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# GEOSITE-TYPOLOGY AND THE ROLE OF COLLECTING IN CONSERVATION

by

**Joris F. GEYS**[1]

## 1. INTRODUCTION

On a previous occasion (the 3rd International Meeting on Earth science conservation, at Lom, Norway), P. Jacobs and myself presented a preliminary classification of paleosites, analysing also their vulnerability to different damaging agents. Paleosites are localities, such as fossiliferous outcrops, which are of particular relevance to paleontology.

However, the domain of geoconservation being wider, I tried to extend the proposed site-typology to other geosites, hoping to enhance its usefulness.

Nearly all geosites fall in one of two categories : "landscapes" and "outcrops". "Landscapes" are sites with a moderate to large spatial extent, which are of interest mainly to general geology and/or geomorphology. This category is not in need of further subdivision. Threats to the existence and the quality of valuable landscapes almost exclusively consist in changes in landuse. Landscapes are less frequently degraded by natural decay or by users activities (e.g. littering).

"Outcrops" are much smaller monuments, where geological formations, showing one or more features of special interest can be studied and/or sampled. Partly owing to their small size, outcrops are often much more vulnerable than landscapes. They can be damaged or even destructed by natural decay (weathering, erosion, vegetation, ...), by exploitation of resources (quarrying, ...), by changes in landuse (landfill, coastal defence, reallotment, ...) and by users activities (littering, recreation, sports, research, education, collecting, ...). Vulnerability of geosites is difficult to measure quantitatively. Yet, some sites are nore vulnerable than other. Site-morphology is of primordial significance in determining the vulnerability. Almost equally important are the kind of interest taken in the site, and hence also the intensity and the way of its use. This second criterion will be called "site-value".

Jacobs & Geys (1990) and Geys (1990) distinguished 7 morpho-types.

type I : Self-rejuvenating natural outcrops (cliffs, riverbanks, ...),
type II : Self-rejuvenating artificial outcrops (active quarries, mines, ...),
type III : Non-rejuvenating outcrops (abandoned quarries, hillslopes, ...),
type IV : Temporary outcrops (building sites, ..),
type V : Non-outcrops (ploughed farmland, ...),
type VI : Ex-situ sites (dumps, ...),
type VII : Caverns.

Each of these morpho-types can be subdivided into 6 value-classes (Jacobs & Geys, 1990 distinguished only 4 of them) :
a : Fossillagerstätten (remarkable preservation of fossils),
b : Bonebeds,
c : Stratotypes,
d : Sites with rare minerals,
e : Sites with educational interest or with interest to general geology,
f : Sites of minor scientific value.

By combination of both criteria, we obtain a site-typology of 48 site-types. The conservational problems arising in each of them are different, but characteristic. Techniques of investigation, the way of use, vulnerability to damaging agents listed above, differ from one site-type to another. Wise conservation should reflect this diversity in morphology and value.

[1]Laboratory of Geology, Mineralogy and Physical Geography, University of Antwerpen (RUCA), Groenenborgerlaan 171 B-2020 ANTWERPEN.

| | I | II | III | IV | V | VI | VII |
|---|---|---|---|---|---|---|---|
| **a** | collecting of displaced objects allowed | transformation into IIIa-site | complete protection | transformation into IIIa-site | transformation into IIIa-site | no limits to sampling | complete protection |
| **b** | collecting of displaced objects allowed | transformation into IIIb-site | complete protection | transformation into IIIb-site | transformation into IIIb-site | no limits to sampling | complete protection |
| **c** | moderate collecting allowed | no limits to sampling | moderate collecting allowed | - | - | - | complete protection |
| **d** | collecting of displaced objects allowed | transformation into IIId-site | moderate collecting allowed | transformation into IIId-site | transformation into IIId-site | moderate collecting allowed | complete protection |
| **e** | moderate collecting allowed | no limits to sampling | moderate collecting allowed | transformation into IIIe-site | - | - | complete protection |
| **f** | no limits to sampling | collecting encouraged | moderate collecting allowed | collecting encouraged | no limits to sampling | no limits to sampling | moderate collecting allowed |

Table 1. Geosite-typology.

## 2. PHILOSOPHY

Although geosites are liable to a plethora of damaging agents, a minor one is particularly frowned upon : collecting. It is true alas, that some sites have been seriously damaged, and even ruined by oversampling and collectors misconduct. On the other hand, the vulnerability of geosites to collecting stress differs strongly from one site to another. Moreover, and this is very important, collecting in earth sciences should not be approached as it is in life-sciences : e.g. trade in endangered species is not involved ! In agreement with authors such as Robinson, 1988, Taylor, 1988, Raup, 1987, etc, I state that collecting can be considered as a vital aspect of the education of earth scientists, both professional and amateurs. More often than not, collecting can contribute considerably to site-conservation, e. g. by preventing natural decay and overgrowth and by stimulating self-rejuvenation.

In geoconservation, a distinction should be made between site-conservation and specimen-conservation. Those promoting site-conservation tend to consider collecting as harmful. Yet, specimen-conservation in situ is often very difficult to achieve, leaving collecting as the only feasible alternative. Site- and specimen-conservation need not to be in conflict : they are in fact complementary.

Collecting is not only an experience to be enjoyed, it is an important need for both professionals and amateurs, which should be respected. Intelligent and responsible collectors can make an important contribution to the conservation of geological patrimony. Conservationists should not be guided by emotional reactions, inspired by irritation or even justified wrath, provoked by isolated cases of vandalism and looting. Blanket-protection over large areas is in most cases unnecessary, if not unwanted. In my opinion, this is not a good conservational policy, doing more harm than good to the sake of earth science. Geoconservationists on the contrary, should try to prevent excesses and damage through misconduct, by an intelligent regulation of collecting activities. The cooperation of amateurs should be sollicited by providing help, possibly even by channelling part of their activities to alternative, less vulnerable sites.

The number of amateur-collectors of rocks, minerals and fossils, active in Belgium, can be estimated to 4000 or 5000, about half of them being organised in some 20 associations of varying size (20 to 400 members). This large group of highly motivated, interested people may provide valuable help in obtaining justified conservational measures, e.g. by putting pressure on accountable authorities. Fundamental research in geo-sciences is largely a non-profit activity, leaving public interest as the only incentive for funding. A total ban on collecting geo-objects would drive amateurs underground, killing public interest almost completely. This should deal a mortal blow to earth-science and conservation itself ! As a warning, precedents do exist.

## 3. SUGGESTIONS FOR REGULATIONS

Being convinced that geoconservation and collecting can and should be conciliated, I will try to do some suggestions, how to achieve this goal.

Not all of the 48 site-types, distinguished in table 1 are in need of the same kind of protection. A total ban on collecting activities is desirable, and even necessary in only a small minority of them. For some other site-types, moderate collecting can easily be allowed, without harming the site. The vast majority of sites is not in need of any limitation to sampling. Sometimes, this kind of activity should even be encouraged, to the benefit of conservation. I attempt to clarify these points of view below.

A few remarks will allow me to explain the points of view, presented in table 1.

1. Out of 48 theoretical site-types, 5 should not exist (IVc, Vc, VIc, Ve, VIe).
2. Seven site-types (IIIab, VIIabcde) deserve a status of full protection, meaning not only that collecting without a permit should be banned, but also that the sites should be protected against every other conceivable damaging agent, including natural decay. Permanent site-management, allowing law enforcement, maintenance, as well as public access and information, should be arranged for.
3. The protection of type-I-sites against natural processes, responsible for their very existance, is obviously pointless. Blanket-protection would result in the loss of numerous potentially valuable and important specimens and should thus be avoided.
To enhance the survival of valuable specimens, I recommend the collection of displaced objects (e.g. those fallen from the cliff) to be allowed in site-types Ia, Ib and Id. The use of heavy equipment without a permit, should however be banned.
4. Important features may come to light in type II and type IV-sites. Both are subject to rapid change. Proper conservation of these features can only be achieved by transformation of the sites into type-III-sites. Site-types IIabd and IVabde should be considered for such transformation.

5. Moderate collecting should be allowed in 8 site-types (Ice, IIcdef, IIIcdef, VId and VIIf). Moderation can be achieved by banning all commercial collecting and by limitating tool-size. In such sites I recommend all tools to be banned, except a hammer (maximum weight 1,5 kg) and a chisel (maximum lenght 30 cm).
6. Many sites are not in need of any limitation to sampling and collecting. From the point of view of paleontology and mineralogy, collecting should even be encouraged in site-types IIf and IVf, in order to salvage as many specimens as possible from destruction.
7. It is obvious that the use of heavy mechanical equipment or explosives, without a permit, should be banned on all sites, even those not otherwise protected.

Local authorities have sometimes tried to protect geosites through non-discriminating restrictional measures. Sometimes, such regulations are not even inspired by geoconservational considerations, but by an irrational feeling of irritation, caused by the conduct of isolated collectors, or even worse, by the lobbying of local clubs or even influential private collectors, in an attempt to acquire a private "hunting-ground" ! More often than not, this has merely resulted in the degradation of the sites, supposed to be preserved, through neglect and natural decay. It is clear that such blind measures do not serve the sake of earth science. A system of permits should be developed, to allow the occasional sampling of protected sites, when duly accounted for. Some organisation should be responsible for issuing such permits.

The introduction of a "collector's pass" can be considered. Bona fide organisations of amateur-geologists (-paleontologists and -mineralogists) can play a role in selecting candidates for such a pass. They can also accompany novices during an introductory probation. The adoption of a common code of conduct by the majority of amateur-organisations in Belgium, is presently under discussion. Conservational considerations should be included in such a code. Observance of the code can be enforced by sanctioning violations, e.g. through withholding of permits or passes, in very serious cases even by blacklisting the offender.

## 4. CONCLUSION

I tried to demonstrate the blanket-protection of all geo-objects is not a good conservational policy. A compromise should be sought between the needs of site- and specimen-conservation. This can be achieved through a differentiated approach of the collecting-phenomenon. Vulnerability and needs of protection differ strongly from one site to another. The site-typology presented here may prove helpful in determining the most efficient conservational policy in each individual case.

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# EARTH SCIENCE CONSERVATION IN GREAT BRITAIN

by


**Keith DUFF**[1]


## 1. INTRODUCTION

In spite of the increasingly sophisticated "Black Boxes" which are becoming widespread in geological studies, geology remains essentially a field science, and is likely to stay that way. Because of this, and due very much to the increased pressure of development and "environmental improvement", the conservation of geological and geomorphological sites is growing in importance. The fundamental aim of earth science conservation is to ensure that the key sites for research, education and training remain available in the future, and this has been recognised by Government since the 1940s. To act as a national agency for nature conservation, including geology and geomorphology, the Nature Conservancy was established by Royal Charter in 1949, and has grown in size and effectiveness since then. In 1973 it became the Nature Conservancy Council (NCC), and is now financed by the Department of Environment. In April 1991 the NCC will be split into 3 separate agencies, covering England, Scotland and Wales separately, but with the same powers to safeguard sites. The history of geological conservation in Britain goes back much further, with the first recorded activities of this sort having taken place nearly 100 years ago in Glasgow, with the conservation of the group of *in situ* fossilised Carboniferous trees known as the "Fossil Grove" inside an ornate building in Victoria Park.

## 2. OBJECTIVES OF EARTH SCIENCE CONSERVATION

The key objectives (Table 1) are to maintain rock exposures, and the integrity of finite or uniques deposits or landforms, for research, training or heritage reasons. The justification (Table 2) for this is the conservation of a part of our natural, and manmade, heritage for future generations of researchers, students, pupils and amateur earth scientists. There is also an economic element, since the modern industrial society in which we live is dependent upon the continued supply of raw materials located and investigated by geologists ; many of the sites protected by the NCC are vital for training the geologists of the next generation. This feeds into all of the critical industries - minerals, oil and gas, groundwater, civil engineering, and waste disposal. The most important feature of earth science conservation is that the sites it protects are intended to be used by geologists of all kinds, both professional and amateur ; it is not intended that the protected sites should be preserved as "museum pieces" which can only be used by the priviliged few.

Britain is unusual because of the very wide range of geology that occurs within such a relatively small area. All of the Periods of the geological column are well-represented, from the Precambrian to the Holocene (except the Miocene), and most are very well exposed in coastal cliffs, large quarries or in mountainous areas. In addition, much of the early development of the science of geology took place in Britain, with the result that many major stratotypes are located in Britain, and many of the Periods are named from Britain (such as the Cambrian, Ordovician, Silurian and Devonian). There are also many sites remaining which were fundamental in the recognition of concepts such as unconformity.

## 3. CONSERVATION LEGISLATION

Laws to protect geological sites (Table 3) first came into being in 1949, with the National Parks and Access to the Countryside Act. This gave the Nature Conservancy the power to identify and designate National Nature Reserves (NNR) and Sites of Special Scientific Interest (SSSI). NNRs are areas of land owned or managed by the NCC, and are designated mainly to protect biological features ; they are not a major mechanism at present for safeguarding geological sites. SSSIs (Table 4) are areas of land not owned or managed by the NCC, but which are still of high nature


[1] Nature Conservancy Council, now English Nature, Northminster House, Peterborough, PE1 1UA, UNITED KINGDOM