



# Improving Visitors' Geoheritage Experience: Some Practical Pointers for Managers

Roger Crofts<sup>1</sup>

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## Abstract

This short paper describes 8 practical pointers to improve visitors' experience of geoheritage sites and areas. These are based around 5 themes: putting communication and education at the heart of geoconservation, focussing communication on the target audiences, challenging the current scientific thinking, making sure there is a duty of care towards the visitor and connecting geoconservation to other conservation interests of the public. It is written on the basis of personal experience from visiting protected areas in many parts of the world. Examples of good practice with web links are provided. It builds on the IUCN Best Practice Guideline on geoconservation. The key message is that visitor target audiences and visitor experience should be included throughout the development of geoconservation protected areas, rather than the more traditional approach of adding these considerations later in the developmental process.

**Keywords** Geoheritage conservation · Visitor experience · Management advice

## Introduction

In this paper, I explore the key messages I have learned and that I think are valuable to geosite and geopark managers in improving their ability to communicate effectively with visitors. I spell out 8 simple principles with examples of what I regard as good practice. Readers may consider there are better examples. That may be so. This should not undermine the case being made in this paper that there are certain essential lessons to be learned and principles to be acted upon. This has been gathered from visits to many geosites and geoparks over a thirty year period as a leader of a national nature agency, as a senior member of the IUCN World Commission on Protected Areas and a founder member of its Geoheritage Specialist Group. This purpose of this paper is to stimulate further progress in improving visitors' experience to geoheritage sites and areas.

There is much literature on interpretation available, starting with the seminal text by Freeman Tilden (Tilden 1977) and the publications of John Veverka (2015) and Sam Ham

(2013). IUCN Best Practice Guideline 31 (Crofts et al. 2020, Table 8) sets out 9 general principles of geoheritage interpretation and education as follows:

1. Build interpretive planning into the design of geoconservation protected areas.
2. Avoid complex geoscience terminology and favour using everyday language, and make it informative, interesting and entertaining.
3. Design interpretation around the user's capacity to understand the complexity of Earth history and processes that are represented in a protected area.
4. Enhance understanding by linking what people see to the underlying rocks and structures.
5. Enhance connections by linking rocks and soils in the protected area to the overlying flora and surface cover.
6. Provide easy-to-understand descriptions of the origins of geoheritage features in the protected area.
7. Provide information giving the Earth history context of the area to enhance understanding of the natural forces that have been formative in its evolution.
8. Provide visual perspectives of landscape and what lies underneath at different scales.
9. Provide connections between geoheritage in the protected area and human cultural and economic history.

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✉ Roger Crofts  
roger.dodin@btinternet.com

<sup>1</sup> IUCN World Commission on Protected Areas Geoheritage Specialist Group, 6 Eskside West, Musselburgh EH21 6HZ, United Kingdom

The same publication (Crofts et al. 2020) also sets out 3 Best Practice Guidelines as follows:

No. 20 Determine the nature and characteristics of the target audience in designing effective public outreach on geoconservation.

No. 21 Include interpretative planning, off-site environmental education outreach programmes and web-based or mobile app-assisted interpretation for geoconservation protected areas to attract visitors, improve understanding of geoconservation and to enhance visitor experience.

No. 22 Use a variety of conventional media to inform the public about geoconservation.

Why is this advice needed? There have been many times in recent conferences of ProGEO, for example in Reykjavik in 2015 and most recently in Charnwood Forest in 2023, and in articles in this and other journals, that the geodiversity community has questioned why our world is less understood and has been less considered by the wider environmental community and the public, especially compared to our colleagues in biodiversity conservation (Crofts 2014, 2018, 2019). Part of the problem is that we are often too focussed on the scientific identification and classifying of sites and areas, rather than recognising that there is at least a nascent public interest in the part of nature we label ‘geodiversity’. Also, we can be so focussed on the accuracy of the interpretations and its acceptance within our sector of knowledge that we forget the wider public interest. And we are too often poor communicators. However, here is a desire within our community to raise the profile of geodiversity and, in particular, the conservation of geoheritage; in other words, to mainstream geoconservation into the nature, environment and wider public agendas.

There is a simple rule of communication termed ‘KISS: Keep It Simple Stupid’. The emphasis is on the last word, meaning that if the communication to the target audience is not successful, then the communicator is Stupid. The essence of this is encapsulated in Best Practice Guideline 20 quoted above and is the basis of all effective communication to enhance visitors experience.

## Putting Communication and Education at the Heart of Geoconservation

### Practical Pointer 1. Design for the Target Audience

The identification of geoheritage protected sites and areas inevitably focusses on two key aspects. First, the uniqueness and rarity of the features and the processes which have brought a site or area into existence in the past and maybe still operating. And second, its fit into national, regional and



**Fig. 1** Knockan Crag NNR Scotland interactive display for progression of Scotland over geological time. © Roger Crofts

global schema for determining its significance. All too often little attention is given during the designation process of how to share the characteristics of the site with the public. This is often regarded as a point for consideration at a later date during the development of site management. As a result, some sites and areas have either no or very limited reference to the visitor experience.

Target audiences and their needs should be identified from the outset, alongside scientific and other values. This is vital as the type of audience will vary. Determinants of visitor profile such as accessibility or remoteness of the site, whether it is visited directly or online, and the type of geoconservation interest, such as static or active, caves or glacial or volcanic, or whether the geoconservation interest is secondary to others such as biodiversity or cultural, are all factors to be addressed in designing the type of interpretation.

Designating a site without providing for the visitor should be avoided. There is a strong argument for prioritising the visitor rather than the geoheritage information in planning the communication and staffing of the site. Design in from the outset how the site/area can be best interpreted to the target audiences, bearing in mind that there may be more than one target audience with different needs at an individual site.

An excellent example is at the Knockan Crag National Nature Reserve in the North West Highlands UNESCO Global Geopark, Scotland, UK. Here the geology is complex for the visitor to understand without help. Therefore, in reconfiguring the site some 25 years ago accessibility to the rock sections, and simple explanations of how the geologically ‘upside-down’ formations occurred and at which stages in the Earth’s history played a significant role in the revamp of the site. <https://www.nature.scot/enjoying-outdoors/places-visit/nhrs/knockan-crag-national-nature-reserve> (Fig. 1). Contrast that, for example, with the lack of

understandable and accessible information for the visitor in Iceland's two UNESCO Global Geoparks – Katla and Reykjanes – despite the fact that the designation of a Global Geopark is about outreach to the public and despite the fact that the public interest in the actual and potential central volcanic and fissure eruptions in these areas is very high.

## Focus Communication on the Target Audiences

### Practical Pointer 2. Keep the Messaging Simple

The terminology used by Earth scientists is highly technical and not readily understood by visitors. Furthermore, high-tech visitor centres can be off putting, and poorly written guidebooks do not help, whereas fewer words in plain language and clear diagrams win the day. There are two national parks on either side of the Austria/Czech Republic boundary – Thayatal and Podyjí, respectively. In the former's high-tech information centre the interpretation is so complex that a guidebook to it had to be produced, whereas the nature guide material at the latter was produced by local school children.

A point to remember in developing facilities for the visitor is that, for example, geological maps and geological sections are not readily understood by most visitors. Whereas interactive models and visualisations work. They provide a way of deconstructing the landscape, showing how it was formed, how it has changed and predicting how it will change in future.

A simple yet effective example is provided at the National Trust for Scotland visitor centre in Glencoe, Scotland, UK. Here a simple interactive model allows the visitor to understand the formation of ring dykes within a volcanic formation (Fig. 2). [Visitor centre | National Trust for Scotland \(nts.org.uk\)](https://www.nts.org.uk).

The use of online messaging is increasingly important. It can attract people to visit the site or it can be sufficient in its own right. There are many examples of use of the web, as the links in this paper demonstrate. Also, social media by communication or by those who have visited the site can be a powerful means of engaging public interest.

### Practical Pointer 3. Employ Skilled Communicators

Many Earth scientists are not great communicators to the public, too often wrapped up in their specialist knowledge and using words that are not readily understood by the public. Quoting great communicators, such as previous scientists and observers, can inspire and improve visitor experience. An early TV series <https://www.imdb.com/title/tt0423645> was presented by a geneticist with excellent communication



Fig. 2 National Trust for Scotland Glencoe visitor centre interpreting volcanic caldera collapse. © Roger Crofts

skills, Aubrey Manning, much to the annoyance of geologists. Another approach is to use actors to role-play the situation. This was done at the opening of the refurbished Knockan Crag NNR in Scotland to expose the intellectual controversy between the geological greats of the time.

Local guides should be employed who are skilled communicators and know the local cultural context, understand the cultural backgrounds of the target audiences and can present the information in an informative and accessible manner. There are countless examples. In Cuba at the Topes des Collantes Nature Reserve Park, aspiring interpreters have to pass tests before they can be certified as guides. Local people work hard to gain the qualification so that they are able to interpret, for example, the amazing Elephant Rock formation to the visitor (Fig. 3). In Nova Scotia, Canada, for example, Joggins Cliff UNESCO World Heritage site has been described as the 'coal age Galapagos'. It has been visited by eminent scientists, such as Charles Lyell and Charles Darwin. The message is simply told, and the site employs young interpreters who show visitors the fossil layers being continually exposed along the beach (Fig. 4). <https://jogginsfossilcliffs.net>

The message is to ensure that communicators are able to make the interpretation relate to people's experience or everyday lives, for example the provision of water, the beauty of the landscape, and how local communities respond to these sites.

### Practical Pointer 4. Provide Memorable Experiences

Providing memorable experiences that visitors can reflect on long after they have visited a site is another way of improving their experience. This can be done in various ways.

One way is to introduce visitors to situations they have never encountered previously, For example, visiting an ice cave, as in the Rhone glacier in Switzerland, gives an experience of the sheer scale of a glacier tongue as well as different colours of the ice and the sounds as it moves: [Ice](#)



**Fig. 3** Topes des Collantes Nature Reserve Park, Cuba guide showing visitors the Elephant rock formations. © Roger Crofts



**Fig. 4** Joggins Cliff UNESCO World Heritage Site, Nova Scotia Canada guide showing the fossiliferous layers on the beach. © Roger Crofts



**Fig. 5** Škocjanske jame UNESCO World Heritage Site cave in the classic Slovenian kras (karst) formations. © Borut Lozej

cave in the Rhone glacier | Geological sites in Obergoms | Valais Switzerland. Volcanic areas can be very exciting and once an eruption has ended, albeit temporarily, it is possible to get a closer view by visiting the inside of a lava tube. A good example is in The Lava Tunnel—One of the Longest Lava Tube in Iceland | Raufarhólshellir. Caves can be very intimidating to visitors with narrow passages and running water. There are countless examples of good practice. One such is Škocjanske jame in Slovenia where the sheer scale of the main caverns and the river running through them is dramatic (Fig. 5). <https://www.park-skocjanske-jame.si/en>

Allowing visitors to get a feel for the site, through handling samples and even being allowed to take some away without creating a conservation problem can make a huge difference to their appreciation. A good example is at the Jurassic Coast UNESCO World Heritage site in England where the cliffs are continually eroded by waves releasing fossils from the rocks (Fig. 6). <https://jurassiccoast.org/visit/fossil-collecting>.

Well designed and readily accessible trails, visual and actual, are essential to enable the visitor to see the ‘coal face’. A good example is at Mount Baker, USA <https://www.wta.org/go-hiking/hikes/mount-baker>. Guided or self-guided walks can be undertaken with a simple leaflet to explain what visitors are likely to see, and small interpretation signs at key points on the trails give easy to understand explanations of the formation of the area Blue Mountains National Park | NSW National Parks (Fig. 7).

## Challenge Understanding

### Practical Pointers 5. Remember There’s No One Explanation

The understanding of Earth processes increases over time. New ideas and new interpretations are the very essence



**Fig. 6** Jurassic coast UNESCO World Heritage Site, Dorset, England specially appointed Warden to supervise fossil collecting from the beach after cliff collapses reveal specimens. © Sam Rose



**Fig. 7** Olsen's Lookout, Blue Mountains, New South Wales simple interpretation at a visitor viewpoint. © Roger Crofts

of scientific endeavour. It is important therefore not to be too rigid in the interpretation of a site or area on the assumption that there is nothing new to be learnt. It is a useful rule to tell visitors what is not known or on what issues there is uncertainty of knowledge or disagreement between experts. Telling the stories of how knowledge of the site has evolved over time also enhances the experience for visitors.

A very good example of these approaches is at the world-renowned Burgess Shale in Yoho and Kootenay National Parks, British Columbia, Canada, part of the Canadian Rocky Mountain Parks UNESCO World Heritage site. Exceptional insights into the evolution of complex life forms on Earth over 500 million years ago during

the Cambrian period is provided alongside telling the story of the evolution of knowledge by leading experts who have looked at the site and the new research that is being undertaken (Fig. 8). <http://www.pc.gc.ca/eng/pn-np/bc/yoho/natcul/burgess.aspx>.

Beyond the site and area, there will likely be broader perspectives of how it fits, for example, into major periods of Earth history, major tectonic provinces and associated plate movements. Connecting to this bigger picture is therefore an important element in the interpretation of a site. An emerging example is in the Reykjanes UNESCO Global Geopark in Iceland where the boundary between the American and Eurasian tectonic plates comes ashore. <https://en.unesco.org/global-geoparks/reykjanes>. A fissure belt is currently very active, and many different types of volcanic features has been formed in recent centuries (Fig. 9). Detailed scientific monitoring is seeking to unravel what is currently happening and what might happen in the years to come. New insights by younger generations of scientists are being achieved that can be applied to other areas [Cambridge Volcano Seismology Group | Department of Earth Sciences](#).

## Make Sure there is a Duty of Care

### Practical Pointer 6. Remember Geoheritage can be Fragile and Dangerous

There is a prevailing view that geoconservation features are robust to visitor trampling and that collection of samples should be allowed. It is often difficult to persuade the public and site managers that this is not always the case and that many features and forms in geoheritage sites are quite fragile.



**Fig. 8** Burgess Shale UNESCO World Heritage Site Yoho and Kootenay National Parks, Canadian Rockies where displays give insights into the evolution of knowledge about the Cambrian 'explosion' of life on Earth. © Parks Canada Ryan Creary



**Fig. 9** Reykjanes Peninsula UNESCO Global Geopark is an area of past and current volcanic activity with many geological features. © Roger Crofts

Controlling access is not always easy where the site is remote or there is insufficient resource to locate staff at key points in the site. Assessments by those with an understanding of what geoconservation actions are needed should determine the management approach. Informing the visitor of this on site and at visitor centres and entrances to the site is important, particularly where there are access restrictions due to the fragility of the site.

There are challenges, for example in remote locations on islands in the Galapagos archipelago where in the past the private sector guides have played a key role not only in keeping their group members away from fragile areas, but also policing other guides who are less willing to restrict visitor access (Fig. 10).

There are hazards to the visitor in many geoheritage sites. Obvious ones are in volcanic areas where noxious gases and lavas flows and scoria are present, or where there are hot pools of mud and super-heated steam (Fig. 11). The public needs to be duly warned of the risks. They also need to be informed that damage can be easily done to fragile structures rather than standing on fresh lavas, for instance, which are fragile (Fig. 12).

## Connect Geoconservation to Other Interests of the Public

### Practical Pointer 7. Connect Messages to Cultural Heritage

Relating the natural and cultural elements provides additional interest for local people and visitors. There are many sites where there is close relationship between the natural



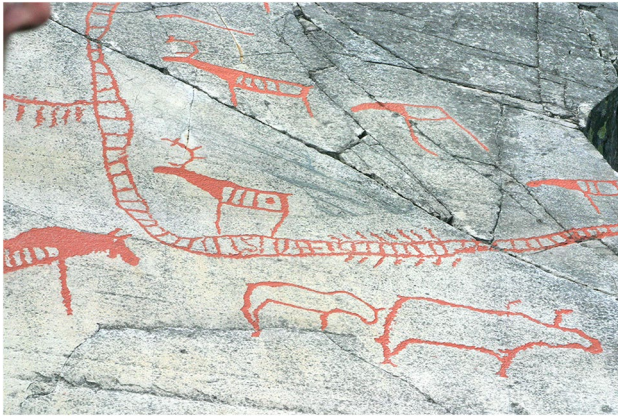
**Fig. 10** San Cristobel, Galapagos showing how unmanaged tourists can damage the features such as lava tubes. © Roger Crofts



**Fig. 11** Hot springs, Mammoth Springs, Yellowstone National Park, USA. © Roger Crofts



**Fig. 12** Visitors clambering on new fragile lavas and throwing unrelated rocks onto it at Fagradalsfjall, Reykjanes UNESCO Geopark, Iceland. © Roger Crofts



**Fig. 13** Rock art at Alta, northern Norway UNESCO World Heritage site inscribed into glacially smoothed rock. © Roger Crofts

features and the cultural history of the area. For example, there are many caves formed by dissolution of rocks with depictions of the art of native people, such as the caves with early paintings of life in the Royal Natal National Park, Kwa-Zulu Natal, South Africa. [Royal Natal National Park—South Africa National Parks \(nature-reserve.co.za\)](http://nature-reserve.co.za) and the rock art etched into the glacially smoothed rocks at the Alta UNESCO World Heritage site in northern Norway [Rock Art of Alta—UNESCO World Heritage Centre](http://www.unesco.org/whc/central-executeive/whv/whv-centres/whv-centre-alta) (Fig. 13). Another example is the link between tower and cone karst and the cultural heritage seen from the symbols engraved on the rocks of the natural monuments in the Shilin southern Yunnan part of the South China [Karst SHILIN UNESCO GLOBAL GEOPARK \(China\)](http://www.unesco.org/whc/central-executeive/whv/whv-centres/whv-centre-shilin) (Fig. 14).

Sites of early hominid evolution have an important geological setting which can help to explain why evolution occurred at such locations. One example is the Olduvai Gorge in the Ngorongoro Conservation Area of northern Tanzania (Fig. 15).

Some sites have a cultural importance because of their role in the development of protected areas thinking and action. Yosemite National Park in the USA with its association with John Muir, the founder of national parks, is one obvious example. Ensuring this is depicted for the visitor is an important component to tell the story of how the thinking developed into action.

The evolution of knowledge at times of great intellectual ferment and advancement is a way of connecting to cultural heritage and educational advancement. The aforementioned Burgess Shale site in the Canadian Rockies is an example, as are the classic sites in Scotland studied by James Hutton to develop his *Theory of the Earth*, such as Sicar Point [Sicar Point—Geowalks](http://www.geowalks.co.uk) and Salisbury Crags in Edinburgh [Hutton's Section, Salisbury Crags—Curious Edinburgh](http://www.edinburgh.gov.uk).



**Fig. 14** Symbols on the Shilin karst formations, part of the South China UNESCO World Heritage Site South China Karst. © Roger Crofts



**Fig. 15** Olduvai Gorge, Ngorongoro Conservation Area, Tanzania showing the hominid remains in the East African Rift Valley. © Roger Crofts

### Practical Pointer 8. Remember the Linkages Between the Biotic and Abiotic Elements

At many geoheritage sites, there are also features, forms and processes of biodiversity that will interest the visitor. Visitor experience is enhanced if the links and interdependencies between abiotic and biotic nature are explained. The examples are obvious, such as the importance of soils, water cycling, erosion and sedimentation that provide nutrients and maintain habitat condition and ecosystem health. Hence, in many environments the complex and dynamic patterns of micro- and meso-scale topography, soils and geomorphological processes provide mosaics of habitats, corridors and topographical variations for high species richness. Specific examples are Waimangu volcanic valley, Rotorua, New Zealand showing the development of thermophilic plants in the geochemical substrate [Waimangu Volcanic Valley | Rotorua's Geothermal Valley | Book Now](http://www.rotorua.govt.nz) (Fig. 16). The Jenolan



**Fig. 16** Waimangu volcanic valley, Rotorua, New Zealand showing the interaction between geochemical processes and thermophilic plants. © Roger Crofts

Karst Conservation Reserve (JKCR), on the eastern flank of Australia's Great Dividing Range, is significant geologically and biologically providing critical habitat for rare, endangered and relict species [Jenolan Karst Conservation Reserve | NSW National Parks](#).

## Relative Priority and Importance

These practical pointers are not in any order of priority. All are considered relevant and essential components in designing geoconservation communication and interpretation of a site. When managers are drawing up plans for new sites or revising existing ones, they should build these practical pointers into the schema of work.

## Further Research

There are 3 aspects for further investigation which could help to improve visitor experience of geoconservation and help managers improve performance. First is to find out visitors reaction to actual or online visits. This is best done objectively by using tried and tested social survey methods. The outcome should help to refine and refresh the approach to interpretation and communication. Second and related to the first is to periodically assess the effect of human attitudes and behaviour towards visiting sites in the light of climate change, the impact of travel and the impact at the site (see Gordon 2023). The outcome might result in

radically different audiences and changes in communication strategy and interpretation. Third, is the need to assess changing natural circumstances which are likely to affect sites, particularly where there are active processes. These should be kept under review by scientific advisers so that management plans can be kept up to date and interpretation revised as changes occur.

## Conclusion

Visitor experience at geosites and geoparks can be enhanced if the 8 Practical Pointers presented here are built into the development and implementation of the plans for the site. It is also important that they are refreshed in the light of new knowledge and new methods of putting over the information that will interest and be understandable to the visitor. None of this is 'rocket science'. It requires protected area managers to be aware of both the possibilities and pitfalls and to ensure that the requisite knowledge and the ability to communicate it effectively is available to them.

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## Declarations

**Ethical Approval** The author complies with the ethical standards set out in the COPE guidelines.

**Conflict of Interest** I have no conflicts of interest with the work reported in this article.

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