

CONSERVING OUR SHARED GEOHERITAGE – A PROTOCOL ON GEOCONSERVATION PRINCIPLES, SUSTAINABLE SITE USE, MANAGEMENT, FIELDWORK, FOSSIL AND MINERAL COLLECTING

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The main aims of ProGEO are to promote the conservation of Europe's rich heritage of landscape, rock, fossil and mineral sites. Within this aim, information to the public, advising authorities, research, networking and cooperation are important keywords.

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Geosites and the rocks they expose shine a light on the distant past and are fundamental to our understanding of the evolution of the Earth, of its volcanic activity, its plate movements, of ancient life and the character of a vast range of past environments. These form part of the vital evidence for the 4,500 million year history of the Earth, and this is our shared international heritage.

The natural heritage of any country includes its geological heritage, made up of many key small and large geosites, as well as landscapes, shaped and defined by their geology. Fossils, rocks, minerals and landforms are just as much part of our natural heritage as plants and animals. Such geological features also form a major scientific asset shared by all countries, as well as an educational and cultural resource. Minerals provide the basis for our modern civilization. Fossils allow us to chart the course of evolution, and also provide a basis for dividing up geological time and comparing the ages of rocks the world over.

Visits to geosites can be a fascinating pastime for members of a wider public. The discovery and study of minerals and the fossils, for instance, can be enjoyable and stimulating activities that give people an insight into the history of the Earth and thus the science of geology.

Research is essential in gaining an understanding of the Earth's place in the solar system, of its painful beginnings and slow maturity to gain a fragile atmosphere and a teeming biota, and we must make sure that geosites survive so that research can continue.



POLICIES FOR SUSTAINABLE MANAGEMENT AND GEOSITE USE

Main Priorities

The protection of nationally and internationally significant geosites is the responsibility of all countries and their governments. Each country should promote a list of conservation priorities, to foster sustainable use of its key geoheritage sites.

- A national geosite inventory and a full understanding of the different interests and importance of such sites is key in the conservation of geoheritage. Such inventories should be the factual bases for judgments on conservation.
- Comparative inventories are the key to understanding the wider significance and value of any geosite – their international and regional importance. Once each country has completed its national inventory, the priorities for action can be assessed, first, for protection and, subsequently, for site use, including interpretation/tourism.
- Only the balanced and sustainable use of important geosites will guarantee that future generations are able to use them – to study, interpret and re-interpret, and enjoy this unique heritage that exists in the Earth's rocks, minerals or fossils.
- Valuable rock or mineral specimens should not be taken from a protected area if it infringes laws on conservation, or regulations on mineral exploitation or export: with this prerequisite, it is valid for there to be a trade in such materials.
- A geosite of national or wider significance should remain available for legitimate use. That is the purpose of conservation. When the defined interests and importance of the locality cannot be observed and demonstrated, then research, or the teaching and training of students, will be prevented. This might be because important elements have been dug out, taken away, or buried – and an essential fauna or flora, a fossil marker band, or mineral assemblage, a vital boundary or junction in the rock record are made inaccessible. Management needs to be directed towards preventing this kind of situation.



Management

A favourable conservation situation depends on international and national management strategies and, directly, on the writing of a coherent management plan for each geosite. This should define what management is needed to sustain the continued geological viability of the locality.

- A management plan should assess the location of each significant interest in the site, as well as the factors affecting the site (threats and others). Management's purpose is to perpetuate the site's primary geological interests and access to them.
- It is natural to want to promote and interpret the obvious visual elements in a geological site or landscape (supported with infrastructure and publicity). However, resources should not be put into this, if geosites of national importance have not been identified, and thus still remain unprotected and unmanaged. The absolute priorities are: 1) geosite identification and protection; 2) to assure management, so that the national resource is maintained; and 3) site use for education, interpretation and tourism.
- Geological visitors (professional or amateur) should be encouraged to respect the land, and its users, as well as the geology and biotic nature, and to work with landowners and occupiers, to make them more aware and help them understand the differing management needs of geosites. In particular, landowners and occupiers can be encouraged to become advocates for conservation of the resource, and the sustainable use of their geosites.



Collecting

Sites with geological interests may be fragile or robust. In some circumstances, where sites are sufficiently robust and specimens are plentiful, it is perfectly acceptable that collecting should occur, and there is sometimes even scope for the sale of common rock, mineral and fossil specimens. In such circumstances, there can be an appreciable economic gain to local communities, with no scientific or heritage loss.

- Many things can be learned in the field, at geosites. Fossils and minerals can be observed *in situ* first – using eyes and a hand lens. Always, consideration should be given to whether geological specimens are better left and studied *in situ*. It can actually benefit a holistic understanding of geology.
- It is, however, important to explore possibilities for enhancing appropriate sites for the use of amateur geologists and members of a wider public, as part of the experience of learning about Geoheritage, and this may include collecting.
- Many of the most important international sites are very small and not at all obvious. The available geological resource is sometimes finite. Some scientifically important materials are rare, or fragile, or finding and collecting them involves considerable difficulty and physical effort. When there are few specimens to be found, or they have high scientific value, they need to be left in the ground until there is purpose in collecting them, a benefit to research or education, and a mechanism to safely remove them to a research collection, museum or other permanent display. Collecting without proper recording and curation, damage to protected sites, inexpert collecting and destruction of specimens, over-collecting – stripping sites of their fossils and minerals – may reduce the usefulness of a site or even permanently remove its scientific value.
- The provision of invulnerable collecting sites or caches of fossiliferous or mineral-rich rock for the use of visitors occurs in some countries. It is useful as part of a dual strategy: which diverts attention from fragile key sites (which might otherwise be mis-used) and provides a focus for the energies of a public interested in learning more about geology and experiencing it in the field.



- Responsible visits and collecting can therefore be a valuable activity in the sustainable management and safeguard of our shared Geoheritage, and in involving owners and the public.
- Sometimes the sites in which fossils, for instance, are found are subject to high levels of natural or artificial change and turnover, such as coastal cliffs that are being eroded or quarries that are being actively worked. In such situations, fossil specimens that might otherwise be destroyed can be retrieved to the benefit of science, provided that they are properly documented and made available for study.
- Geologists should recognise the contribution that responsible collectors have made and can make to science – to many branches of geological study. Collectors should be encouraged to collect for scientific purposes, to work with the geological community, and to put significant finds into national collections
- Conversely, unfounded individual or blanket restrictions on visiting and collecting at sites with fossils and minerals will promote bureaucracy and elitism. Certainly, when fossils are so abundant as to be rock formers, restrictions on collecting become a burden and a mis-use of protective resources. It can prevent a wider public from enjoying our shared heritage, and from learning about geological time, and valuing geology in all its variety. It will also inhibit valid and justifiable research. Many sites in the very first scientific rank are capable of supporting well motivated collecting and reasonable visitor numbers.
- Each country needs to recognize its resource of sites: then the sustainable use of appropriate sites may be systematically assessed.



Exploitation

A holistic approach is required in exploitation, and any protected site should be properly monitored for use, and collecting looked at in an informed fashion. That is, site use should not be judged from the perspective of the commercial collector or dealer, but having due regard to its heritage value, its potential for use and the information that all elements in the rocks contain. A few people should not make an economic gain, through selective exploitation, when there is a heritage loss to society as a whole.

- It is necessary, where possible, to use economic methods to promote geoconservation and local communities. Mineral exploitation (coal, oil, stone, metallic minerals etc.) is vital to society. Quarrying and mining have created and can create sites for geological study and education, and, after they become inactive, visits to such geosites may become possible. Commercial exploitation is permissible at such localities, and there is no moral reason to restrict sales of their products in money-making enterprises, such as at conserved sites (visitor centres, reserve shops), to help promote geology, geoheritage and its conservation.
- Buying a small rock sample from a shop is often a child's first introduction to geology. The sale of common rocks, fossils and minerals, if legally won from state-permitted extractive sites, should not be hindered.
- But, to avoid damaging exploitation of valuable heritage sites, all evidence for palaeoecology and past environments, and past orogenesis, for instance, and the whole fossil biota should be considered and valued. The generality of finds form part of the complex story in the rocks. Fossils, for instance, should not be seen as simply commercial objects to be bought and sold. And a site should not be predated so that the 'cream' is removed and a residue left for amateurs and the pursuit of science. Nor should key geosites be stripped by commercial interests, with most contents present being sold. This squanders valuable information that is present.



- One fossil group is not intrinsically more important than another, or one mineral more than another. For instance, a few vertebrate fossils might perhaps be collected and sold to museums, but this ‘saving’ of a few specimens does not excuse the sale and disappearance of all other kinds of fossil material, at the whim of a commercial market.
- Such cases of commercial exploitation should not conflict with the sustainable long-term future of a protected site. No site that is considered a protected area, having defined heritage values, should be stripped for profit – if it is naturally renewed (eroding) or static – only collecting within the context of a site management plan should be possible. Sites of the highest significance, such as World Heritage Sites or a Strict Nature Reserves, should in principal be sacrosanct, and certainly free from all unmonitored collecting.
- In each country, the statutory nature conservation agencies need to be robust in their response when a geosite is being exploited. They should oppose collecting on the sites where this activity is causing or might cause significant damage to the special interests and loss of data. They need to prevent large-scale commercial exploitation of any protected site, not only to safeguard more obvious geological features, fossils and minerals, but to protect a multiplicity of evidence and the geological context of all finds.
- In any situation, commercial interests should not devise, drive or determine the use (including excavation and collecting) and management of any protected key site.



DEFINITIONS

Geoheritage

Geology is a fundamental part of nature, and geoheritage is an integral part of the global natural heritage – it encompasses the special places and objects that have a key role in our understanding of the history of the Earth – its rocks, minerals and fossils, and landscapes. That is, those localities and objects (geosites, specimens *in situ* and in museums) that give special insights into the organic and inorganic evolution of the Earth over the last 4,500 million years. Thus, geoheritage includes the evidence for the Earth's formation, of meteorite impacts, of the start and evolution of life, of plate movements and mountain building, rock and mineral formation, and of how desert formation, glaciations and sea-level changes have through time shaped and re-shaped the globe. Geoheritage is an applied scientific discipline which focuses on unique, special and representative geosites, supporting the science of geology and its place in modern culture.

Geoconservation

Conservation concerns the protection and management of our shared natural 'goods'. Geoconservation is the preservation of special geological sites and areas (and specimens) for use: for scientific research, education and training; and, where appropriate, popularisation of the Earth's history for a wider public and promotion of good conservation practice. Geoconservation involves the protection from damage of internationally and nationally significant geosites, their physical management, and their enhancement for scientific and educational uses.

Geosite

A key locality (derivation: geo (Greek) + situs (Latin)) or area showing geological features of intrinsic scientific interest, features that allow us to understand the key stages in the evolution of the Earth. Such important geosites normally are, or should be, statutorily protected under national conservation legislation. Geosite is a neutral term for geological sites (without legalistic or ethnic complications), and a geosite can be small (in various country usages; monument, point, site, geotop) or large (park, reserve, protected area). Large or small, they are distinguished by their characteristic interest, and sometimes by great vulnerability combined with their high importance for science.

In the context of the ProGEO/IUGS Global Geosites Project, Geosites were selected in the countries as part of contextual regional frameworks, selected for the special part they play in understanding a particular interest and of major events in geological history – stratigraphic, palaeobiological, mineral, plate tectonic, volcanic etc. As an example, reference can be made to the approach used in Spain, where colleagues have recently completed their national Geosite frameworks, and the sites identified therein prioritized for conservation in the context of new law on the conservation of geosites (Garcia Cortes, A. (Ed.) 2008. *Contextos geológicos españoles: una aproximación al patrimonio geológico español de relevancia internacional*. Instituto Geológico y Minero de España. 235 pp.)

Geopark

Geopark is an informal (non-statutory) term to describe complexes of geosites, or even small geosites, that are promoted for touristic purposes. The label does not formally imply great scientific or heritage importance, but the capacity and utility of an area to be used for popularization and presentation of its interests. As well as visual and aesthetic appeal and suitability for education, another key hope and aim has been that local socio-economic gains will come from such popularisation. Such aims can be integrated with historical, industrial or other social interests or activities. The term geopark evolved from an original concept for development of “geosphere” reserves, which then (during discussion between UNESCO and ProGEO) was combined with the additional element of sustainable economic gain. Geoparks now develop at local, country and regional levels. Though the ambition to develop an official funded programme under UNESCO did not come to fruition, UNESCO now supports the geopark concept within the countries and in 2004 it launched the Global Network of National Geoparks (GNN) (www.unesco.org/new/en/natural-sciences/environment/earth-sciences/geoparks/)

Geodiversity

Geodiversity is a descriptive informal term that recognises the infinite complexity of geology – of all the variations that typify geological history with its fluctuating sedimentation, volcanicity, landscape change, and the repeated ebb and flow of the oceans across the continents. It is a flexible term, capable of wide interpretation, that is broadly equivalent to the term biodiversity. But, whereas biodiversity is one-dimensional, describing biotic diversity at the present day only, geodiversity involves an appreciation of the Earth and its environmental, ecological and biological variety in space and time. It is possible to say that geodiversity is everywhere, in the landscape, in

the rocks and even in building stone and buildings. However, since every aspect of the Earth's history and all sites are not significant, diversity is not synonymous with heritage or heritage sites of importance. Whereas geoheritage deals with the special heritage that we share, the special places that need protection, geodiversity describes a wider general context.

