

Putting Geoheritage Conservation on All Agendas

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Geoheritage

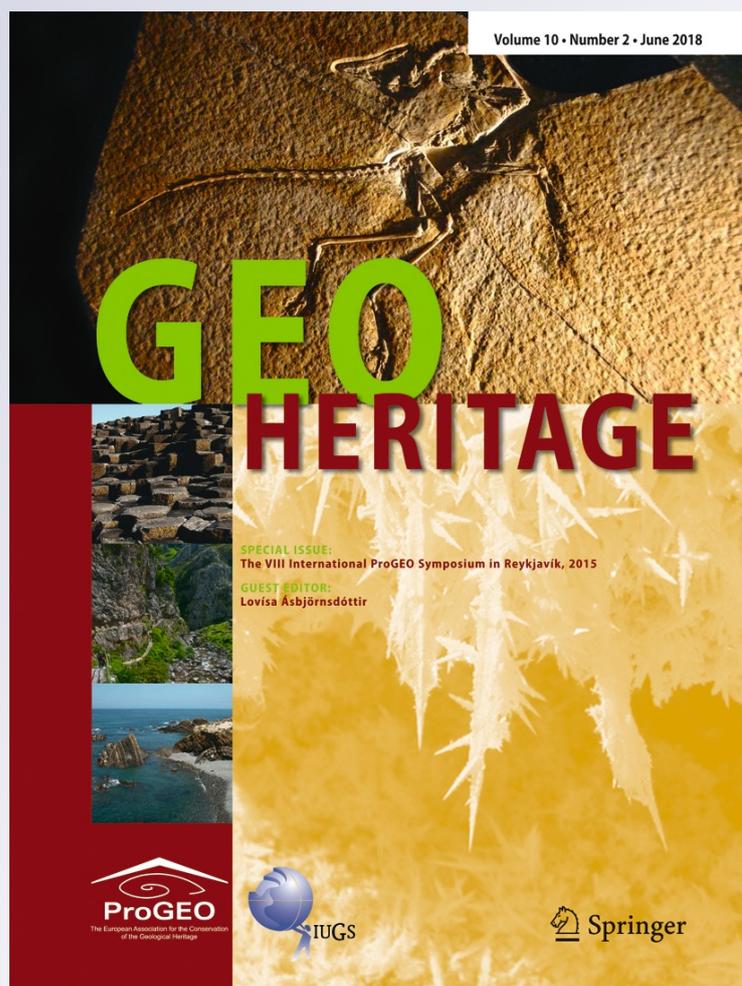
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Putting Geoh heritage Conservation on All Agendas

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Abstract The paper, given as the keynote speech at the ProGEO Reykjavík Seminar 2015, focuses on how geodiversity and specifically geoh heritage conservation can become an integral part of the nature and wider environmental and sustainable development agendas. It examines why geodiversity currently plays a minor role compared to biodiversity at all geographical scales, and why, in particular, geoh heritage conservation in protected areas is a poor relation of protecting species and habitats and cultural landscapes. Suggestions on what the geocommunity should be doing about improving the situation are made throughout the paper at the global, regional, and local scales. These include finally agreeing on the definitions of key terms, working with all stakeholders, especially those in the wider nature community, improving the language of communication, and exploiting the new thinking on “conserving nature’s stage.”

Keywords Sustainable development · Geoh heritage conservation · Protected areas · Biodiversity · Geodiversity

Introduction

A good deal has been written about the history of geodiversity and especially geoh heritage conservation (see, for example, Burek and Prosser 2008; Prosser et al. 2011, 2013; Thomas

and Warren 2008. Wimbledon and Smith-Meyer 2012; Prosser 2013). Too often these issues have been addressed internally within the geoh heritage conservation community. In the debate about the relevance of geoh heritage conservation, there is a need to ensure that we address wider public agendas locally, nationally, regionally, and globally, and that we do not talk just within our own geoscience and geodiversity community but reach out to, and connect with, other interests. This paper asks a series of deliberately challenging questions to all of us in the geoh heritage conservation community and suggests what we can and should do to address them and therefore improve the situation. I hope that this approach will be sufficiently provocative and stimulating for our community to become more engaged in the major issues of our world where geoh heritage conservation can have a valuable role to play.

The issues we should be dealing with are beyond those local and national issues identified for purposive discussion at the seminar, as I consider that these are symptoms of a wider set of issues that we have to address if we are to improve the status and standing of geodiversity and specifically geoh heritage conservation.

I address three fundamental questions and identify the points at issue and the action counterpoint needed to address each one.

Why Is Biodiversity Ahead and Why Is Geodiversity Not Figured Alongside It as an Integral Part of the Nature Conservation Agenda?

Why has biodiversity captured the public imagination? Maybe it is, in part, because society sees animals as cuddly and furry, and more fundamentally, the public sees them also as rulers of a natural world largely lost. They are revered for their evolutionary traits and their survival prowess. This is obvious from the success of wildlife programs, for example, on BBC TV

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and on Discovery Channel, presented by leading nature experts, such as Sir David Attenborough. The post-World War 2 conservation movement was built on concern about species survival (Holdgate 1999), and the new lobbies established in that period focused on iconic species, none more so than the giant panda—the potent symbol of the World Wide Fund for Nature (WWF).

Why has biodiversity achieved this international status? The main reason is because environmental campaigners and thinkers saw the connection with the future of life on Earth and that essential connection between people and nature (see, for example, Holdgate 1996; Wilson 1992). From that premise, ground-breaking strategies were developed, such as the *World Conservation Strategy* (IUCN-UNEP-WWF 1980) and *Caring for the Earth* (IUCN-UNEP-WWF 1991), as precursors to the Rio Earth Summit. The leaders of these strategies knew how to lobby and link their thinking to international concerns of the day.

What can we learn from these two simple approaches by the biodiversity community to help us promote our cause? I have eight suggestions for debate within the geoheritage conservation community.

First, we must have clarity in the *definition of terms*. We can spend far too much time arguing about definitions and so focus internally, rather than coming to an agreement and ensuring our conclusions are intelligible to outside audiences. So, we should, without further debate, be adopting the definitions by Gray, ProGEO, and Sharples on geodiversity, geoheritage, and geoconservation, respectively. These were reviewed and recommended by Crofts and Gordon (2015) as follows.

Geodiversity is:

The natural range (diversity) of geological (rocks, minerals, fossils), geomorphological (landforms, topography, physical processes) and soil and hydrological features. It includes their assemblages, structures, systems and contributions to landscapes (Gray 2013, p. 12).

A simpler wording is:

The diversity of minerals, rocks, fossils, landforms, sediments and soils, together with the natural processes that constitute the topography, landscape and the underlying structure of the Earth (McKirby et al. 2007).

Geoheritage comprises those elements of the Earth's geodiversity that are considered to have significant scientific, educational, cultural, or esthetic value (Díaz-Martínez 2011; Geological Society of America 2012). They include special places and objects (specimens in situ and in museums) that have a key role in our understanding of the abiotic and biotic evolution of the Earth (ProGEO 2011). Implicit in these

definitions are the intrinsic values of geoheritage and the link to ecological system and processes embraced by the term “scientific” (as discussed by Crofts and Gordon 2014).

Geoconservation has been defined as:

The conservation of geodiversity for its intrinsic, ecological and (geo)heritage values (Sharples 2002, p. 6).

A broader definition is:

Action taken with the intent of conserving and enhancing geological, geomorphological and soil features and processes, sites and specimens, including associated promotional and awareness raising activities, and the recording and rescue of data or specimens from features and sites threatened with loss or damage (Prosser 2013a, p. 568).

Both of these definitions help to clarify the term geoconservation and should be universally adopted.

Second, we need to *think strategically* in a wider context than just geodiversity and geoheritage conservation: embracing all of nature and the human and cultural environments in which geoheritage exists. This means connecting to the major global agendas stemming from the Rio Earth Summit, such as biodiversity, desertification, climate change, and sustainability, and the evolution of thinking and action internationally as they have been progressively reviewed through Conferences of Parties (see, for example, <https://www.cbd.int/>; <http://unfccc.int/2860.php>; <https://sustainabledevelopment.un.org/>; <http://www.unccd.int/en/Pages/default.aspx>).

Third, we should be linking our approach with other parts of the *nature conservation agenda*, particularly the interconnections and dependencies between bio and geo, sometimes termed biotic and abiotic natures. This is explored, for example, by Crofts and Gordon (2014 and 2015, pp. 539–541). But, this aspect has been largely ignored by the biodiversity community unfortunately. It is only relatively recently, for example, with the change in the definition of a protected area by IUCN to include implicitly geodiversity (Dudley 2008) and the agreement of the last two IUCN General Assemblies to recommendations on geodiversity (IUCN 2008, 2012), that some progress has been made. I elaborate on this point later in the paper.

Fourth, if we are to achieve the second and third points, we need to *interact with other communities of interest*. Most important are interactions with the rest of the nature community—species, habitat, and ecosystems experts, as well as with business and economic development interests and, most of all, civil society. In interacting as suggested, we should ensure that it is a two-way process which achieves gains for geoconservation as well as other interests.

Fifth, we need to *communicate in a way that relates to people and to societal agendas* now and in the future, rather than to obscure past times which people have difficulty relating to and understanding the language we use. For example, the five reasons for geoconservation developed by Crofts and Gordon (2014) are a simple attempt to get over fundamental messages in everyday language to a range of audiences. The five reasons are as follows: geoconservation for its own sake, as a scientific and educational resource, for cultural and aesthetic values, as the complement to biodiversity, and for the provision of environmental goods and ecosystem services.

Sixth, we need to put more effort into celebrating the *iconic places and points in time* in a meaningful way to current generations on the ground and through use of modern media. There are so many locations within Europe where the public can be inspired by iconic features and formations, such as the original karst (Kras) area of Slovenia, the overthrusts and folding in many parts of the Alps, the ice caps and glaciers of Iceland and Norway, the great river systems of the Danube, Rhine, Rhone, and others throughout the continent, and the volcanoes around Naples, in Sicily, and especially in Iceland. And, the points of time can be explained so easily. As a Scottish resident, I always think of the sites where James Hutton, the commonly recognized “Father of Modern Geology” elucidated his *Theory of the Earth* in the late eighteenth century at Siccar Point in Berwickshire and Salisbury Crag in Edinburgh and the sites in northwest Scotland where John Home and Benjamin Peach first unraveled the complex tectonics of continental overthrusts so well displayed at the Knockan Crag National Nature Reserve (see McKirdy et al. 2007 for more details).

Seventh, at a technical level, we should be developing and reporting on *indicators of loss and gain* of geoheritage conservation interest. We are already far behind the developments in indicator development internationally, such as the Aichi targets of the Biodiversity 2020 agenda (<https://www.cbd.int/doc/strategic-plan/2011-2020/Aichi-Targets-EN.pdf>), the long-established IUCN Red List of species and habitats (<http://www.iucnredlist.org/about/overview>), the newly established IUCN Green List of Protected Areas (<http://www.iucn.org/theme/protected-areas/our-work/green-list>), and the IUCN Red List of Ecosystems (<http://iucnrl.org>).

And, finally, we lose out because we have too few equivalents of the many and sizeable *non-government organizations* which care for and act as such powerful advocates for the protection of wildlife. We should consider the development of national NGOs to care for our geoheritage and champion its protection by governments. These should be encouraging participation by non-experts of all ages and levels of knowledge. One way to develop this suggestion is to broaden the membership base of ProGEO beyond the geoheritage professionals and to consider setting up national chapters in key countries around Europe.

Before leaving the lessons from biodiversity, we also need to address why IUCN, the world's leading nature conservation organisation, focusses almost exclusively on biodiversity. I ask this question because ProGEO is a member; Landvernd, another of the organizers of the ProGEO 2015 Seminar, is a member, and many of those who attended the conference are involved in IUCN, especially through the World Commission on Protected Areas (WCPA). The main reason is that IUCN was established by those concerned with species survival, and that focus has remained, led by the major NGOs that are biofocused, such as WWF, Birdlife, The Nature Conservancy (TNC), and Conservation International (CI) (Holdgate 1999).

But, as a result of the efforts of some of Europe's geoheritage communities, the focus has begun to change to a more balanced perspective. I applaud, in particular, the efforts of ProGEO and especially those of Enrique Díaz-Martínez, Lars Erikstad, and colleagues, which have brought recognition of geodiversity through the passing of formal Resolutions by the General Assembly of the IUCN in 2008 and 2012 (IUCN 2008, 2012). It is perhaps interesting to readers to know that it took a former professional geomorphologist (the writer) to argue, successfully, for the substitution of the word “biodiversity” by the word “nature” in the IUCN definition of a protected area; as a result, geoheritage conservation has achieved full recognition in protected areas. To press the point home, consider the difference between the earlier, 1994, definition:

An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

And, the current definition:

A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values (Dudley 2008; Stolton et al. 2013).

Simply, the narrower definition with its focus on “biological diversity” has been replaced by the broader, more inclusive, term “nature.” It may hardly seem revolutionary, but it took a great deal of argument and debate to achieve that change (IUCN 2007).

To drive these changes forward, the WCPA has agreed to the formation of the *WCPA Geoheritage Specialist Group* (<http://www.iucn.org/protected-areas/world-commission-protected-areas/wcpa/what-we-do/geoheritage>). The group remains quite small, but it wishes to recruit new members from all parts of the world with a knowledge of, and interest in, geoheritage conservation. Members can actively help to form the agenda and provide linkages with the

biocommunity and to deliver the work program. One major piece of work currently underway is to develop guidelines for managers and staff of protected areas on all aspects of geoheritage conservation in the form of *Best Practice Guideline on Geoheritage Conservation in Protected Areas*, with the author as the general editor.

At the intellectual level, we need to promote the new concepts which link geodiversity and biodiversity. There are two particularly important ones developed in recent years. First is the concept of *conserving nature's stage* on which biological conservation is maintained; in other words, plants and animals are the actors on the geodiversity stage which they depend on to survive and to thrive. The literature on this approach is developing (Anderson and Ferree 2010; Anderson et al. 2014; Beier et al. 2015; Hjort et al. 2015). This approach provides an ideal opportunity to demonstrate that geodiversity provides the physical underlying base for biodiversity and the two components are therefore interdependent. Second is the concept of *ecosystems* and the *Ecosystem Approach*. This concept has been developed through the Convention on Biological Diversity (UNEP/CBD 2000) and explored further in many studies (see, for example, Pirot et al. 2000; Shepherd 2008), but there is little or no reference to the geodiversity component. Only recently has some preliminary exploration been undertaken from the geodiversity perspective (Gordon and Barron 2013; Gray et al. 2013). This concept certainly merits greater attention from the geodiversity community, both in the generality and in the highly contested aspect relating to the economic valuation of ecosystem services (Fisher et al. 2009; ten Brink 2011).

Why Is Geoheritage Low on the International Agenda?

In parallel to the first question, and partly related to it, is the issue of why geodiversity, and specifically geoheritage conservation, is low on the international agenda.

Part of the problem is that we do not link it to *the sustainable development agenda*, so that geoheritage conservation, for example, is not part of the Sustainable Development Goals approved by UN Member States in September 2015 (United Nations 2015). Of the 17 goals identified, 6 are particularly connected to the proper functioning of the Earth's natural systems and their protection, conservation, and sustainable use: ending poverty, ending hunger and achieving food security, ensure healthy lives, promote education and lifelong learning opportunities, combatting climate change, conserve the oceans, and protecting, restoring, and promoting sustainable use of terrestrial ecosystems including halting and reversing land degradation and halting biodiversity loss. The linkages are surely obvious—water, soils, and minerals, as well as the natural processes that sustain life. Geoheritage conservation has a major role to play in the natural goods and services produced from geodiversity and is, therefore, a vitally

important component of sustainable development in the correct Brundtland meaning of the term (World Commission on Environment and Development 1987) (as opposed to modern economic hijacking of the term, such as sustainable economic development, which neatly ignores the fundamental natural and societal components). The geoheritage conservation community must make these points abundantly clear by providing objective evidence to support the arguments and by providing forms of words to be used in the emerging protocols and indicators.

We should be only too well aware that there is no intergovernmental agreed protocol for geodiversity, unlike those for desertification, climate change, and biological conservation referred to earlier. Surely, the geoheritage conservation community “missed a trick” a quarter of a century ago! I know that a case can probably be made, as our Australian colleague, Margaret Brocx, did so eloquently at the First International Conference on Geoheritage Conservation in China (Brocx 2015). And, others have referred to the need to learn lessons from biodiversity (Crofts 2014a). It is probably too late to argue effectively for a new global Convention and preferable and more realistic to argue for geoheritage conservation, in form and function, to be included in the protocols and practices of all of the other Conventions. To achieve this will require the geoheritage community to agree on formal principles and statements that others in the international nature community will be able to sign up to. This will not be at all straightforward, but is essential if the geoheritage conservation agenda is to progress.

In our global world, the current post-economic crash paradigm is about resource use. This is perhaps best defined as exploitation without defining the boundaries of acceptable levels of, or effects on, the functioning of natural systems. If we are to protect existing sites and to ensure that new sites are developed in a more environmentally sensitive way, we need to develop some new tools for evaluating impact. Saying “no” boxes us into a corner; saying “yes” is easier but destroys our credibility. So, defining how to measure the limits of activity and of acceptable change and the thresholds which determine unacceptable levels of interruption to natural systems (to borrow concepts from biodiversity conservation and recreational impact assessment, respectively) needs to be developed further by earth scientists. In this, we need to decide whether the so-called exploiters, the mining and energy companies, are our friends or our enemies. A bit of both I suspect. But, some companies are changing. I recall listening to senior bosses from Rio Tinto talk about their new corporate strategy embracing environmental systems and processes and protecting these as part of their operations at an IUCN meeting in 2012. A sea change from decades ago!

Turning to Europe, readers will be aware that there is an important EU strategy for nature: *Our life insurance, our natural capital: an EU biodiversity strategy to 2020* (European

Commission 2011). The strategy does not adequately cover all of the ecosystem goods and services which the geoh heritage conservation community considers that it should. Rather than demanding an EU Geodiversity Strategy (which is unlikely to be accepted), I recommend that the geoh heritage conservation community re-engages with senior staff in the Environment Directorate-General and with its Natural Capital group, as well as the heads of the units dealing with agriculture, forestry and soils, and biodiversity and nature. I know that ProGEO has made attempts in the past, but rarely do new ideas and approaches get through the first time. I strongly recommend, therefore, that ProGEO tries again and uses the good offices of the IUCN team in Brussels who know the relevant staff and their modes of operation.

Although the proposals for a Soil Framework Directive have been formally withdrawn and replaced by the Soil Thematic Strategy (European Commission 2015), the challenge of soil degradation is recognized as a key issue in the EU Seventh Environmental Action Programme which came into force at the beginning of 2014 (<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013D1386>). Backing for geoh heritage conservation involvement can be supported through the IUCN Commission on Environmental Law, especially Ben Boer and Ian Hannam who have been working on these aspects for a long time (Hannam and Boer 2004). All of these policies and the resultant actions are ones which geoh heritage conservation experts can contribute towards (Crofts 2005) and reinforce my recommendation that contacts in the Environment Directorate-General should be renewed.

In the EU, also, there is specific action in relation to species and habitats through the Natura 2000 program of site protection: the largest regional protected area program in the world (Crofts 2014b). To achieve the ultimate outcome of the Habitats and Species Directive of “favorable conservation status” requires input from the geoh heritage conservation community to demonstrate, in principle and especially in practice, what needs to be done and how the geoh heritage conservation community can help. This is all the more important as the Natura scheme, along with many other EU environmental instruments, has been subject to a periodic “fitness check,” with a favorable outcome expected later in 2016 (European Commission 2016). For the next phase of development of Natura 2000, it is necessary to add the geoh heritage conservation component if the favorable conservation status is to be achieved.

Why Is Geoh heritage Conservation Low on the Local Political Agendas and Why Is There Not More Public Support?

Turning attention to the local level, there are a number of issues that need to be addressed.

One of the problems is that the geoh heritage conservation community is still playing to our own internal agenda too much. Whilst the UNESCO Geoparks approach has revolutionized our focus and has been implemented successfully in some countries, like China, it cannot be the whole solution. We do need to retain the scientific basis of geoconservation, but we must not make our approach and our language so obscure that other interests do not understand it; and we should not be too inward looking in our approach, otherwise we will remain isolated from wider interests. Stratigraphical reference sites (GSSPs and other forms of type site), for example, are vitally important in the evolution of intellectual development about the Earth, but we must make sure that we communicate their importance to other interests in their language. If we talk about the scientific reasons for site conservation in our language and fail to communicate and enthuse others, no doubt politicians and the public will respond that “this is not for us.” There is a significant lesson from recent history in Great Britain. This insular approach, in part, was the downfall of the government nature conservation agency in Great Britain in the late 1980s and the establishment of broader-based bodies to succeed them with a new philosophy of engagement and communication without ignoring the objective scientific basis of conservation (Marren 2002). There is nothing wrong with the scientific approach in principle; otherwise, how can protected sites be justified? But, we need to have strategic frameworks which are made meaningful to others and link to wider conservation agendas, as I have argued earlier.

Another issue is that we do not take a sufficiently systematic approach to geoh heritage conservation. For example, in Great Britain, a systematic approach was developed by earth scientists and geoh heritage conservation experts to undertake the Geological Conservation Review (Ellis 2011). Although there were numerous attempts by the statutory overseeing committee (the Joint Nature Conservation Committee) to stop the work, wiser counsels of common sense by the Chief Executives of the statutory country conservation agencies in England, Scotland, and Wales prevailed.

Related to this point, geoh heritage conservation rarely figures in the environmental plans and strategies that determine the place and pace of development of land and other natural resources (Gordon et al. *in press*). This means that geoconservation does not figure in debates about development and infrastructure projects, for example, to the extent that it should.

A crucial aspect of getting over the message at the local level about the importance of geoh heritage conservation is for us to remember who the audience is. We need to do more to interest, inspire, and enthuse people about their geoh heritage and its contribution to “the wonders of nature.” Therefore, promoting the iconic sites, providing people with focused interpretation, and ensuring good management are all needed.

We have the skills and capabilities within our community, but we all too often have an inward, rather than an outward, focus. And, we make it too complex and difficult to understand and we do not sell it well enough. We should be recruiting and training geocommunicators. The first TV program on Earth evolution in the UK, I recall, was by an evolutionary biologist (Professor Aubrey Manning) and the geologists were furious; but he could communicate and they could not. Times have changed and, now, we have the first Professor of Geocommunication, Iain Stewart at Plymouth University, who is highly regarded by the media and TV viewers, as well as an effective communicator to scientific audiences (Stewart and Nield 2013; Stewart 2016).

The Four Topics for Discussion

At the ProGEO Seminar in Reykjavik in 2015, four specific topics were identified for discussion. So, how does all of these arguments relate to them? I shall deal briefly with each in turn.

How to Secure the Integrity of Geosites Under Threat?

My message is that we have to communicate the importance of these sites for the benefit of the public. Specifically, we have to communicate the necessary information in understandable ways to the public and to politicians and their advisers, none of whom are likely to have had any earth science training. And, we need to make clearer links with biodiversity on sites that are protected for species and habitat conservation, as they are the most likely to be the basis for nature conservation in most countries. So, the geoheritage conservation community should develop a set of model policies nationally linked, for example, to the developing ideas on natural capital and a set of criteria to assess impacts on geoheritage as a guide to decision makers.

What Is Sustainable Use of a Geosite?

To me this is quite clear and should be based on conserving the critical features and natural processes of the site in perpetuity. Some features may need strict protection. Others may be amenable to modification, especially if that modification, natural or human induced, enables more knowledge to be gathered and communicated to the public. Some may be dynamic sites anyway as they reflect natural processes in operation. For all of these types, the system applied in the UK by defining sites as exposure sites (for example, active or disused exposed sections), integrity sites (for example, caves and karst sites and active process sites), and finite sites (for example, mineral and fossil sites) could be a useful guiding framework (Prosser et al. 2006). To develop this topic further needs clarity on what we

mean by sustainable use and precisely how it would apply to different types of sites.

How to Incorporate Geoheritage in Environmental Impact Assessment?

There is a great deal of existing material on this topic (Erikstad et al. 2008; Erikstad 2013; Vegas et al. 2015). What would be a useful next step is to provide guidance on this topic with colleagues in the European Federation of Geologists and the Chartered Institute of Water and Environmental Management, so that the approaches have broader professional credibility and recognition among practitioners.

Are Mining and Quarrying Compatible with Geoconservation?

The answer to this question depends on the purpose of geoheritage conservation at the site and in the wider area. It may be permissible if it allows new exposures to be achieved and therefore new knowledge to be gathered. It is unlikely to be compatible if it destroys or damages the features of interest. And, it is unlikely to be compatible if it interferes with the natural processes that the site depends on for its continuing existence. The production of guidelines on geoheritage conservation and the extractive industries would be a helpful next step. In drawing up guidelines, reference should be made to the work already done jointly between the IUCN and the International Council for Mining and Minerals (ICMM) (https://www.iucn.org/about/work/programmes/business/bbp_work/by_engagement/bbp_mining/news/library/).

Conclusion

The challenge for the geoheritage conservation community is to work to ensure that geodiversity, and specifically geoheritage conservation in protected areas, is of more fundamental significance in local, national, and international agendas for nature and sustainable development. Some progress has been made and with concerted effort, led by ProGEO working with IUCN colleagues, a great deal more can be achieved. Although the challenges I have set out may seem substantial, there are many initiatives which can be taken with the present level of knowledge and expertise within the geoheritage conservation community for further progress to be made.

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