular sites and elements around the globe. This is the main justification for why we need to conserve this legacy in a sustainable way, for the benefit of humankind.

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