

Scotland's Geodiversity Charter 2017-2022

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Scotland's Geodiversity Charter was launched in June 2012 and has attracted the support of 61 signatory organisations. Various initiatives have helped to take forward the vision of the Charter: that Scotland's geodiversity is recognised as an integral and vital part of our environment, economy, heritage and future sustainable development, to be managed appropriately and safeguarded for this and future generations. The Scottish Geodiversity Forum has worked with partners to revise and update the Charter during 2017.

Organisations are now invited to confirm their support for the renewed Charter as presented in this document. Please do this by Friday 15 September 2017. This renewed Charter will then be launched at an important conference at Dynamic Earth in Edinburgh on Thursday 16 November 2017 – this conference will celebrate what has already been achieved and encourage further activity.

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Introduction

Scotland has world-class geodiversity that provides the foundation of our remarkable geoheritage and essential benefits for people and nature. It has a profound influence on landscape, the economy, historical and cultural heritage, habitats and species, education, health and well-being.

This Charter encourages the promotion and management of Scotland's geodiversity and better integration of geodiversity into policy and guidance, consistent with the economic, social, cultural and environmental needs of Scotland. This will help to protect a crucial aspect of our natural heritage and deliver more sustainable management of Scotland's natural resources.

Geodiversity is the variety of rocks, landforms, sediments, soils and the natural processes which form and alter them.

Geoheritage is those elements of our geodiversity that have significant intrinsic cultural, aesthetic, scientific or educational value.

The first five years

Scotland's Geodiversity Charter was launched in June 2012 and gained the support of 61 signatory organisations. The Charter has been successful in a widening appreciation of the many facets of geodiversity and its impact on society. The international importance of this, the world's first Geodiversity Charter, is recognised in similar initiatives being taken forward in other nations of the UK. Three updates have been published to promote the Charter and share new case studies.

The Charter has encouraged varied and innovative public engagement projects organised by small voluntary organisations working in partnership: voyages in homage to Hugh Miller, a writing competition, workshops, conferences and festivals. Two of Scotland's community-led Geoparks have gained UNESCO Global Geopark status and are actively contributing to their local economies.

Engagement with and support for Scotland's Local Authorities has encouraged better awareness of local geodiversity, with several Local Authorities developing geodiversity audits and Geodiversity Action Plans (often included in Local Biodiversity Action Plans). Over 100 Local Geodiversity Sites are now designated



in central Scotland. The Scottish Geodiversity Forum and other partners have worked the tourism industry has showcased the value of Scotland's geodiversity in promoting Scotland internationally.

The Charter was established and is being taken forward by the Scottish Geodiversity Forum, with support from the Scottish Government, Scottish Natural Heritage, the British Geological Survey, GeoConservationUK and other partner organisations. These organisations will continue to promote the Charter through conferences and the sharing of best practice and support further developments by signatory organisations.

The importance and value of Scotland's geodiversity

Scotland has been shaped during 3 billion years of the Earth's history by the movements of tectonic plates, mountain building, volcanic activity, climate and sea-level changes, and erosion and deposition. This has given rise to a remarkable geodiversity, both on land and offshore. Scotland is the cradle of modern geology, with many aspects of our geodiversity renowned worldwide and contributing key aspects of world geoheritage. Together, the different elements of geodiversity record the history of the Earth, as in the pages of a 'great stone book', and form part of our natural heritage to be passed on to future generations. The rich variety of fossils contained in Scotland's rocks has contributed significantly to our knowledge of the evolution of life.

Geodiversity is not only about the past, but enables a better understanding of the geological processes that continue to shape the world we live in today and it contributes to human well-being through cultural and aesthetic values and other economic and environmental benefits for society.

Geoheritage links the people, cultures and landscapes of Scotland. It forms part of our 'sense of place' and has been a powerful influence on cultural and intellectual development, as a source of inspiration for art, sculpture, music, poetry, literature and science. Geodiversity is the fundamental determinant of the character of our valued landscapes and seascapes, while the local character and distinctiveness of our built environment reflect the use of different building stones. As a rich resource for education and research, it lends itself to cross-curricular learning through the Curriculum for Excellence and provides opportunities for lifelong learning. In addition, it provides the platform for diverse recreation and outdoor activities that contribute to the economy and people's health and well-being.

Tourism, a vital component of Scotland's economy, is largely based on geodiversity. Visitors come to Scotland for world-class scenery, distinctive history and culture and an outstanding natural environment. Scotland's Geoparks, developed by their local communities, are beacons of innovation that demonstrate how awareness and promotion of geodiversity can contribute to local economies. Geological tourism in Scotland is still small in scale, but there is potential for international marketing of Scotland as 'the home of geology'.

On land and offshore, geodiversity makes a significant contribution to Scotland's economy as a source of energy and materials, playing a critical role in: the exploration and production of mineral resources, coal, oil and gas; the development of new technologies (e.g. Carbon Capture and Storage); the location of wind and hydro power resources; infrastructure development; waste storage and remediation of pollution; and provision of fresh water.

Scotland's geodiversity provides the foundation for a rich biodiversity. Mosaics of landforms, soils, water, nutrients and natural processes support nationally and internationally important terrestrial and marine habitats, species and ecosystems. Soils store large amounts of carbon, an important consideration in climate change mitigation. We live in a dynamic landscape where understanding of river, coastal and slope processes is a vital part of nature-based solutions to management of hazards such as flooding, sea-level rise, coastal erosion and landslides.

International recognition of geodiversity

There is now international appreciation of the value of geodiversity and growing support for its conservation. The International Union for Conservation of Nature recognise that geodiversity is part of natural diversity and geoheritage is part of natural heritage (Resolutions WCC 2008 RES 040 and WCC 2012 Res 048). They also acknowledge the scientific, cultural, aesthetic, landscape, economic and intrinsic values of geoheritage and the relevance of geodiversity in underpinning biological, cultural and landscape diversity. This follows the Recommendation of the Committee of Ministers of the Council of Europe (2004) that: “geological heritage constitutes a natural heritage of scientific, cultural, aesthetic, landscape, economic and intrinsic values, which needs to be preserved and handed down to future generations”. The United Nations Organisation for Education, Science and Culture (UNESCO) also recognised the importance of geodiversity with the creation of UNESCO Global Geoparks in 2015. This is the first new UNESCO designation of this kind to be established in over 40 years and puts Global Geoparks alongside UNESCO’s World Heritage Sites.

The need for action

Geodiversity is an integral part of the natural environment that cannot be taken for granted. It is a common misconception that the many facets of geodiversity are sufficiently robust not to require conservation or active management. The loss or mismanagement of geodiversity, as a consequence of factors such as unsustainable or misguided development, changing land use or climate change, not only devalues our geoheritage but also presents real threats to biodiversity and can result in significant economic and social costs (e.g. enhanced coastal erosion or flooding). Conversely, the sustainable management of geodiversity and promotion of its importance and value can have very positive economic, social, cultural, educational and public health benefits.

Integration of geodiversity into wider environmental policy and decision frameworks is vital not only to conserve vulnerable elements of our geoheritage, but also to ensure more holistic conservation management of biodiversity, geodiversity and landscape through the ‘ecosystem approach’. Geodiversity has an essential part to play in dealing with societal challenges, including sustainable economic development, changes in climate and sea-level, loss of biodiversity and improving people’s health and well-being. The consideration of geodiversity at a strategic level will better inform robust action on climate change, and contribute to the Scottish Government’s five Strategic Objectives and the National Performance Framework.

Scotland's Geodiversity Charter: A vision for Scotland's geodiversity

The shared vision of the signatories to this Charter is that Scotland’s geodiversity is recognised as an integral and vital part of our environment, economy, heritage and future sustainable development, to be managed appropriately and safeguarded for this and future generations.

We commit to maintain, promote and enhance geodiversity as an integral part of our natural heritage, recognising its contribution to:

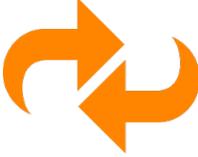
- Scotland's remarkable geoheritage
- historical and cultural development, intellectual growth and creative expression
- sustainable economic development and essential benefits for society
- informing nature-based solutions for adaptation to changes in climate and sea-level
- supporting biodiversity
- public health, quality of life, national well-being and reconnecting people with nature.

What needs to be done

The Charter encourages determined and collective action from all sectors – public bodies, industry, land owners and managers, academics, teachers, voluntary organisations and individuals – to fulfil our vision and so ensure that our geodiversity is adequately considered and conserved, and continues to provide essential benefits for Scotland.

Achieving the Vision

To achieve the vision, future action should address four main areas of activity:

	<p>Raise awareness of the importance of geodiversity and its wider links with landscape, culture and sense of place, and encourage a sense of pride through education (at all levels including schools, universities and life-long learning), promotion and interpretation;</p>
	<p>Integrate geodiversity in relevant policies to ensure sustainable management of the natural heritage, land and water at a landscape/ecosystem scale for the wider benefit of Scotland's people, environment and economy;</p>
	<p>Conserve and enhance our geoheritage and its special character: within existing designated sites and areas, by further designation of local sites, and in the wider rural, urban and marine environments;</p>
	<p>Research to improve our understanding of the role of geodiversity in providing benefits to ecosystems and people, and to address key knowledge gaps such as the functional links between geodiversity and biodiversity in terrestrial, freshwater and marine environments.</p>

A. Individuals and communities

Promote the importance and value of local geodiversity and landscapes. Join a local geoconservation group, start your own group or volunteer to help in one of Scotland's Geoparks. You can:

	Raise awareness of the importance of geodiversity and its links to local landscape and culture.
	Provide information on local geodiversity to local authorities, encouraging integration of geodiversity in policy and planning decisions and the designation of Local Geodiversity Sites.
	Undertake practical restoration and maintenance work to improve the quality of geodiversity sites in your area.

Support and guidance:

www.scottishgeology.com/find-out-more/geoconservation/

scottishgeodiversityforum.org/whocanhelp/

www.unesco.org/new/en/natural-sciences/environment/earth-sciences/unesco-global-geoparks/

Case studies:

A1 UNESCO Global Geoparks

Geoparks are run by local communities to promote and manage geological sites and landscapes with a strong focus on education and sustainable development, creating jobs and supporting small businesses. Scotland's three Geoparks run visitor centres, organise events (including festivals, guided walks, talks and geotours) and provide interpretation to help visitors and locals understand the landscape and geology of the area.

In November 2015, UNESCO (the United Nations Organisation for Education, Science and Culture) announced the creation of UNESCO Global Geoparks. This is the first new UNESCO designation of its kind to be established in over 40 years and puts Global Geoparks alongside UNESCO's World Heritage Sites. Previously operating with the informal support of UNESCO, the status of Global Geoparks is now formally recognised under the new programme. Geopark Shetland and the North West Highlands Geopark became UNESCO Global Geoparks in 2015, and Lochaber Geopark has now applied for UNESCO status.

A2 Hugh Miller: celebrating the legacy of Scotland's great geologist, writer and social campaigner

In 2014 and 2015, two multi-disciplinary sailing voyages celebrated the rich legacy of Hugh Miller (1802-1856). Miller was many things – writer and newsletter editor, key figure in the Free Church, traveller and social campaigner, fossil collector. His book, *The Cruise of the Betsey* about his summer travels in the Inner Hebrides documented the social conditions of the islands and the impact of the disruption – as well as his geological discoveries.

These voyages brought together writers, artists, geographers, film makers, geologists and local communities. They were organised by a partnership including the Royal Scottish Geographical Society, The Friends of Hugh Miller and the Scottish Geodiversity Forum, with support from the geological societies of Edinburgh and Glasgow. These projects led to the Hugh Miller Writing Competition in 2016, that resulted in some fantastic new poetry and prose inspired by the writings of Hugh Miller.

A3 Atlantic Island Centre

This new building the Island of Luing, south of Oban, tells the story of the people, nature and landscape of the surrounding islands and provides a hub for the community, with a cafe and rich cultural programme of arts and science events. Since opening in May 2015 the Centre has made a huge difference to people's lives by being open 7 days a week all year round. Visitor numbers to the island have increased threefold, including many groups. It has created 6 FTE jobs (increasing the number of jobs on the island by over 30%) and motivated 36 regular volunteers who donate 1,000 hours of work per month to the Centre.

B. Land owners and managers

Take into account the geodiversity of the land you manage, try to work in sympathy with natural processes and landforms, and consider how geodiversity can be appreciated on your land. You can:

	Help local communities and schools to appreciate the connections between geodiversity, land use, history and biodiversity, and encourage safe and responsible access to sites.
	Incorporate geodiversity and working with natural processes into your management practice, existing nature conservation activities or policies.
	Maintain the geodiversity of your land. Seek information and advice to help you understand what you can do to manage and enhance geodiversity.
	Support responsible geodiversity research, and ensure important sites are accessible and safe for study.

Support and guidance:

SNH website - www.snh.gov.uk/protecting-scotlands-nature/safeguarding-geodiversity/
scottishgeodiversityforum.org/whocanhelp/

Case studies:

B1 Rottal Burn, Glen Clova, Angus

The River South Esk in Glen Clova is one of Scotland's leading salmon rivers. It is designated a Special Area of Conservation (SAC) for both Atlantic salmon and the freshwater pearl mussel. The Rottal Burn is a major tributary of the River South Esk. However in an effort to reduce flooding in the area early in the 19th Century, the Rottal Burn was radically straightened by digging a new channel which effectively destroyed the habitat for fish.

Around 2012 a partnership involving SEPA, SNH, Landowners, the Local Authority and the Esk Rivers & Fisheries Trust brought about the restoration of 800 metres of canalised burn to its original meandering course with the planting of several thousand native tree species. The result has been a return to a more natural flow regime. This has created a diverse riparian and aquatic habitat and brought visual enhancement of the area. It is hoped that the restoration of this dynamic geodiversity feature will in time encourage the return of freshwater pearl mussels to the Rottal burn.

The restoration of this Angus Burn, to its original meandering course, illustrates how consideration and appropriate management of dynamic geodiversity features can benefit biodiversity.

B2 SNH Remedies project

In the last 6 years, SNH has applied 'remedies' – management interventions – at over 20 geological sites. The most commonly required action is tree or scrub clearance, but there has also been graffiti removed from rock faces, measures to prevent dumping and dumped material removed (including 6 vegetation-covered vehicles at one site), and habitat management to reduce dune erosion. Implementation of remedies is ongoing and will continue in tandem with the Site Condition Monitoring programme, now in its third seven-year cycle.

C. Industry and business

Ensure that new developments aim to maintain and enhance geodiversity and provide long-term, safe access to local sites of interest for education, tourism and enjoyment. You can:

	Support efforts to encourage public awareness and enjoyment of geodiversity. Develop sustainable businesses utilising geodiversity, including tourism, local products, guiding and interpretation, retail sales and local arts and crafts.
	Develop company geodiversity action plans. Contribute to geodiversity work carried out by Local Authorities, including site audits and action plans.
	Work with natural processes as far as possible, and consider the 'ecosystem services' provided by geodiversity when planning new developments.
	Facilitate access to geodiversity features including temporary exposures, and make available records and samples as part of local and national geological record keeping.

Support and guidance:

BGS website – www.bgs.ac.uk/research/ukgeology/scotland/scottishGeodiversity.html

Taking Scotland's Geodiversity Charter forward: Tourism – scottishgeodiversityforum.org/charter/

Case studies:

C1 Lochaber Geopark: development of business opportunities

Lochaber Geopark is a community-led Scottish charity run by a volunteer board of Directors, with the support of many other volunteers who staff our Visitor Centre in Fort William High Street. We employ three part-time staff to manage the Geopark and Visitor Centre (2 FTE posts). Lochaber Geopark also employs a full-time café manager at the 'Darwin's Rest' café, craft shop and information centre in Roy Bridge, at the entrance to the Glen Roy National Nature Reserve and the Parallel Roads of Glen Roy. These developments were made possible by a three-year business development grant from Highlands and Islands Enterprise in 2016. The business plan is for Lochaber Geopark to become self-sustaining, by selling our own brand of merchandise, including 'Ben Nevis' chocolates, books, maps and guides. We also sell high-quality craft goods from local suppliers, and books about local culture and Scottish geology. Our goods and information are also available at a growing network of 'Lochaber Geopark Info Points' throughout the area.

Lochaber Geopark is a vigorous, active organization, formed in 2002. In June, 2016, we were evaluated by an international mission, who reported that Lochaber has 'great potential to be a very good UNESCO Global Geopark'. Our application has been deferred for two years to enable us to obtain permanent, core management funding.

C2 Mineral Products Association – management of geodiversity in quarries

[case study to follow]

C3 Scottish Carboniferous Research Park / East Ayrshire Council area for conservation

The late 18th to mid-20th century industrial prosperity of Scotland and its urban development depended upon the extensive deposits of approximately 325 million year old Carboniferous coal, ironstone and oil shale. Opencast coal sites at Spireslack in East Ayrshire and at Mainshill Wood in South Lanarkshire are now unique and stunning geological exposures. These sites can be retained for a wide range of uses and developed to provide a rich visitor and learning experience of coal geology, the coal industry and a way of life for previous generations of Scots.

The Scottish Mines Restoration Trust, the British Geological Survey and partners are exploring ways to fulfil the potential of the sites as an open-air laboratory and learning platform, alongside a rich visitor experience that can support local businesses and communities.

D. Local authorities, public agencies and Scottish government

Ensure that due consideration, management, enhancement and promotion of geodiversity and Local Geodiversity Sites are an integral part of decision making, and support action by local communities to achieve this. You can:

	Promote Scotland's geodiversity as an asset that provides a sense of place for local communities and adds value to visitor experience and enjoyment.
	Acknowledge the value and importance of geodiversity in policy and guidance at national and local level, and seek advice from appropriate expert bodies and agencies in decision making.
	Form partnerships with local geoconservation groups to audit geodiversity sites and develop geodiversity action plans, and involve local communities in collating information about sites of interest.
	Encourage developers to allow access to temporary exposures to record and sample, and to contribute borehole and other factual geological data to the British Geological Survey.

Support and guidance:

SNH website – www.snh.gov.uk/protecting-scotlands-nature/safeguarding-geodiversity/protecting/local-geodiversity-sites/

BGS website – www.bgs.ac.uk/research/ukgeology/scotland/scottishGeodiversity.html

Taking Scotland's Geodiversity Charter forward: Advice for Local Authorities – scottishgeodiversityforum.org/charter/

Case studies:

D1 Clyde Marine Partnership, integrating geology into marine planning

The Clyde Marine Planning Partnership is tasked to create a statutory marine plan for the Clyde marine region. The geodiversity of the Clyde has a significant impact on its shape, function and ecosystem. The sediments play an important role in waste breakdown and detoxification of the water as well as supplying the nutrients and minerals that form the basis of the food chain. Soft muds provide essential habitat for *Nephrops* which form the basis of the Clyde's main fishery and intertidal mudflats support international numbers of wintering birds. In providing source material for replenishing the beaches the seabed geology is integral to the amenity value of the local coast and the raised beaches in the area provide the base for a number of world renowned golf courses. The topography of the seabed and the surrounding hills plays a significant role in everything from tidal dynamics to wind patterns. The wealth of geodiversity makes the area fascinating for everyone from university students to rock climbers. It is a perfect training ground for a wide range of skills, from geologist to submarine helm or kite flyer!

D2 Designation of Local Geodiversity Sites in the Lothians

Lothian and Borders GeoConservation has worked with City of Edinburgh Council, West Lothian Council and the British Geological Survey to identify 80 sites with important local geodiversity. The City of Edinburgh Council designated 30 geodiversity sites as Local Nature Conservation Sites in the City Local Development Plan adopted in 2016. West Lothian Council have listed 51 West Lothian Geodiversity Sites (WLGS) in Supplementary Guidance that supports the West Lothian Local Development Plan.

D3 Clyde Urban Super Project (CUSP)

[case study to follow] <http://www.bgs.ac.uk/research/engineeringGeology/urbanGeoscience/clyde/>

E. Education, research and museums

Share and promote the values and applications of Scotland's geodiversity through education, public outreach and world-class research. You can:

	Inspire teachers and learners at all levels about Scotland's geodiversity and the wider links. Develop the use of Scotland's geodiversity in outdoor learning in an Earth and environment context. Support and develop outreach activities for the general public. Improve access to, and encourage better use of existing information and data (e.g. through Scotland's Environment Website).
	Help to promote geodiversity at a policy level. Share research evidence to demonstrate the wider benefits, values and applications of geodiversity.
	Follow the Scottish Outdoor Access Code and other codes and advice about fieldwork and collecting. Support local geoconservation groups and local authorities in designating Local Geodiversity Sites.
	Develop the scientific and theoretical framework of geodiversity and address key knowledge gaps, including the functional links with biodiversity and our knowledge of marine geodiversity and its wider significance.

Support and guidance:

www.scottishgeology.com/find-out-more/teachers-page/
scottishgeodiversityforum.org/charter/ethical-rock-collection/

Scottish Fossil Code - www.snh.gov.uk/protecting-scotlands-nature/safeguarding-geodiversity/protecting/fossil-code/

Case studies:

E1 Geobus: taking Earth Science education to schools across Scotland

GeoBus is an Earth Science education resource based at the University of St Andrews, which delivers interactive workshops in Scottish secondary schools. Launched in 2012, the project has worked with over 54,000 pupils in its first five years in schools all over the country – from Gtretna to Shetland and everywhere in between.

There are currently no specific Earth Science qualifications in the Scottish curriculum and, as a result, GeoBus works with classes (and teachers) across a variety of subjects to highlight the integral and applied nature of Earth Science, as well as the opportunities available in a diverse range of related careers. In addition to classroom workshops, GeoBus also supports senior pupils carrying out project fieldwork for Geography and Environmental Science qualifications and promotes responsible approaches and best practice in an outdoor learning context.

GeoBus actively involves current researchers and industry partners in the development of teaching materials, and promotes continued interaction and learning by providing follow-up resources and teacher CPD sessions on specific topics. Acting as a uniquely well-established bridge between industry, academia and schools, GeoBus is therefore well placed to champion geodiversity in Scottish education.

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GeoBus is grateful for past and present support from RCUK, industry, government and professional societies. The current Principle Sponsors are NERC, PremierOil, Scottish Government and Shell, and the project is also supported by the UK Space Agency. For more information please see geobus.st-andrews.ac.uk, or you can find GeoBus on Twitter (@GeoBus_StA), Facebook (GeoBusStA) and Instagram (geobus_sta).

E2 Shore shapers

The shore shapers guide (www.shoreshapers.org) helps people understand more about the geomorphology of rocky coasts and how the plants and animals that live on rocky shores help shape their habitat, explaining how rock composition and physical characteristics influences the types of plants and animals that live on the shore. It was showcased by The Times and National Geographic Kids Magazine in 2014, and became a permanent exhibition in the aquarium at the Field Studies Council Centre in Millport in 2015. It is used in Scottish Wildlife Trust public engagement activities with Edinburgh schools as part of the Edinburgh Living Landscapes programme, with funding from NERC's pilot earth public engagement call. The guide was funded by Esmée Fairbairn.

E3 ClimateXChange: assessing risks to geoheritage

ClimateXChange has assessed the vulnerability to climate change of natural heritage features in protected areas, including more than 650 notified Earth Science features in Scotland's Sites of Special Scientific Interest. Scottish Natural Heritage has taken a lead role in this work alongside the James Hutton Institute, Aberdeen University and Dundee University. The project assessed risk of detrimental climate change impacts on Earth Science features based on factors including fragility, location and extent. This work will continue to consider suitable mitigation and adaptation measures to reduce the impacts of climate change for features ranked as high risk. www.climatexchange.org.uk.