



LA SOCIALIZACIÓN DE LA GEODIVERSIDAD: ESTRATEGIAS (Ejemplos en Gran Bretaña y Europa)





Geology and geological heritage: new perspectives from the UK

3: Environmental interpretation on geological heritage sites: examples from across Europe



1. Promoting Earth heritage and its conservation:

- News media
- Formal education
- General education
- The internet...
- On-site interpretation

1.1: News media

e.g.

- Radio,
- Television,
- Newspapers,
- Magazines.



- Ephemeral, but useful for stimulating interest and action or informing about on-going activities...



1.2: Formal education

e.g.

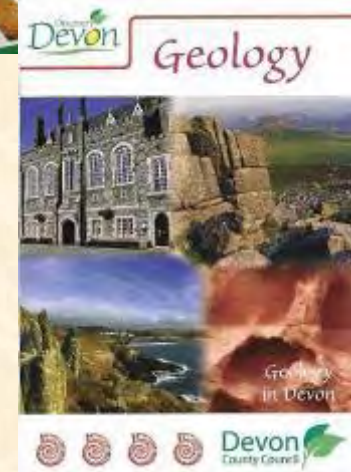
- National Curriculum,
- University courses,
- Adult / continuing education, etc.
- Long term investment in the future – but can engender interest and support in the short term..



1.3: General education

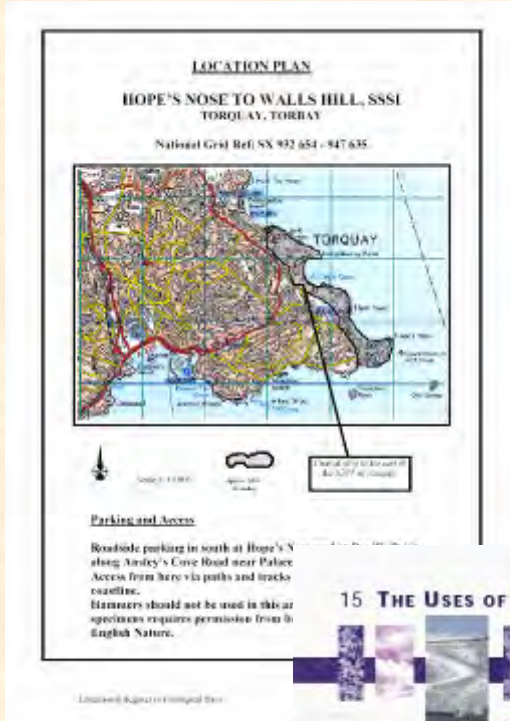
e.g.

- Information leaflets,
- Themed publications,
- Seminars / conferences,
- Museum activities and displays,
- ‘Festivals’ of geology, etc.
- Most appropriate long-term strategy for geodiversity and conservation but should be closely linked with news media coverage and site interpretation...



1.4: The internet, including:

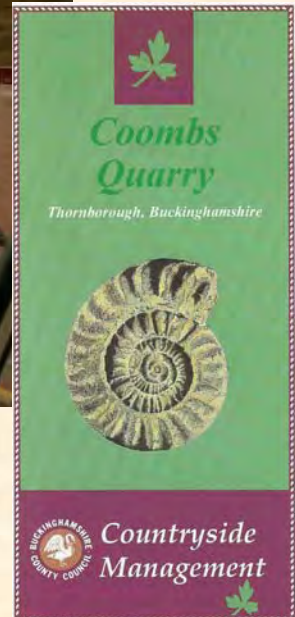
- General web-based information and reports
- Information on sites to visit, e.g. the *Educational Register of Geological Sites for Devon*:
- News items, etc.
- N.B. All web-based information implies discrimination, is inevitably 'self-targeting' and cannot be a substitute for on-site provision!



1.5: On-site interpretation

e.g.

- Sign boards,
- Self guided trails,
- Heritage centres, etc.



2.The principles of environmental interpretation...

Interpretation is:

*“...an educational activity which aims to **reveal meanings** and relationships through the use of original objects by first hand experience and by illustrative media, rather than simply to communicate factual information.”* (Tilden 1967)

Environmental Interpretation is, therefore:

*“....the act of **explaining or revealing the character of an area** through interrelationships between rocks, soils, plants and man to.....visitors in the field, with preparation and follow-up usually in thematic or story form, to increase visitor awareness of the significance of the site visited and the need to conserve it.”*

(Aldridge 1975)

Interpretation has the:

*“...dual purposes of best **servicing the interests of the visitors** who come to see and experience a site and also those of the place itself. Good interpretation will raise the value of a site in the eyes of those who come to visit; greater value will lead to a greater conviction of the need to conserve.”*

(Herbert 1989)

Geotourism (provision) is:

*“The provision of **interpretative and service facilities to enable tourists to acquire knowledge** and understanding of the geology and geomorphology of a site (including its contribution to the development of the Earth sciences) beyond the level of mere aesthetic appreciation.”*

(Hose 1995)

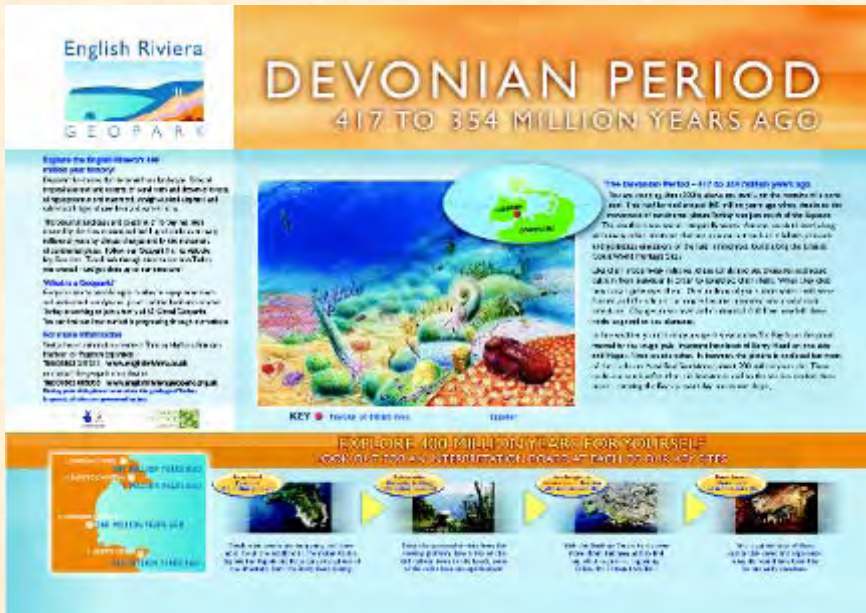
3. Site information signs and boards

3.1: The function of signs on conservation sites:

- To inform visitors of the conserved status of the site
- To control or manage visitors and therefore aid site conservation
- To establish the role of the organisation or organisations responsible for the management and/or protection of the site
- To interpret features at the site for visitors (optional).

3.2: Interpretative sign boards have additional functions:

- To enhance visitor enjoyment in the belief that an understanding of the countryside increases the pleasure derived from visiting
- To increase the public understanding and appreciation of the countryside leading to a respect for it and an awareness of the need for its conservation
- To facilitate the management of a natural resource by influencing the pattern of visitor movement
- To satisfy a visitor demand for information.



3.3: Basic types of signs for site management and information:

- Site Specific Information Plaque - includes brief description of the site on which it is placed
- Standardised Site Management Sign - includes a statement of the conserved status of the site (non site specific)
- Visitor management instructions - short statement or instruction only.



3.4: Prioritising Interpretative Information Board schemes, considerations include:

- High visitor numbers, e.g. Signs on sites within popular touristic areas/ established viewing points/ visited by significant numbers of visitors (e.g. close to urban areas) will have the highest impact. Schemes must be designed to meet needs of a significant number of these visitors!
- Prime teaching sites, i.e. sign can be a teaching aid.
- Sites damaged or threatened by over use, bad practice, ignorance or trespass may benefit from signing although...
- The site must also have an appropriate level of management to ensure that the facility is maintained in good order!

- Full co-operation of site owners and managers is essential - in practice a 'partnership approach is most reliable and productive.
- Risk of vandalism or erosion must be such that longevity of sign not significantly prejudiced.
- Interpretative signs are most effective if linked into an existing or planned natural and/or man-made heritage interpretation or management programme (e.g. with links to museums, centres, other sites, etc.).
- There must be a strong and interesting story to be told, and preferably dramatic or obvious features, for the scheme to work, i.e. the interpretation provides links with features people can see or experience...

Anatomy of a signboard...

Meldon Viaduct

View from a bridge - back through time....

Landscape is a complex thing - the product of millions of years of geological processes and thousands of years of our own interactions. By reading the signs embedded in the hills and valleys, we can unravel a fascinating story of prehistoric worlds and changing climates. The spectacular view from this viaduct - itself a key feature of the landscape - reveals just such insights, spanning some 360 million years of the history of our planet. The story here begins with Krakatoan volcanic fury and ends with... Well, it doesn't end, landscape continues to evolve - what we see today is just a transient state, linking the past to the future. But to understand how we reached this point in time and space and read the signs for yourself, just follow the numbered insets on this interpretation panel and all will be revealed!



80,000 to 10,000 years ago: ice age!
When temperatures plummeted as the Ice Ages began, the ground froze solid as permafrost. Summer thaws of surface layers, however, caused soil and rock to slide down hill, creating stony slopes and exposing granite bed rock - as the famous tors of Dartmoor. These features all date from the last ice age, which finished around 10,000 years ago.

300 million years ago: molten magma rises
The mountain belt grew so high that its roots were pushed down deep into the Earth that they began to melt. This molten magma was then pushed upwards through the heart of the mountains, eventually cooling as crystalline granites, such as those of Dartmoor.

9,000-4,000 years ago: massive deforestation
After the ice melted Dartmoor became cloaked in woodlands and people arrived to hunt the forest animals. They also began to remove the forest, first by burning to create areas where animals could be more easily hunted and later on a much larger scale for agriculture. Climate changes and higher rainfall, however, washed nutrients from the soil which became poor and acid and blanket bog began to creep across the high moor where trees once grew. Today much of this area remains almost devoid of trees but the blanket bog itself is now recognised as a habitat of international importance.

360 million years ago: volcanic fury
Violent volcanoes blasted ash and lava into a tropical sea. These deposits now form the rocky ridge of South Down and Sourton Tors and belong to the Carboniferous Period of geological time.

1972: West Okement dammed
The steep, deep valley of the West Okement River, incised over thousands of years, made it a suitable site, from a landform point of view, for a reservoir. Construction was completed in 1972 and the flooded valley now holds up to 300 million litres of water.

330-300 million years ago: the big squeeze
A tectonic plate collision between the Africa and Europe folded and fractured the rocks trapped between, squeezing them upwards to form a vast mountain chain. The Carboniferous rocks of the Meldon area were caught up in this activity and folded and fractured and even in places turned upside down! Meldon Quarry is famous for showing these features.

290 million years ago: magma distilled to make bottles
As the granite magma continued to cool and crystallise, unusual elements were concentrated in the last remaining traces of liquid, before being injected through a fissure in the surrounding metamorphic rocks. These then crystallised to form a vein of finely grained granite-like rocks - the famous Meldon aplite dyke. As a result this deposit contains many strange and unusual minerals. Its unique chemistry also made it suitable for glass production and the area was the site of a short lived glassworks in the 1920s.

300 million years ago: cooked rocks and copper
The heat of the molten granite literally cooked the Carboniferous rocks that it touched as it arrived. These hard metamorphic rocks are the source of the aggregate produced by Meldon Quarry. This has been used as railway ballast since the 1880s. This metamorphism also released fluids which reacted with limestones and cherts to form an incredible variety of new minerals including garnets and deposits of copper ore. Several small mines in the area worked these deposits, including Red-a-ven Mine, which was active in the 1820s.

335 million years ago: deep sea worlds and lime burners
The seas deepened and plankton remains sank to the sea bed to form hard, flinty rocks known as chert. Bands of deep water limestone also occur and were quarried at Meldon Pool from the 1790s to the 1890s. Well preserved remains of two limel-kilns survive in the woods below the viaduct.

80,000 to 10,000 years ago: raging torrent?
Red-a-ven Brook drains the Dartmoor granite massif and passes through several steep, rocky courses, as it descends, its valley sides often show huge boulders, which also litter a fan-like expanse near where it meets with the West Okement River. Are these evidence of violent floods as winter snows melted?

So next time you gaze at an attractive view, try to speculate on how it may have developed - think deeply, deep into time, thousands of years, millions of years - think of lost worlds and ice ages, think of stone age farmers and industrial revolutions. All signs will be there to read. Landscapes may be complex, but deciphering their hidden stories gives insights into our modern world and just maybe even glimpses of possible futures...

For further information on the area visit www.dartmoor-npa.gov.uk or www.devon.gov.uk/geology.htm
Text by Kevin Page kp@pagepymouth.ac.uk
Illustrations by Carol Mullin © DMPA www.carolmullin.co.uk
Interpretation board © DMPA 2007

The nationally important geological features of the Meldon area are protected within the Meldon Aplite Quarries Site of Special Scientific Interest and all collection of geological specimens requires a formal consent from Natural England www.naturalengland.org.uk

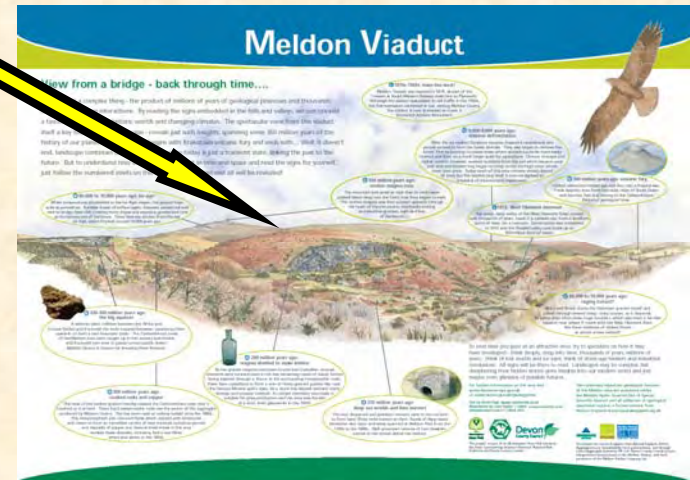


This project, as part of an Okesborough Deer Park initiative, has been a partnership between Dartmoor National Park Authority and Devon County Council.



The project has received support from Natural England, Defra's Aggregates Levy Sustainability Fund grant scheme, and through a joint Aggregates Industries UK Ltd / Devon County Council project. Interpretation board placed on the Meldon Viaduct, with kind permission of the Meldon Viaduct Company Ltd.

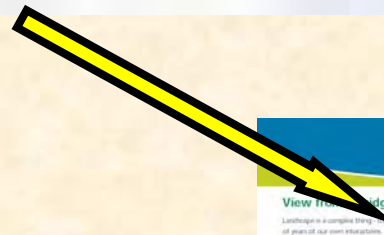
Anatomy of a signboard (1) ...the view!:



Anatomy of a signboard (2), the introduction:

View from a bridge - back through time....

Landscape is a complex thing - the product of millions of years of geological processes and thousands of years of our own interactions. By reading the signs embedded in the hills and valleys, we can unravel a fascinating story of prehistoric worlds and changing climates. The spectacular view from this viaduct - itself a key feature of the landscape - reveals just such insights, spanning some 360 million years of the history of our planet. The story here begins with Krakatoan volcanic fury and ends with... Well, it doesn't end, landscape continues to evolve - what we see today is just a transient state, linking the past to the future. But to understand how we reached this point in time and space and read the signs for yourself, just follow the numbered insets on this interpretation panel and all will be revealed!



Meldon Viaduct

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1 The hills, both the east and west, are made of Devonian granite. The granite was formed about 360 million years ago. It is a hard, igneous rock that has been weathered into the hills and valleys we see today. The granite is a key feature of the landscape - it is what we see today and it is what we see in the past.

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Devon

Anatomy of a signboard (3), the story:



290 million years ago: magma distilled to make bottles

As the granite magma continued to cool and crystallise, unusual elements were concentrated in the last remaining traces of liquid, before being injected through a fissure in the surrounding metamorphic rocks. These then crystallised to form a vein of finely grained granite-like rock - the famous Meldon aplite dyke. As a result this deposit contains many strange and unusual minerals. Its unique chemistry also made it suitable for glass production and the area was the site of a short lived glassworks in the 1920s.

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dammed



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Meldon Viaduct

View from a bridge - back through time...

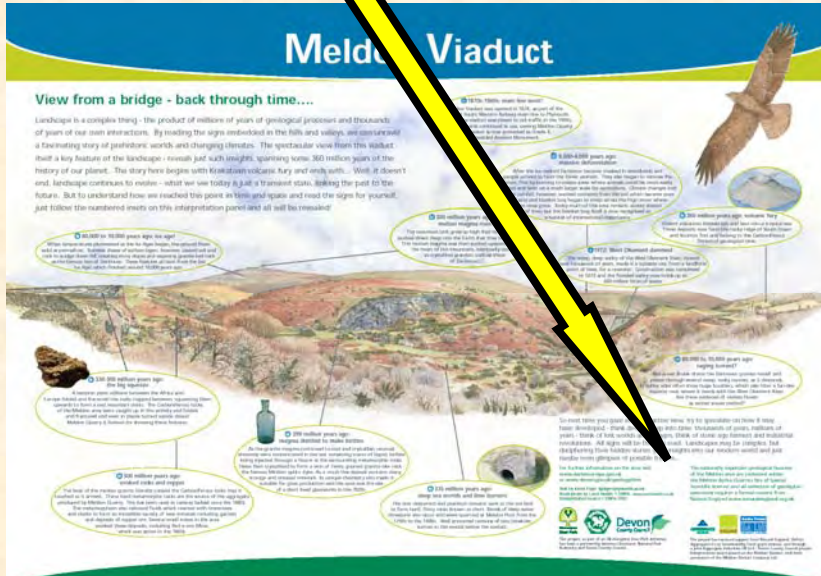
Landscape is a complex product of millions of years of geological processes and thousands of years of our own interactions. Following the signs embedded in the hills and valleys, and capturing a fascinating story of profound and ever-changing climates. The spectacular view from this viaduct itself a key feature of the landscape. It's not just such insights, spanning some 360 million years of the history of our planet. The story here is one of tectonic violence. Fury and fury unto... Well, it doesn't end, landscape continues to evolve. In today's, it's transient state, bidding the past to the future. But to understand how we reached here as hills and spurs and read the signs for yourself, just follow the numbered icons on this interactive panel and all will be revealed!

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Devon

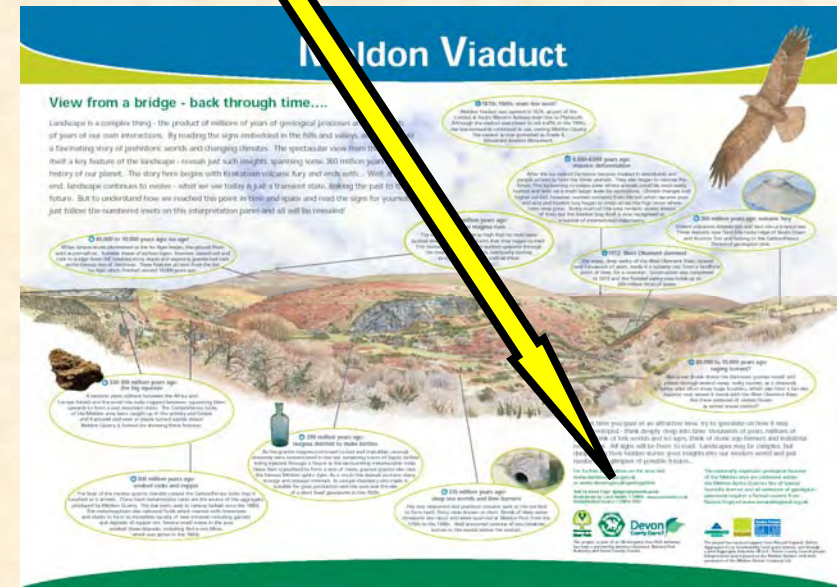
Anatomy of a signboard (4), the conclusion:

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Anatomy of a signboard (6), how to find out more:

For further information on the area visit
www.dartmoor-npa.gov.uk
or www.devon.gov.uk/geology.htm



Interpretative sign boards: Examples of good (and not so good!) practice (1):



Hunstanston, Norfolk, E England



Interpretative sign boards (2):

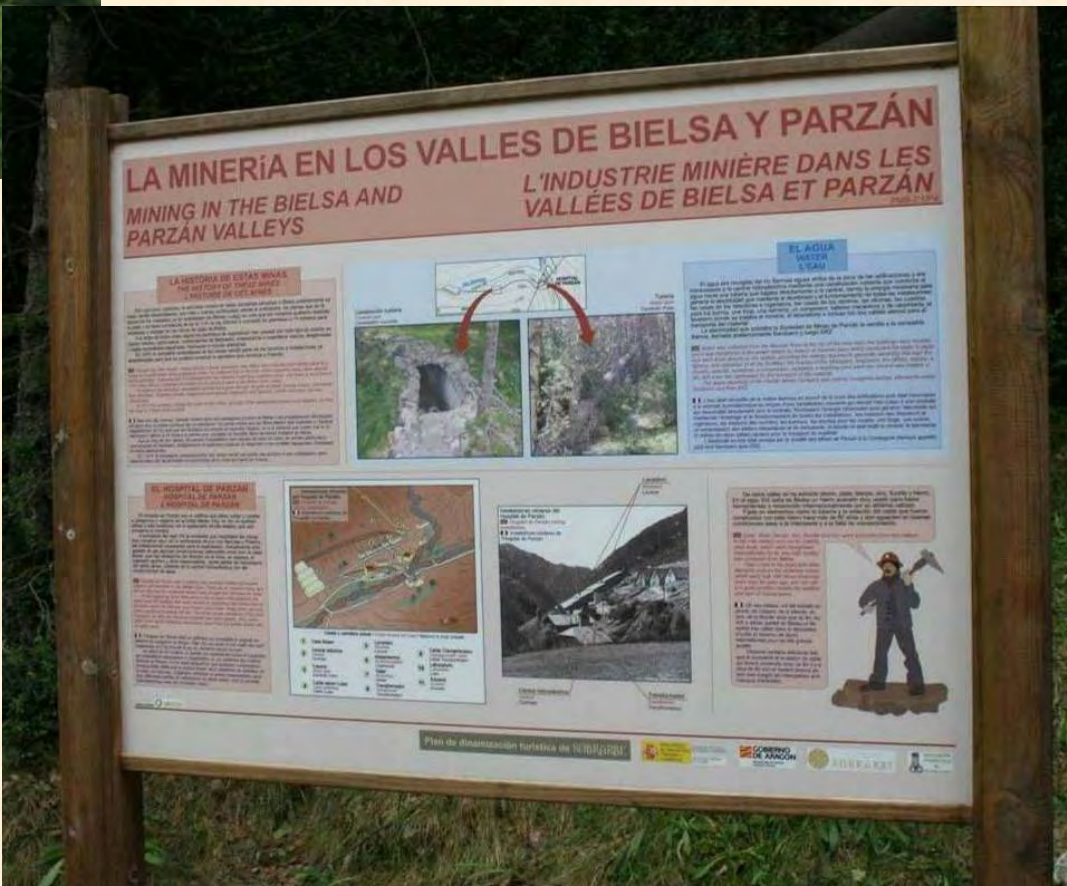


Dozeski Soteska, Slovenia

Interpretative sign boards (3):



Sobrabre European Geopark, Pyrenees, Spain (1)





Bielsa valley, Sobrabre
European Geopark,
Pyrenees, Spain (2)



Interpretative sign boards (4):

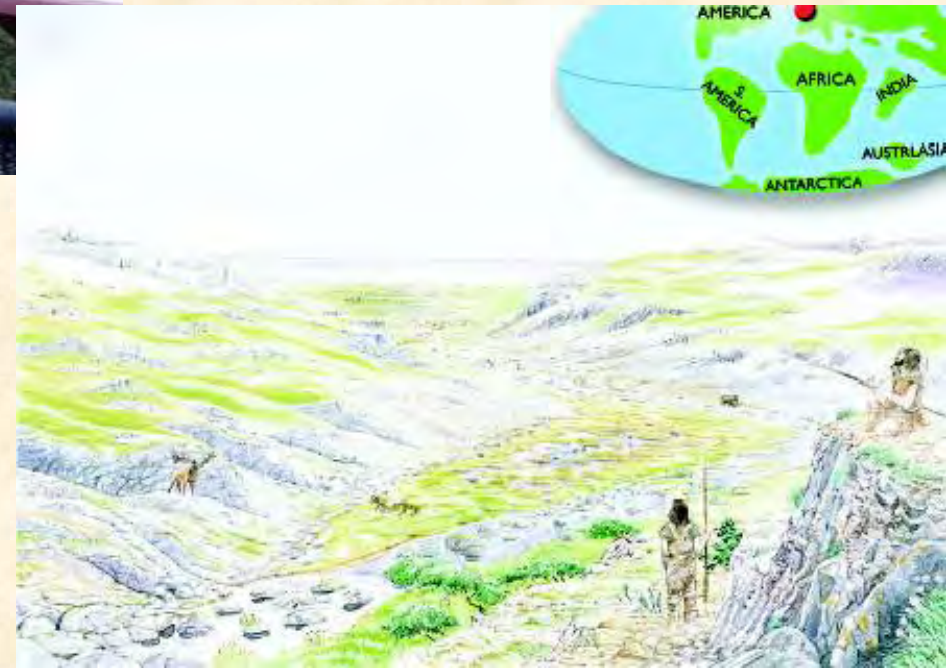


English Riviera European Geopark, Devon, SW England

Interpretative sign boards (5):



English Riviera European
Geopark, Devon, SW England

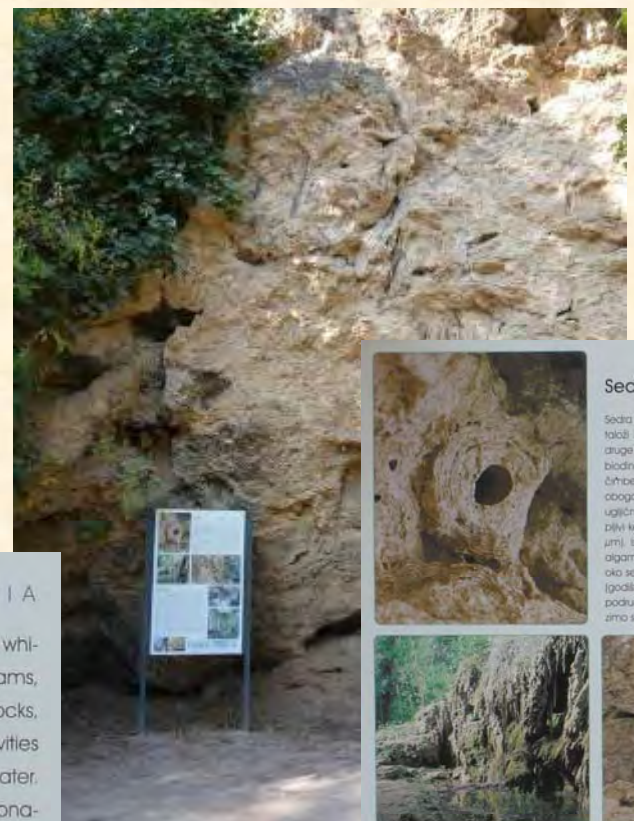


Interpretative sign boards (6):



Travertines CROATIA

Travertines are deposits made of calcium carbonate (limestone) which precipitate out of running water, creating barriers, thresholds, dams, cones and other geomorphological forms. They are biolithic rocks, and are formed in a biodynamic process of the combined activities of physical and chemical factors and the living organisms in the water. At the dams and barriers, water rich in dissolved calcium bicarbonate loses carbon dioxide with each splash, and the bicarbonate molecules break down in the water. The undissolved calcium carbonate precipitates to the bottom in the form of microcrystals (size of 10 μm). These precipitated microcrystals then become encrusted in the moss and algae, thus forming new travertines. The travertines of Skradinski buk are about seven thousand years old. It is called a "living travertine", as the deposits continue to grow today (annual growth of about 3 mm). Outside of today's course of the Krka River, in the area of the former river course active in geological development, we can find travertines up to 125,000 years old, which we call "dead travertines".



Sedra

HRVATSKA

Sedra ili travertin je kalcijev karbonat (vapnenac) koji se u tekucicama taloži iz vode hvoreći barjere, pragove, pokrivače, brade, zastore i druge geomorfološke oblike. Ubraja se u biolitne stijene, a nastaje u biodinamičnom procesu međusobnim djelovanjem fizikalno-kemijskih čimbenika i živih organizama u vodi. Na brzacima i barjerama voda obogaćena topljenim kalcijevim bikarbonatom isparavajući gubi ugljični dioksid, a bikarbonatna molekula se raspada na vodu i netopljiv kalcijev karbonat koji se taloži u obliku mikrokrstala (veličine 10 μm). Istaloženi mikrokrstali zadržavaju se na manovrhama i rastarnj algama te tako nastaje nova sedra. Sedra Skradinskog buka stara je oko sedam tisuća godina. Nazivamo je "živa sedra" jer raste i danas (godišnji prirast do 3 mm). Izvan današnjeg vodotoka rijeke Krke, na području nekadašnjeg vodotoka aktivnog u geološkom razvoju, nalazimo sedru stariju do 125.000 godina i nazivamo je "mrtva sedra".

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NACIONALNI PARK KRKA
ŠIBENIK

Krka National Park, Croatia

Interpretative sign boards (7):



Kimmeridge Bay, Jurassic Coast World Heritage Site, Dorset, SW England



Interpretative sign boards (8):



Parc Natural de Cap de Creus, Costa Brava, SE Spain



4. Geological trails

4.1: *Definition*: Self-guided written trails are:

“...booklets [or leaflets] involving the identification and explanation of a collection of linked sites which can be examined by the reader without the physical presence of an interpreter” i.e., they are “self paced structured distance-learning packages”

(Keene 1995)

4.2: Geological trails - Important considerations (1):

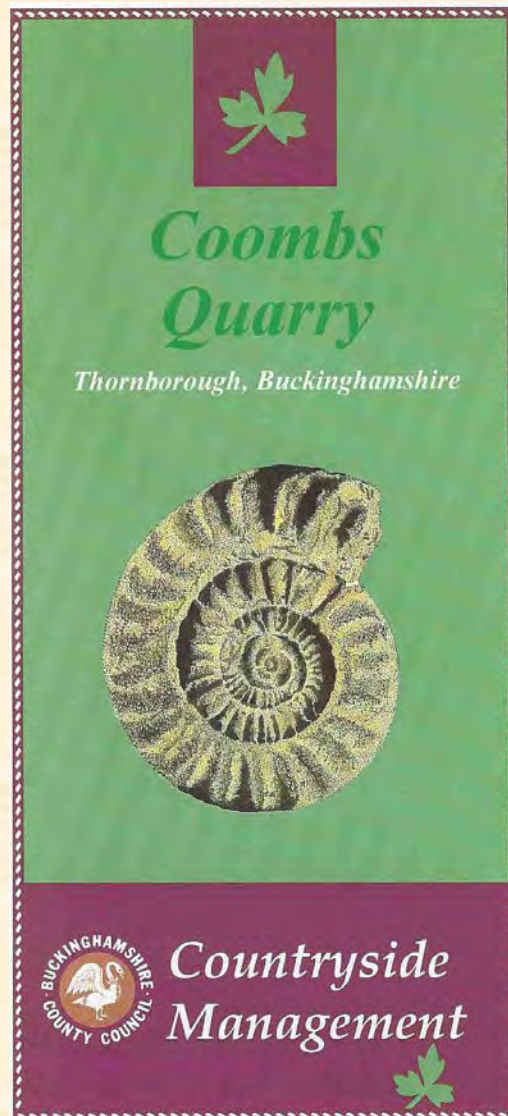
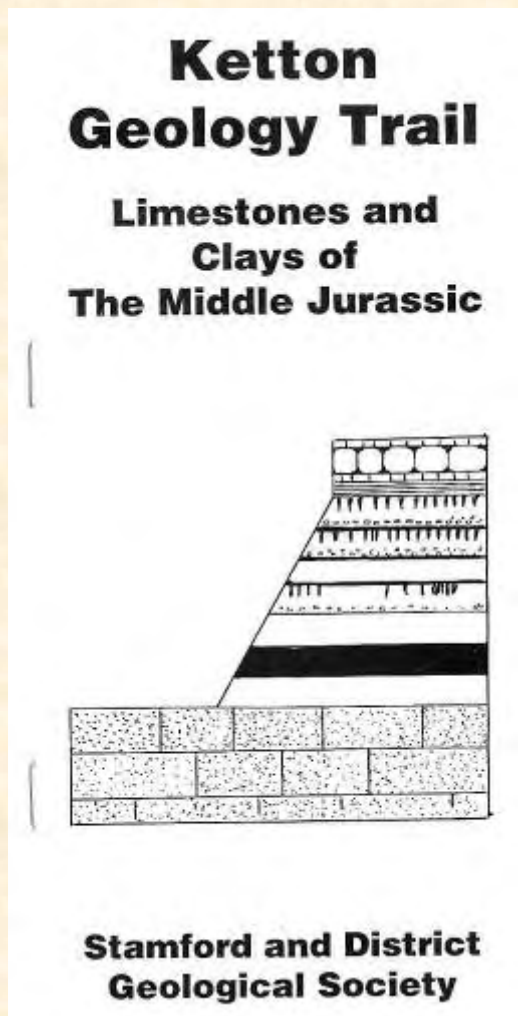
- *Is your trail really necessary?* (Or is some other technique more appropriate?)
- *Target audience?* (Who is likely to use the trail and will their expectations influence its development?)
- *Focus?* (What is the theme of the trail and what do you wish your target audience to gain from using it?)
- *Participation?* (e.g. What degree of interaction do you expect to achieve from your chosen target audience?)

4.2: Geological trails - Important considerations (2):

- *Adjustment to audience?* (e.g. Can some of the needs and expectations of other potential audiences be combined with those of your target audience without significantly prejudicing the effectiveness of the trail?)
- *Authorship?* (communicator v. specialist)
- *Logistics and finance?* (e.g. sponsorship, safety, access, rights of way, maintenance)

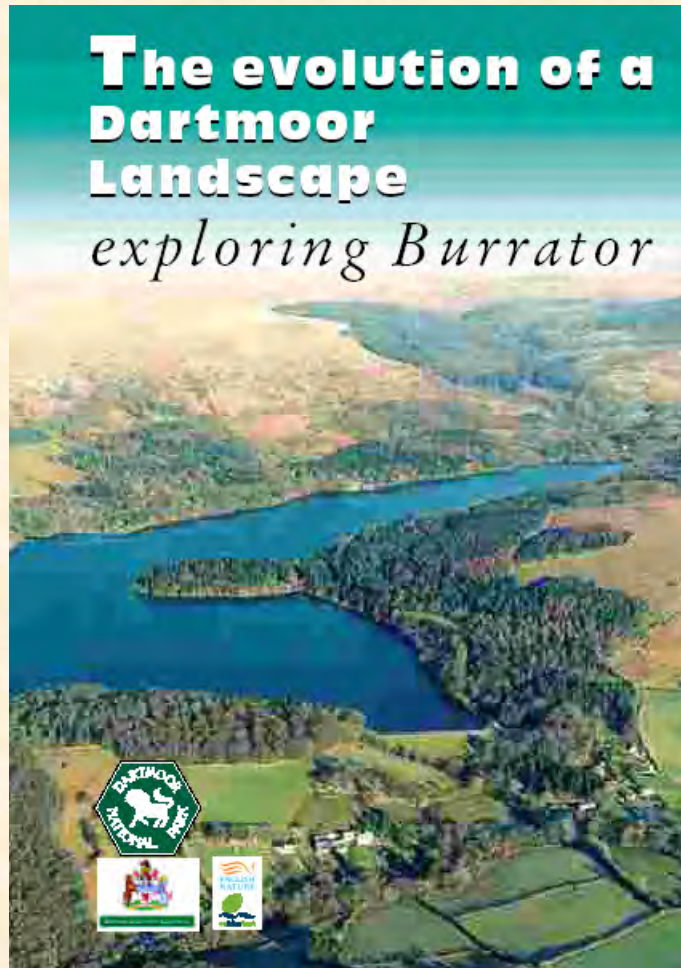
Examples of self-guided trails (1):

Leicestershire,
central England



Buckinghamshire,
central England

Examples of self-guided trails (2):



Burrator, Devon,
SW England (1)



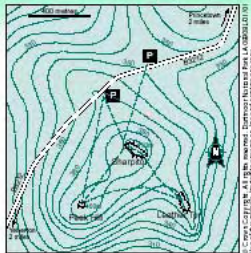
Sharpitor

The evolution of a granite landscape with tors

The crest of the tor is a gentle walk of about 400 metres from the roadside parking areas on the B3212. It is about 3 miles (4.8 km) from Princetown and the same distance from Yelverton (see inside rear cover map). Sharpitor: grid reference SX 560 703.

Standing on the peak of Sharpitor you are 410 metres above sea level. On any clear day you will have sweeping views in all directions. "There is nothing I love so much as that which stretches before me and out of sight." (André Breton)

Beyond Burrator Reservoir the land drops steeply away from the moor. Twelve miles (19 km) away, and 410 metres lower, is Plymouth Sound and the English Channel. In other directions, for example south-east (see photograph), the relief of the moor is relatively gentle. Although this is the 'high moor', the horizon looks quite level with many of the rounded summits reaching similar heights. With this view it is not difficult to reconstruct the ancient tableland or plateau into which the rivers and streams of Dartmoor subsequently eroded their valleys. Although it has been dissected by numerous streams radiating from the moor, Dartmoor stands proud of the surrounding Devon landscape. Why?



The short answer is GRANITE. Most upland surfaces are slowly reduced in height as they are eroded by slope processes and rivers. However, the granite of Dartmoor has proved more resistant to this attack than the surrounding, softer, sediments. The result is that, after a long time, the granite moor stands above the surrounding Devon landscape. Despite its present elevation granite originally formed only 3 km beneath the earth's surface. Overleaf an Information Box explains the birth of the moor in geological terms.

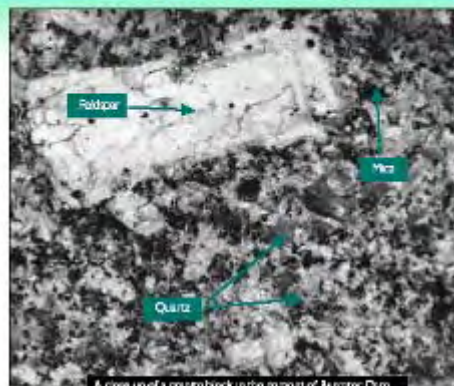


Photo: Leather Tor and the high moor
© Peter Keene

Burrator, Devon, SW England (2)

Burrator quarries

Looking at rocks in close-up



A close up of a granite block in the parapet of Burrator Dam.
© Peter Keene

Access to Burrator Quarries is best from Dousland village on the B3212 Princetown to Yelverton Road (see inside rear cover map). At the crossroads in Dousland, take the road south-east (sign-posted to Burrator and Meavy). In under a mile (1.6 km) road swings left to Burrator Quarries, the reservoir and dam.

The floor of the disused upper quarry, on the left as you curve down the hill towards the dam, has a spacious parking area (grid reference SX 550 577). Alternatively you may prefer to park by the dam, 300 metres further on, where the walk starts at the roadside wall of the dam.

Granite exposed

The granite exposed in the parapet of the dam was quarried only 200 metres from here (we will pass the quarry shortly). Although some local variations occur in Dartmoor granite, the composition of the granite in the wall is typical. Granite is an example of an igneous rock, one that has cooled from molten magma. As such it is made up of minerals in a crystalline form. The crystals here can be pitted out with the raised eye.

Large interlocking crystals

Why does granite have large interlocking crystals? Crystal size is controlled by the rate of cooling of the magma, the molten material from which igneous rocks form.

Norsworthy Bridge to Leather Tor Pit

Finding evidence for violent environmental change

Access to Norsworthy Bridge is best from Dousland village on the B3212 Princetown to Yelverton Road (see inside rear cover map). At the crossroads in Dousland, take the road south-east (sign-posted to Burrator and Meavy). In under a mile a road swings left to Burrator Reservoir.

Passing the dam on your right, keep straight on, ignoring any junctions coming in from the left. After some 1.5 miles (2.4 km) the road crosses two stone bridges spanning two streams in quick succession. Stop just beyond the second bridge where there is convenient parking for cars or minibus. The walk starts by the side of the stream, Newleycombe Brook, which flows under the bridge closest to the car park.

Carrying away the moor

Natural processes (Box E) are always changing the landscape. For example, material weathered from the tors is transported down-slope, either as solid debris or in solution. Slopes lead to the streams that will eventually transport this 'load' off the moor.

All the material that travels down slopes anywhere in the stream catchment above this point will eventually find its way under this bridge. Dartmoor is gradually being carried away. Boulders and stones are trundled or bounced along the stream bed. Finer material such as silts and clays

are kept in suspension by the turbulence of the water. Some dissolved minerals or other chemicals are carried in solution.

What is today's load?

Look at the stream closely. Do you think the stream is moving any of its load at this moment?

Box E

Landscape processes

The landscape is constantly being modified by a variety of processes acting upon it.

Walk from Norsworthy Bridge to Leather Tor Pit

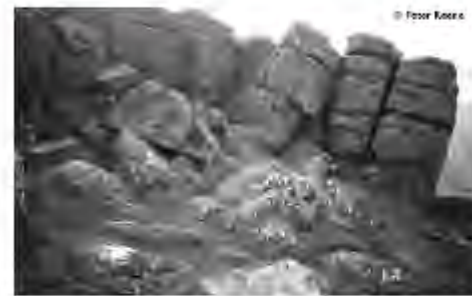


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The ice-age moor

Before leaving Sheep's Tor an exciting discovery awaits. A group of rocks and a stone landscape are replete with what this view seems to you. There is pleasure in simply absorbing a processed lot, as the introduction in this booklet suggests, there is also a satisfaction in being able to interpret what you see.

As an example, look at the photograph below, which was taken on the western side of Sheep's Tor. A wealth of data can be read into this scene, simply using information contained somewhere within this booklet.



© Peter Keene

In the background, granite, cut by sheet joints, marks the curve of the hillside. The sheet joints themselves cut by short near-vertical joints at right angles to the sheets. These vertical joints are probably the result of the release of pressure on the granite (pressure release) as the overlying rocks were eroded away. The joints have been exploited and widened by weathering. Clearly, the resulting reworked granite blocks have become candidates for impending collapse.

Blocks collapsing in the east must have produced the rubble of limestone on the left of the photograph. The mix of vegetation partly eroding the lichen-encrusted clatter suggests that today the slope is relatively stable.

It is almost as if the photograph has caught that 'moment', 10,000 years ago, when the cold stage 'engine of denudation' was suddenly turned off. In the temperate climate that followed, cold stage processes such as frost-shattering and rapid slope movements, solifluction, were largely replaced by chemical weathering and solution. While rock moving processes were put 'on hold' – dormant – but just awaiting a climatic change which could set the cold stage machinery up again.

The easiest way to return to Burrator (Dam) is to retrace your steps.

Examples of self-guided trails (3):



VISITANTES DEL PARQUE EOL TURAL DEL MAESTRAZGO - GEOPARK

El Parque Eolial (Al Maestrazgo) forma parte de la Red de Geoparques Europeos, la Red Mundial de Geoparques de la UNESCO (Global Geopark Network), que promueve y difunde el patrimonio geológico, natural y cultural de cada territorio.

Los hijos de la Comarca Aragonesa de Aragón protegen el Patrimonio Paleontológico y geológico, preservando la memoria de España en cada rincón.

En estos, los Puertos de Maestrazgo, el Gobierno de Aragón, el Ayuntamiento de Maestrazgo y el Geoparque colaboran para promover el desarrollo sostenible y proteger el patrimonio geológico de esta comarca con los órganos gestores del Geoparque.

NO ESTÁ PERMITIDO:

- Picar, perforar, pintar, coquear o deteriorar los afloramientos o las señales informativas.
- Extraer muestras de roca o minerales de los afloramientos señalizados.
- Realizar fotos de cualquier tipo.

VISITORS TO MAESTRAZGO - GEOPARK

Maestrazgo Cultural Park is part of the European Network and the Global Geopark Network of UNESCO, which promote and diffuse the cultural, natural and geological heritage of this area.

The sons of the Aragonesa Autonomous Community protect our Paleontological Heritage, preserving the memory of Spain in the area in every detail.

In these, Places of Heritage of Maestrazgo, the Government of Aragón, the Ayuntamiento of Maestrazgo and the Geopark collaborate to promote the sustainable development and protect the geological heritage of this comarca with the management bodies of the Geopark.

NOT ALLOWED:

- Hammering, drilling, painting, disturbing or damaging rock outcrops or panels.
- Taking rock samples or minerals from signalized outcrops.
- Collecting fossils from anywhere.

Aliaga Geological Park, Maestrazgo Geopark, Aragon, Spain (1)



Aliaga Geological Park, Maestrazgo Geopark, Aragon, Spain (2)

Examples of self-guided trails (4):



Geopark trail, Rab Island, Croatia

5: Heritage centres

5.1: Prerequisites for successful centres are likely to include (1):

- A location where there is a significant existing interest in aspects of the natural history or heritage of the area or site
- A location which is already frequented by significant numbers of visitors
- Multi-tiered and attractive displays, providing 'something for everyone', with each separate display clearly and separately themed
- Interactive displays, ranging from simple specimen handling tables to computer technology.

5.1: Prerequisites for successful centres are likely to include (2):

- Displays based on spectacular specimens or other interesting objects
- A range of locally produced / targeted information leaflets or other publications which enable visitors to continue to benefit from the facilities elsewhere on the site or at home
- A warden or attendant on hand to bring the displays to life or lead guided walks
- An adequate and ideally self-sustainable source of funding and support (e.g. through partnerships and community participation)

5.2: Types of geological heritage centre include:

- Simple shelter or building with flexible displays linked to geological activities
- 'Stone gardens' and parks
- Reconstructions and sculptures
- Staffed buildings with displays, educational facilities, etc
- Museums and related facilities (e.g. with integrated interpretative programmes and activities, incorporating site-specific displays and/or conservation themes)

Simple shelter or building with flexible displays linked to geological activities (1):



Yorkshire Brick Quarry,
Yorkshire, NE England

Simple shelter or building with flexible displays linked to geological activities (2):



La Rioja, Spain

Simple shelter or building with flexible displays linked to geological activities (3):



Berry Head,
Devon, SW England



Simple shelter or building with flexible displays linked to geological activities (4):



Ljubljana castle, Slovenia

Simple shelter or building with flexible displays linked to geological activities (5):



Galve, Maestrazgo Geopark, Aragon, Spain

Simple shelter or building with flexible displays linked to geological activities (6):



Hallsands, Devon, SW England



'Stone gardens' and parks (1):



Tata Geological
Park, Hungary

'Stone gardens' and parks (2):



Los Galachos de la
Alfranca, Aragon, Spain



'Stone gardens' and parks (3):



National Botanic Gardens of Wales
Carmarthenshire, Wales

Reconstructions and sculptures (1):



Crystal Palace, London,
England

Reconstructions and sculptures (2):



Galve, Maestrazgo Geopark, Aragon, Spain

Reconstructions and sculptures (3):



La Rioja, Spain



Staffed buildings with displays, educational facilities, etc (1):



Ainsa, Sobrabre European Geopark, Pyrenees, Spain (1)



Ainsa, Sobrabre European Geopark, Pyrenees, Spain (2)



Sobrabre European Geopark,
Pyrenees, Spain (3)

Staffed buildings with displays, educational facilities, etc (2):



Morwellham Quay, Cornish Mining
Landscapes World Heritage Site,
Devon, SW England

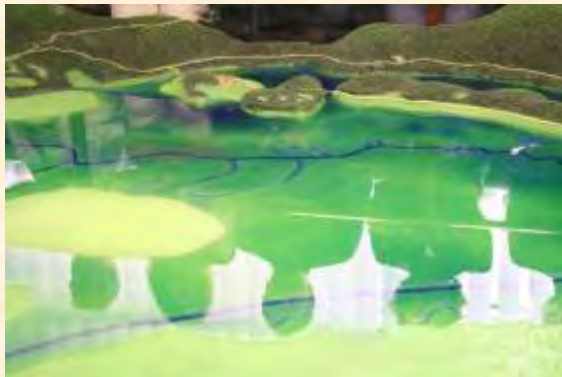
Staffed buildings with displays, educational facilities, etc (3):



Aliaga Geological Park, Maestrazgo Geopark, Aragon, Spain



Staffed buildings with displays, educational facilities, etc (4):

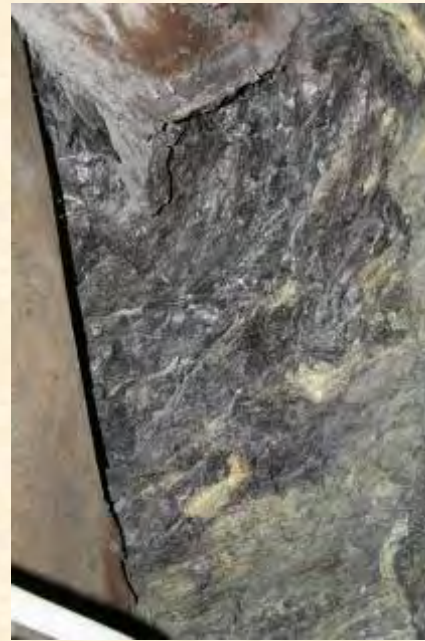


Cerknica Polje, Slovenia

Staffed buildings with displays, educational facilities, etc (5):



Antonijev Rov Mine, Idrija, Slovenia (1)



Antonijev Rov Mine, Idrija, Slovenia (2)

Staffed buildings with displays, educational facilities, etc (6):



Podezemlje Pece Mine, Idrija, Slovenia (1)



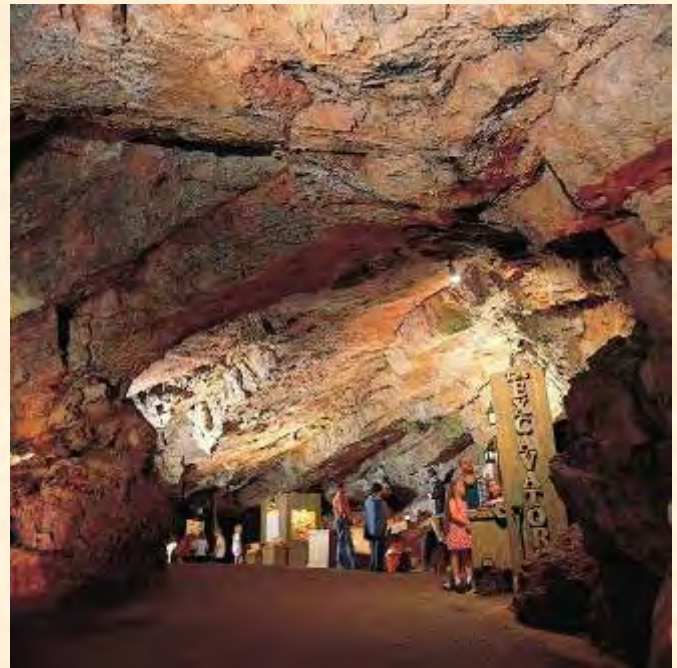


Podzemlje Pece Mine, Idrija, Slovenia (2)

Staffed buildings with displays, educational facilities, etc (7):



Kents Cavern, Torbay, Devon,
SW England



Museums and related facilities (with site-specific displays) (1):



Semur en Auxois Museum,
Burgundy, France

6: Evaluating the effectiveness of interpretative schemes

6.1: Methodology includes interviews with assessment of:

- Visitors response to panel/scheme(e.g. ignored / viewed)
- Size of groups logged
- Number of visits a year by interviewee
- Age profile of visitors
- Daily newspaper readership
- Visitors educational attainment
- Visitors level of geological education
- Common fossil recognition
- Recognition of or naming of geological systems
- Rock types believed to be at site by visitors.



Roadside interpretation at a Neogene bird footprint site in the Réserve Géologique de Haute Provence: how much geological information will these visitors retain on leaving the locality?

6.2: Implications:

- Given sufficient exposure, people *will* recall geological terms
- At present geological information cannot compete with other natural history and general heritage material
- Geological information therefore needs to be presented in isolation or integrated within a themed landscape approach to be most effectively communicated
- Additional detailed analyses of visitor responses to existing provisions are needed to aid the design and fully develop new geological attractions...

7. Interpretative Strategies and 'geodiversity audits'

- Provide a rationale and framework for developing cost-effective and suitably targeted schemes.
- Enable integrated approaches by exploring the potential of the geological resource available and by identifying established facilities or materials and potential partnerships.

What should the geoscientists role be in environmental interpretation?

- Encouraging more geologically focussed interpretation?
- Providing free advice to any organisation establishing geologically focussed interpretation?
- Or even being paid commercial rates for providing such advice?!

Peña Oroel, Pyrenees, Spain - possibly the worst sited interpretation board in Europe....



...and one of the best!

