CONSERVING AND PROMOTING GEODIVERSITY IN SHROPSHIRE

A SUMMARY OF THE SHROPSHIRE GEODIVERSITY ACTION PLAN

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Introduction

What is the Shropshire Geodiversity Action Plan?

The Shropshire Geodiversity Action Plan (SGAP) is a strategy to protect and promote Shropshire's exceptional geological heritage. It has been prepared by a group of organisations with an interest in Shropshire's geology and covers the area shown in figure 1. A series of such plans have been prepared nationally under a process started by English Nature (now Natural England) in 1998.

Landscapes can reflect geodiversity. Precambrian volcanics form the Stretton Hills

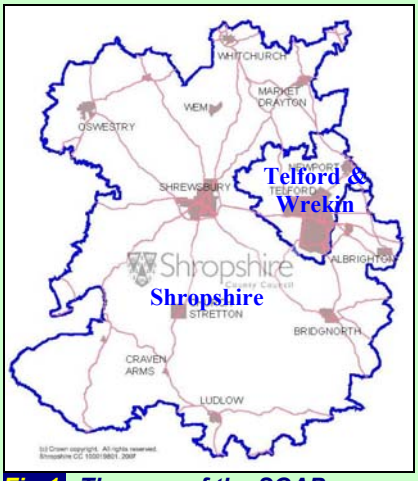


Fig 1 *The area of the SGAP*

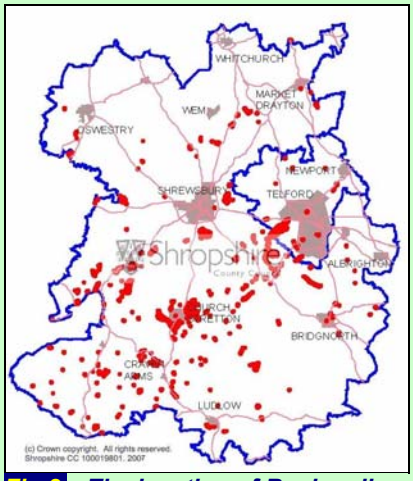
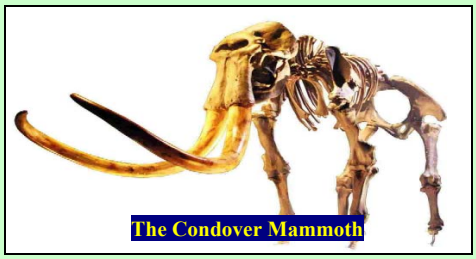


Fig 2 *The location of Regionally Important Geological Sites (RIGS)*

Plant fossils from the Coal Measures one expression of geodiversity



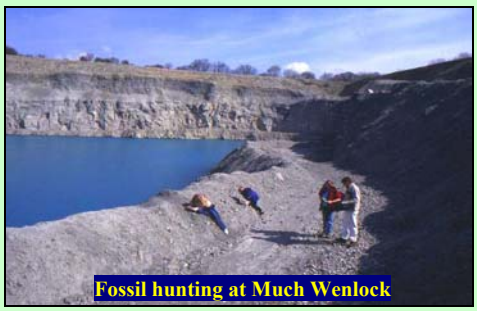
The Condover Mammoth

What is geodiversity? Geodiversity means the geological variety of an area. This includes rocks, fossils, minerals and soils, and the landscapes, cultural and economic activities which result from this variety. Our lives and environment are greatly influenced by geodiversity, from the distribution of mineral resources and water supplies to the pattern of settlements. An appreciation of geodiversity adds an extra dimension to our understanding of the natural and historic environment. It also gives us an insight into the history of the Earth, its ancient animal and plant communities and past climates.

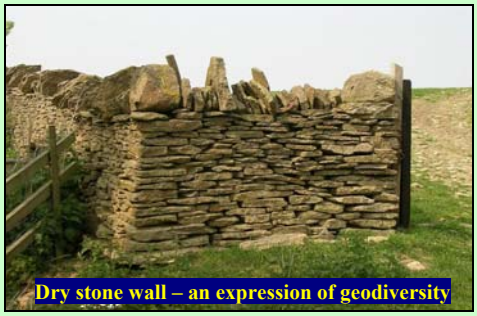
Geodiversity in Shropshire Shropshire shows exceptional geodiversity. There are over 300 important geological sites (fig. 2) and ten out of the twelve main divisions of geological time are represented. This includes the deposits of volcanoes, deserts, glaciers, rainforests and tropical seas. The county is also famous for its fossils including the Ludlow Bone Bed, the Wenlock Limestone coral reefs and, more recently, the Grinshill Rhynchosaur and the Condover Mammoth.

Geodiversity has played a significant part in the economic development of the county. At Ironbridge near Telford local supplies of coal, limestone and ironstone provided the raw materials necessary to start the industrial revolution. The county remains an important mineral producer, being the largest supplier of crushed rock in the West Midlands region. Geological diversity also accounts for Shropshire's attractive and varied landscapes, from the glacial meres and mosses around Ellesmere to the Shropshire Hills Area of Outstanding Natural Beauty with its wooded Silurian limestone scarps, imposing volcanic hills and wild Precambrian moorlands.

Historical research Shropshire was the location for pioneering geological research in the mid 19th century which established the relationships between older (Lower Palaeozoic) rocks. Shrewsbury was also the birth place of Charles Darwin.



Fossil hunting at Much Wenlock



Dry stone wall – an expression of geodiversity

Historical geological research in Shropshire.

Shropshire's Geology

An amazing story Shropshire's geology spans nearly 700 million years and charts the movement of England over 110 degrees of latitude from the southern to the northern hemisphere. The story involves plate collision, faulting and folding of rocks formed in a diverse range of environments.

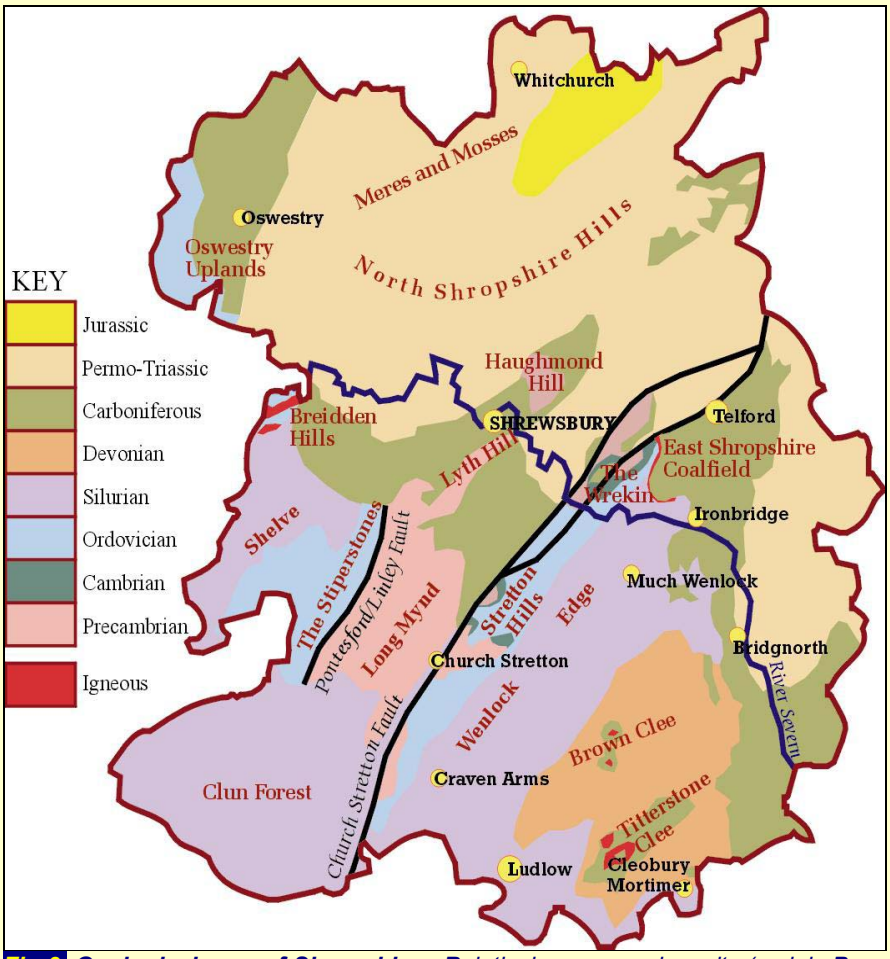


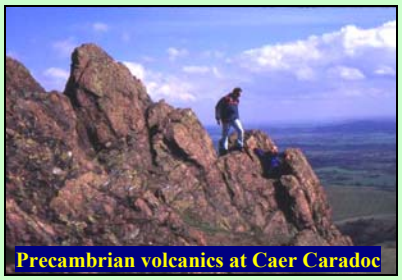
Fig 3. ***Geological map of Shropshire:*** *Relatively younger deposits (mainly Permo-Triassic with thick glacial cover) in the north and east are separated from older rocks (Precambrian to Devonian) in the south and west by an intermittent band of Carboniferous strata containing a series of small coalfields*

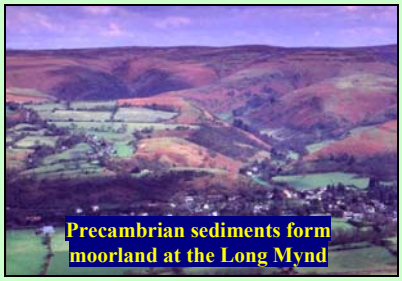
The oldest rocks At 660 million years old Shropshire's Precambrian volcanic rocks ('Uriconian') are amongst the oldest in England. Like modern Japan, they represent the remains of an island arc which, formed on the edge of one of the Earth's major crustal plates. Erosion of the island arc led to the accumulation of a massive thickness of sedimentary rocks (the Longmyndian) which was folded into a huge syncline (U shaped fold) at the end of the Precambrian, c.550 million years ago.

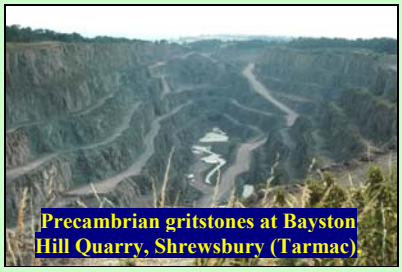
A lost ocean During the Lower Palaeozoic Shropshire was located at the edge of an ocean (the Iapetus Ocean). To the west the continental shelf plunged into an area of deeper water which was the site of significant volcanic activity in the Ordovician. To the east was a shallow marine shelf. Southern Britain moved to a subtropical position during this period, enabling the coral reefs of Wenlock Edge to form during the Silurian period.

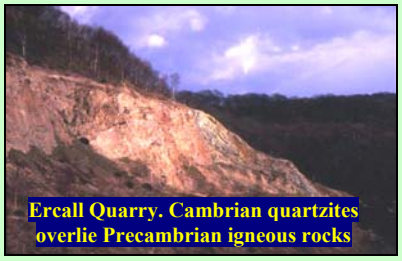
Mountains Uplift and mountain building ensued in the Devonian as southern and northern Britain collided with the closure of the Iapetus ocean. New mountains to the north swept sediment across the alluvial plains of the Marches, creating what is popularly known as the Old Red Sandstone.

Swamps and tropical seas Earth movements at the end of the Devonian saw uplift of a land mass across the centre of the county, with shallow tropical seas to the north and south. The Carboniferous Limestone of the Oswestry Uplands was deposited to the north of the land whilst the Thinner deposits around Titterstone Clee were deposited to the south. By Coal


Precambrian volcanics at Caer Caradoc


Precambrian sediments form moorland at the Long Mynd


Precambrian gritstones at Bayston Hill Quarry, Shrewsbury (Tarmac)


Ercall Quarry. Cambrian quartzites overlie Precambrian igneous rocks

The Stiperstones - Ordovician quartzite.

Silurian brachiopods (Pentamerus)

Carboniferous Limestone at Llynclys Quarry near Oswestry

Measures times Shropshire was very close to the equator and home to extensive tropical rain forests. This led to the formation of a number of small coalfields including Coalbrookdale near Telford where coal famously fuelled the birth of the Industrial Revolution.

Deserts During the succeeding Permian period Shropshire continued its northward journey into desert latitudes as part of the supercontinent of Pangaea. Wind-swept desert conditions formed the "New Red Sandstone" which is well seen in the cliffs below Bridgnorth High Town. A major river system flowed north through Shropshire in the early Triassic, giving rise to a number of prominent sandstone ridges and yielding fine building stones. There followed a return to desert conditions, producing red clays associated with salt deposits which are worked in neighbouring Cheshire. Subsidence of the Triassic basins heralded in the warm seas of the Jurassic, producing mudstones around Prees in North Shropshire which were the basis of a flourishing early brick making industry.

A new ocean America began to split away from Europe in the Tertiary period (from 65Ma), creating the Atlantic Ocean. Younger rocks were stripped off the newly elevated uplands of north-west Britain to reveal the older rocks beneath. Meanwhile, south east England warped steadily downward, with thick deposits accumulating in the London-Paris Basin.

Ice age Glaciers, swept southwards across the Shropshire-Cheshire Plain and eastwards out of upland Wales during the Pleistocene. There were two major glacial advances peaking around 450,000 and 25,000 years ago which left the north of the county plastered with till (boulder clay), sands and gravels. Thicker glacial deposits (moraines) formed at the edges of glaciers, giving rise to sandy hillocks. The hollows between them filled with water giving the attractive landscape of 'meres and mosses' so characteristic of the country around Ellesmere.

The final act Since the end of the last ice age about 10 000 years ago, our landscape has been gradually shaped into the form we see today. Initially this was by vast outpourings of water from the retreating ice sheet. Later landscape processes were dominated by weathering and river action, giving rise to the modern river valleys with their flat flood plains and gravel terraces. At this time rising sea levels broke through the chalk ridges linking Britain to the continent, forming the English Channel and leaving us as an island.

Economic geology Geodiversity has played a significant part in the prosperity and development of Shropshire. The county's coalfields have all been extensively mined. Shropshire was also an important supplier of lead and barium in the 19th and early 20th centuries. A diverse range of local building stones add character to the county's historic towns and villages. This includes the famous Triassic Grinshill stone which continues to be quarried today and has been used both locally and nationally on many prestigious buildings. Shropshire remains an important mineral producer. The county supplies around 4 million tonnes of aggregate annually and is the largest supplier of crushed rock in the West Midlands region.

Plant fossils from the Coal Measures

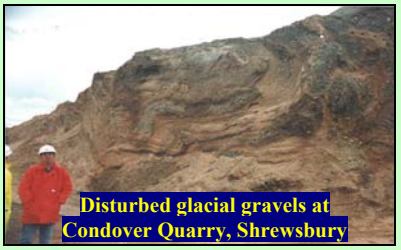
Coal Measures at Caughley Quarry

Red Triassic sandstones at Myddle Quarry Nr. Wem.

Pale Triassic sandstone at Grinshill

Cream & red Triassic sandstones. Grinshill Quarry Nr. Wem.

Excavating a peat lens at Condover Quary, Shrewsbury


Disturbed glacial gravels at Condover Quarry, Shrewsbury

Galena (lead ore).

Themes, Actions and Objectives

We have divided the SGAP into four main sections:

Theme 1 – Geoconservation and access
Theme 2 – knowledge and understanding
Theme 3 – Interpretation and geotourism
Section 4 – Delivering SGAP actions

Each section includes a series of objectives which are divided in turn into a series of detailed actions. There are 30 objectives and 100 actions, nearly half of which are identified as priorities for the current plan. Many actions will require additional resources to progress.

The SGAP is not an end in itself. The success of this process is dependent on the ability to deliver the actions. We have therefore adopted a number of strategies to maximise opportunities for achieving the actions, placing a strong emphasis in particular on partnership and joint working.

The following section summarises the objectives of the SGAP. A copy of the SGAP including the full objectives and actions of the plan can be downloaded from: www.shropshire-cc.gov.uk/planning.nsf

Theme 1 - Geoconservation and Access

The first major aim of the SGAP is to effectively conserve Shropshire's geological resources in the field and to provide access to these resources wherever possible. To this end we will:

1.1 review known important geological sites and potential new sites in order to identify potential threats such as dumping of rubbish or excess growth of vegetation;
1.2 promote geological trails;
1.3 work with site owners and managers to develop management plans for key sites, including paying regular visits to all working quarries to record important exposures;
1.4 promote geological conservation at disused quarries and mining sites;
1.5 investigate the potential for temporary and permanent engineering excavations such as road cuttings to yield interesting rock outcrops;
1.6 identify sources of the many distinctive building stones across the county, which closely reflect geodiversity, with a view to protecting these for future use;
1.7 identify those other features of the man-made landscape which have a close affinity with the local geology, in particular mining, lime burning and brick making, with a view to preserving them as part of the geological story;
1.8 prepare guidance notes for quarry managers, planners and developers on the geological potential of their operations.

Theme 2 - Knowledge and Understanding

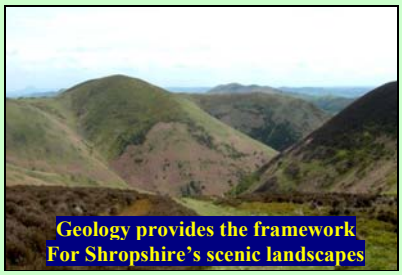
The second major aim of the SGAP is to promote knowledge and understanding of Shropshire's geodiversity amongst the widest possible audience. This includes professionals such as mineral operators and planners and also interested local communities and visitors. To this end we will:

2.1 carry out an audit of all existing sources of information relating to Shropshire's geology, reviewing and updating information and presenting it in a user-friendly format;
2.2 establish a geographic information system (GIS) based database of geodiversity, including past mineral workings;
2.3 promote the coverage of Regionally Important Geological Sites (RIGS), highlighting areas which are under-represented with a view to updating records and establishing a monitoring system;
2.4 seek to establish a local geological record centre as a central point for housing records of the county's geology;
2.5 promote increased access to academic geological information;
2.6 promote geological research in Shropshire;
2.7 promote knowledge of Shropshire's important historical contribution to the science of geology.

Theme 3 - Interpretation and geotourism

The third major aim of the plan is to promote interpretation and tourism, based on Shropshire's unique geology. This includes facilitating education to increase awareness of geological resources across the board. To this end we will:

3.1 promote geological education and tourism in Shropshire, engaging with the formal education system to encourage greater use of Shropshire's geology for field work and in the curriculum;
3.2 create and promote more tangible products for 'geotourists' in the form of specific trails, displays in visitor centres, interpretation panels etc;
3.3 assess the feasibility of establishing a geopark centred on the -

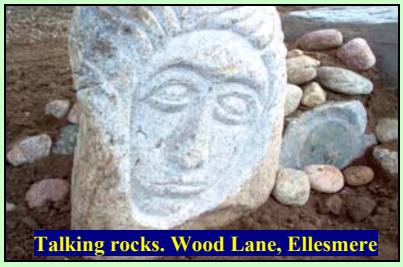

Geology provides the framework For Shropshire's scenic landscapes

Fly tipping at an old quarry

Cleaning graffiti at Forest Glen Quarry

Poles Coppice after clearance

Viewing platform. Clee Hill (Hanson)


Talking rocks. Wood Lane, Ellesmere

Shropshire Hills AONB;

3.4 raise the awareness of the value of RIGS and the need to conserve them;

3.5 promote interpretation, understanding and conservation of the geological landscape;

3.6 aim to conserve/promote Shropshire's geological museum collections.

Section 4 – Delivering actions

We will review the SGAP regularly over the next five years with a view to creating a rolling programme of successful geological projects. We will encourage all organisations, companies and individuals who have an interest or involvement with any part of our geological heritage to join us in order to ensure that these actions are fully inclusive. To this end we will:

4.1 establish a Shropshire Geodiversity Partnership;
4.2 extend the geological stakeholder network;
4.3 secure a county Geodiversity Officer;
4.4 identify and promote links with the planning system;
4.5 identify and promote links with other subject areas;
4.6 promote community involvement in geological conservation;
4.7 monitor and review the SGAP;
4.8 promote the SGAP;
4.9 secure resources to achieve actions.

The SGAP Steering Group

The actions of the SGAP will be overseen by a Steering Group consisting of stakeholders with an interest in conserving and promoting Shropshire's geology. The core of the Steering Group will comprise the existing membership of the Shropshire Geological Forum which has been meeting to discuss geological matters in the county since 2003.

Getting involved

You can apply to join the Steering Group or the partner network by sending your details to: planning.development@shropshire.gov.uk. If you would like to become involved in the SGAP or to develop projects that could help us achieve the objectives of the SGAP then please contact us.

Fossils can help us to understand past environments

An Ordovician trilobite

Geology exhibition at Church Stretton Food Fayre

Limestone flora at Llynclys Quarry

Off-white Triassic sandstones at Grinshill Quarry, near Wem. Home of the Grinshill Rhynchosaur.

Contact Information:

Shropshire County Council: Tel: (01743) 252515; **Fax:** (01743) 252505
Web: www.shropshire.gov.uk/planning.nsf ; www.shropshire.gov.uk/museums.nsf
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