

ESEF Cymru
Earth Science Education Forum – Cymru (ESEF-Cymru)
In Conjunction with
the Association for Science Education (ASE) NE Branch
“Geodiversity and Geoconservation -
the Welsh dimension”

13 March 2007

Techniquest @ NEWI, Science Discovery Centre
Wrexham, North East Wales

Presentations by

Professor Cynthia Burek

(University of Chester, Chair of NEWRIGS and UKRIGS Executive),
Cathie Brooks and Alwyn Roberts (Countryside Council for Wales) and
Dr Jacqui Malpas (Geodiversity Officer, Clwydian Range AONB)

Displays

GCSE Science and GCSE/A level Geology publications by WJEC and OCR

By recognising and protecting important Earth science and landscape features, they can be used as educational resources with clear links to Curriculum Wales and for future generations to enjoy. ‘Biodiversity’ is underpinned by ‘Geodiversity’.

1. Cynthia Burek c.burek@chester.ac.uk

Cynthia introduced the terms ‘Geodiversity’ and ‘Geoconservation’ and outlined the work of RIGS and other voluntary groups. The term ‘Geodiversity’ was first used in Tasmania in a Forestry Commission document as ‘The diversity of Earth features and systems’ (Sharples, 1993). Cynthia suggested ‘Geodiversity is the stage on which life acts out its part - it provides the props and the scenery’. Other definitions include:

‘The link between people, landscape and their culture: it is a variety of geological environments, phenomena and processes that make those landscape rocks, minerals, fossils and soils which provide the framework for life on Earth’ (Stanley, 2001)

‘Geological diversity or the variety of rocks, fossils and natural processes (Prosser, 2002)

Geological resources impact on people’s lives by shaping the landscape they live in, by influencing where settlements develop, how land is used, and the materials that houses are built out of ... Geodiversity underpins the variety of life. The immense richness of the planet’s ecosystems derives in large part from its rocks and soils and the natural processes affecting them ... Awareness of geodiversity and the Earth’s finite resources is essential for sustainable development.’ (from the Geodiversity and the Cheshire region LGAP Partnership leaflet *The Playground of Life*)

Geoconservation is ‘the conservation of geodiversity in its natural setting’ and works with nature and its timescale. While biological conservation is driven by legislation and public concern and archaeological conservation is driven by planning guidance and legislation, geoconservation (the youngest of the conservation sciences) has been driven mainly by the voluntary sector.

Geoconservation involves the classification of sites as either exposure sites (extensive sites, such as cliffs, exposures are allowed to evolve/develop/change at their own rate while retaining a geological interest) or integrity sites (those that are finite, such as a fossil site, road cutting or quarry face where features are retained without change). The type of site determines the method of geoconservation (geoconservation philosophy) for example, exposure sites will be maintained, whilst integrity sites may need some interaction such as covering, or cleaning in order to preserve site.

Site-based conservation is carried out mainly by voluntary groups. Sites may be designated as SSSIs (Sites of Special Scientific Interest), RIGS (Regionally Important Geological/geomorphological Sites) and others including SINC, LNR, NNR, Ramsar site etc.

Cynthia suggested that maybe that the RIGS acronym should be re-defined as Regionally Important Geodiversity Sites. RIGS are non-statutory geodiversity sites seeking to conserve a particular interest which use any of the following criteria:

- Educational
- Scientific/research
- Historical
- Aesthetic

They have a volunteer membership who:

- Identify sites after research
- Record sites using criteria on data sheets
- Assess sites using UKRIGS/CCW guidelines
- Notify Local Authorities and landowners of RIGS nomination
- Enter information on a Geoconservation database
- Interpret sites
- Produce publications related to RIGS
- Promote education
- Lead walks
- Give talks
- Produce urban geodiversity trails

RIGS differ from SSSIs in that SSSIs:

- Are designated solely on their research potential
- Must be the best in the UK, showing the biggest, smallest, most, or the only example of a particular feature
- Are protected by the law

2. Cathie Brooks cebrooks@btinternet.com and Alwyn Roberts gwyneth.r@tiscali.co.uk

Cathie and Alwyn shared outcomes from the research project *Using field-based geodiversity information in schools* commissioned by the Countryside Council for Wales (CCW) which they have recently completed. The project has researched in detail:

- The place of geology in the school curriculum from 3-18
- Current field geology resources
- Teachers' views on resources and future collaboration

The project addressed two key questions:

- What do schools want?
- How can RIGS and CCW help?

Initial findings

They met with teachers and relevant groups and looked at what geodiversity information is required by the school curricular and by teachers, and what is available from the North Wales RIGS sites and other sources. Initial findings were that many teachers hadn't heard of geodiversity, even if they were aware of RIGS and their resources, they were not using them. Teachers were concerned about their own lack of local knowledge. Primary teachers wanted to know how to use their playground and the views from the playground (there are 600 primary schools in North Wales) and were keen to have experts visit the school to help with explanations, provide virtual geological trails and relevant worksheets (with answers). At secondary level, geodiversity sits within the geography and the science curricular, there was a lack of confidence, with many science teachers asking for help to find and use relevant resources and to help prepare or lead field trips.

What schools want - the school curricular

Although geodiversity is not mentioned in the curriculum, there are a number of subject specific areas where it can be included, for example within 'fieldwork' or 'outside classroom' in Science, Geology and Geography at all levels from KS2 (7-11 years old) to AS/A levels, and also in 'The Learning Country' of the Early Years curriculum (under 7s). There are also opportunities to include geodiversity in cross curricular teaching and learning, for example:

- Curriculum Cymreig
- Education for Sustainable Development and Global Citizenship (ESDGC)
- Personal and Social Education (PSE)
- Key skills, Learning Pathways (14-18)
- Welsh Baccalaureate

Geodiversity fieldwork is specified in both the GCSE Geology (approx 1,000 WJEC candidates a year) and A level Geology (approx 1,600 WJEC candidates a year). Only two awarding bodies, WJEC and OCR, offer A level Geology. The WJEC Science

curriculum doesn't specify fieldwork and in Geography it is possible to choose 'human geography' rather than 'physical geography' and therefore miss/avoid physical geography fieldwork. 20% of WJEC (**Geology??**) candidates are based in Welsh schools; the remainder are at school in England.

The report project prioritised Early Years, KS4 Science, AS/A level Geology and AS/A level Geography as areas where geodiversity resources were most needed by schools. Questionnaires were sent to primary and secondary schools in North Wales and Anglesey, these were followed with discussions with teachers by phone and face-to-face and discussions with staff at residential fieldwork centres.

What schools want - the teachers' views

The primary sector showed considerable interest in the urban geological trails, virtual geological trails and work sheets, in the development of field-based resources of the school grounds and the local area with hands-on activities, with initial help being provided by teachers.

Geography, Geology and Science teachers in the secondary sector each had different requirements. Geology teachers were interested in detailed resources or a few selected safe RIGS sites, which should be developed along with a web-site providing information about all RIGS sites. Science teachers wanted internal assessment tasks based on the Earth science content of the new GCSE Science specifications. Geography teachers were impressed with the urban geological trails and asked for more, thought the local RIGS sites would be ideal for short visits and asked for short video-clips to help explain features. They also felt that virtual field trips would be a good way of introducing the work, or as a follow up to a field trip.

What is available – N Wales RIGS, NEWRIGS, Gwynedd and Mon

As a result of their geodiversity audit, NEWRIGS has identified 127 sites of which 38 have an educational potential. Ten urban geology trails (leaflets, some with posters) have been produced.

What is available – other field-based Geodiversity materials

There are a number of free downloadable geodiversity resources specifically developed for educational use including:

- UK RIGS Earth Science On-Site Project (ESOS)
- Earth Science Education Unit (ESEU)
- Earth Science Teachers' Association (ESTA)
- Natural England
- Joint Earth Science Education Initiative (JESEI)
- Quarry Products Association (QPA)

There are also examples of models of regional geodiversity resources including:

- Natural England
- Educational Register of Geological sites in Devon
- Foundations of Mendip
- Scottish Earth Science Education Forum (SESEF)

- Assynt Geopark (Scotland)
- The Outer Bristol Channel Marine Habitat Study

Conclusions – How can CCW/RIGS help teachers and schools?

In order to provide teachers and schools with what they need, RIGS material needs to be adapted to suit the individual needs of the different sectors:

- Foundation/primary – interest in immediate home/school area (including indoor and outside the classroom e.g. school grounds). CCW/RIGS can help by setting up school clusters (in conjunction with Careers Wales and General Teaching Council for Wales) and preparing geodiversity resources including generic worksheets.
- Primary/secondary – regional interest. CCW/RIGS can help by preparing geodiversity resources and worksheets (including photographs and risk assessment).
- Secondary – regional interest. CCW/RIGS can help by liaising with teachers to identify a limited number of sites which match their needs and the needs of the curriculum, provide internal assessment papers for KS4 Science, field trips using local specialist knowledge, worksheets and resources.
- A level/teacher – national interest. CCW/RIGS can help by adapting RIGS material so that it is in a form that teachers/students can access for their individual needs, provide virtual information on sites with access difficulties and include regional background information, interactive location/site and geology maps, photos and investigation ideas on the website.

Possible role for ESEF Cymru

Cathie finished by suggesting some possible objectives for ESEF Cymru whose aim is 'to promote Earth science in education and to bring together all relevant organisations in pursuit of this'. Possible objectives include:

- Identify why there is so little geodiversity taught in Welsh schools
- Identify/rectify why many science teachers do not enjoy teaching Earth science
- Contribute to the promotion of Earth science in the curriculum
- Maintain close links with curriculum development WAG/WJEC where fieldwork is under review
- Co-ordinate with Welsh Baccalaureate
- Lobby WAG for the inclusion of geodiversity in the development of criteria for Education for Sustainable Development and Global Citizenship
- Participate in DfES consultation to illustrate how the Outdoor Manifesto can be fulfilled through geodiversity
- Ensure field-geodiversity resources for Wales are so exciting that teachers will choose to use geodiversity to illustrate more generic topics and acquire skills
- Provide resources closely linked to needs of curricula and teachers
- Lobby for funding to provide geodiversity materials and INSET (in service training) based on identified needs

With imminent educational changes, the Earth science community have an opportunity to be involved and make a positive difference. Changes in both the GCSE

and A level Science specifications should include geodiversity and future geodiversity resources must have a close link with the new specifications. In Geography there will be a movement away from large projects and the development of RIGS sites close to schools would be an advantage. Geology sites illustrating past climatic change in North Wales should have priority. Welsh Baccalaureate schools (75 centres in Wales) should be encouraged to include field-based geodiversity in their core. There is also the introduction of 'Foundation Phase' (3-7 year olds) in Welsh Primary schools from September 2008 which will include far more outdoor learning. Now is the time for action.

3. Jacqui Malpas jmalpas@geodiversity.co.uk

Jacqui showed how schools and others can make the most of the Clwydian Range. It is the first Area of Outstanding Natural Beauty (AONB) in Wales that uses a Local Geodiversity Action Plan (LGAP), as a tool to raise the awareness and understanding of geodiversity. Working in partnership with NEWRIGS (North East Wales RIGS) and AONB, the aim is to clearly identify geodiversity as 'the link between people, landscape and culture'. The area is ideal for geotourism with beautiful landscapes, heathers and hill forts and with a large catchment area including Manchester and Liverpool which is less than an hour away.

NEWRIGS and AONB have common goals (identified from Geodiversity Audit of NE Wales):

- Conservation
- Management
- Increase awareness of importance of landscape to wellbeing
- Enhance information available

In order to achieve this, the Geodiversity Project (started in August 2006) will:

- Guide management, conservation and interpretation of geological features
- Identify with threats and opportunities
- Engage with:
 - Conservation agencies
 - Industry, communities
 - Education
 - Tourism
 - Economic development
 - Local groups

A geodiversity audit was carried out between 2004 and 2006. Based on findings, communication will take a holistic approach, working with biodiversity to promote a greater understanding and wider awareness of geodiversity. Education will be aimed at all levels, both formal and informal. AONB Management Plan will influence policy and strategy and there will be clear goals for conservation and management of landscape and specific sites.

The overall education objective is to develop six field-based education sites that can be used at all levels (initially with KS2 and KS3 and then developing further

resources, training and workshops so that the sites can be used for GCSE and A level). Resources will include teacher packs (with lesson plans) and rock boxes which can be loaned to schools. They will cover the Clwydian Range AONB LGAP and include information on other AONBs so that they can be shared with a wider audience.

The Clwydian Range AONB LGAP 'Genius Geology' Young Geologists' Club will work with other relevant clubs for young people including 'Awesome Archaeology', Anglesey Young Geologists' Club, local museums and visitor services.

A pamphlet '*Geodiversity in Clwydian Range AONB LGAP*' has been produced. The project will be used to prioritise geodiversity/geotourism actions and to encourage others to take action, supporting partners in education, geotourism, Geoconservation, planning, archaeology and helping with applications for project funding.

Jacqui's conclusion is that conservation of our geodiversity is important for a number of reasons including:

- For our well-being
 - Leisure
 - Landscapes
 - Vistas
- Education at all levels
- Future generations
- Visits to our national and local economy
- Part of our natural heritage
- Investment in the future
- Landscape management/planning
- Geotourism
- Holistic approach
- Need to work with the conservation community

The LGAP will address many of these issues.

Discussion following the presentations

- **Access and virtual field trips**

Resources, video conferencing and video links, access and virtual field trips were discussed. Footpaths have been developed in some limestone quarries to facilitate access. The coastal path gives easy access to numerous geological outcrops. Training for access to quarries and a 'Quarry Passport' may be worth following up. The 'competency certificate scheme' for group leaders/trainers is not feasible for many, including teachers because of the cost both in time (2 days training) and money. It was agreed that a future meeting would address the issues of access, health and safety and virtual field trips.

- **Rock boxes**

It was agreed that rock boxes were beneficial, particularly at primary level. There was some discussion about the whereabouts of the rock boxes that used to be provided by

the National Museum of Wales, Cardiff and whether anyone there was could re-establish this very important and much missed resource.

- **Minerals in School**

The British Geological Survey with Careers Wales are working on a project to take minerals to schools that are relevant to the school area and can be used to stimulate an interest in Earth science.

- **Development and construction in North Wales**

Local industries including, for example the importance of salt in Cheshire, are wonderful local resources and more should be made of them.

The Chair thanked the attendees: the speakers for their presentations; WJEC, OCR and others for their displays; Techniquist @NEWI for their hospitality; and the Association for Science Education (ASE) for their help in organising the first meeting of ESEF Cymru in North Wales.

End

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13 April 2007

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