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JOINT NATURE CONSERVATION COMMITTEE

GEOCONSERVATION WORK WITHIN JNCC - A FORWARD LOOK TO 2011 AND BEYOND

Paper by Neil Ellis¹

1. Introduction

- 1.1 This paper aims to provide an outline of JNCC's proposed contribution to geoconservation² set within the wider context of geoconservation work being carried out in the UK as a whole.
- 1.2 In 2006/7, work was undertaken by the country agencies and JNCC towards the development of a UK Geodiversity Action Plan (UK GAP) in consultation with key stakeholders and partners, such as the British Geological Survey (BGS), the RIGS (Regionally Important Geodiversity Sites) movement, the Earth Science Teachers Association, academic institutions involved in research, and the planning community. An important function of the UK GAP will be to provide a mandate to local areas (typically at the county level) to promote and safeguard their geodiversity. More generally, the UK GAP is intended to provide guidance and a common framework for geodiversity action.
- 1.3 Broadly, geoconservation in the UK is summarised in the draft UK GAP as being *'To provide an environment in which the rich geodiversity of the UK can be understood, valued and conserved; making geodiversity relevant to the way we work and live, providing a sense of place and contributing to the decisions we make about a sustainable future for our environment, for both people and nature.'* Turning that vision into action will require:
 - i. building knowledge and understanding of the geodiversity resource;
 - ii. conserving and managing geodiversity;
 - iii. influencing national, regional and local planning policy;
 - iv. increasing awareness and appreciation of geodiversity; and
 - v. establishing and sustaining a framework of practitioners for carrying out geological conservation.

¹ With guidance and contributions from: Peter Doyle, Joint Committee, Colin Prosser and Eleanor Brown, Natural England, John Gordon, SNH, Stewart Campbell, CCW, Ian Enlander and Michael Dempster, EHS.

² There is often some confusion about terminology used in this branch of conservation. 'Geoconservation' is the most-accepted term today for 'geological and geomorphological conservation', or 'Earth heritage Conservation'. Geoconservation concerns the conservation of our abiotic natural environment – our geodiversity – which is itself defined as “the natural range of geological (rocks, minerals, fossils), geomorphological (landforms, landscape-shaping processes) and soil features”; although some extend the definition to the built (stone) heritage and historical literature.

- 1.4 These UK GAP aims can be further extended, from the JNCC perspective, to cover:
- i. the UK role in international geoconservation; international obligations and promotion of our experience as a world leader in the topic;
 - ii. development of an integrated, whole-landscape approach to geoconservation, informed by the 'ecosystem' approach to habitat conservation; and
 - iii. advice to Government over the impact of climate change on landscape processes.
- 1.5 The UK GAP covers a number of issues which are primarily matters for the country agencies to lead on, and only those where JNCC has, or could have, a role are dealt with further here. In this paper, issues are considered under the following headings:
- i. protected sites;
 - ii. state of the geological resource;
 - iii. geoconservation and the landscape;
 - iv. provision of information;
 - v. international geoconservation.

2. Protected Sites

- 2.1 In general, protected sites have a key role in conserving and managing biodiversity, in helping to build knowledge of the geodiversity resource, and in increasing awareness and appreciation of biodiversity. Protected sites also assist in establishing and sustaining a framework of geoconservation practitioners. In this section, the role of the Geological Conservation Review (GCR), and Marine Conservation Zones are considered. Regionally Important Geodiversity Sites (RIGS) also have a function here, but the JNCC role is largely in the provision of information, and RIGS are considered here in section 5.

Geological Conservation Review

- 2.2 Work on the Geological Conservation Review (GCR) has been confirmed as the top priority area for the future by the country agencies and by stakeholders such as the British Geological Survey (BGS), Universities and, indeed, regional geoconservation groups. The GCR programme has been adapted as a model system for geological conservation work in some other countries, and remains an important 'hallmark' for quality in geoconservation. The series of 3,000 GCR sites in Great Britain, and the parallel series of Earth Science Conservation Review sites in Northern Ireland, provide the main pillar of geoconservation in the UK. In Great Britain, the GCR site series is protected through some 2,500 SSSIs.

- 2.3 Work to update the GCR site series, and to publish the definitive statements on the importance of the sites in a 44 volume series (45 volumes including the Introductory volume), is undertaken by JNCC. This work:
- i. contributes to the resolution of casework problems, public inquiries and site management activities on geological SSSIs. JNCC has been particularly active in supporting casework on those sites threatened by coastal protection and landfilling/engineering works;
 - ii. provides the spatial and factual information that justifies the conservation case for the sites under law;
 - iii. sets standards for selecting new geo-SSSIs (the GCR site nomination process) and standards for the monitoring of the nature conservation condition of geo-SSSIs based on GCR criteria;
 - iv. is important to our stakeholders and partners in research activities and has enabled us to establish an invaluable network of geological experts. The research itself enhances conservation value of sites, in support of our wider geoconservation goals; e.g. in modelling the state of the future environment, from sea-level change to landscape development by rivers and landslides, in other words, providing the information that enables environmental forecasting
 - v. supported the establishment of a geo-World Heritage Site in Dorset - East Devon, and helped create several UK 'GeoParks' (a UNESCO-supported initiative);
 - vi. is used to support a wide range of promotional and educational initiatives from geotourism, site interpretation and fieldwork for the benefit of the students and the general public.
- 2.4 Thirty-three volumes of the 45-volume series have been published to date; publication is now in-house; books are produced using desktop publishing and digital printing methods. Costs of publication are small in proportion to the costs of producing the text. All of the texts for the, as yet, unpublished books have been commissioned and completed or virtually completed, and it is intended that the production of the books in press or in preparation will be completed in the calendar year 2009/10. The remaining net costs (excluding staff costs) of publishing the last 12 books of the GCR series are estimated at £60k over the remaining term of the publications project (i.e. over three financial years).

- 2.5 The Joint Committee has previously agreed that the GCR site series should be progressively, and systematically, kept up to date with panels of relevant specialists maintained for consultation purposes. To date, this work has largely been undertaken as part of the GCR publication work, but when that is completed, rapid review of the early GCR publications to bring the site-list up-to-date is desirable. In the longer-term, it is the updating and maintenance of the GCR network that will be important and which will help to initiate new ideas in relation to geological science and geoconservation.

Marine Geoconservation

- 2.6 The draft Marine Bill will provide for important geological and geomorphological areas to be protected through the mechanism of Marine Conservation Zones. The Irish Sea Pilot, undertaken during the Review of Marine Nature Conservation, tested out the feasibility of identifying important marine Earth heritage areas (for example, see <http://www.jncc.gov.uk/page-1616>.) and concluded (after collating the available information) that they would fall into one or more of the following categories:
- i. marine extensions of existing coastal geological or geomorphological sites;
 - ii. nationally-important marine geological or geomorphological areas;
 - iii. geological or geomorphological systems (e.g. estuarine systems, longshore systems, shelf-slope systems).
- 2.7 The Irish Sea Pilot concluded that the most appropriate approach to conserving marine geological features was to: firstly, undertake a rapid review of the available literature and databases to identify important features; secondly, to combine geological features and biological communities within marine protected areas (i.e. in the identification of Marine Conservation Zones) where this was appropriate; and thirdly, to use the marine spatial planning mechanism (and licensing controls) to conserve features outside protected areas.
- 2.8 This does not imply extending the Geological Conservation Review to the marine environment, and there is no intention of doing so. Rather, it is a proportionate measure to protect the UK's marine Earth heritage from damaging activities such as dredging or development, and work would be concluded within the timetable for identifying the national network of Marine Conservation Zones, namely by 2012, (currently, the legal provisions will not apply in Scottish or Northern Irish waters). JNCC's role would be to collate the information on important geological features in offshore waters and contribute this information to the process of identifying Marine Conservation Zones and Marine Spatial Planning.

2.9 In fact, the marine environment is proving an example of how geoconservation and biological conservation can come together in practice. For example, in relation to offshore SACs, the work has taken account of geological features in developing its approach to site selection to ensure full representation of the range of marine habitats in terms of subtidal sandbanks, reefs and sub-marine structure made by leaking gas (for example by ensuring the inclusion of biological communities representative of sand waves, iceberg ploughmarks, eskers, sand volcanoes etc are taken into account in site selection). The same is true in relation to the classification of marine landscapes (under the UKSeaMap project), particularly in relation to physiographic features.

3. **State of the geological resource**

3.1 Understanding the state of the geological resource contributes to all aspects of geodiversity activity. This section deals with our knowledge on the overall state of our knowledge, and on the condition of protected sites.

The geodiversity resource

3.2 Our record of the total geodiversity resource of the UK is extensive though not complete. The JNCC, country agencies and RIGs groups have the best/most accessible archive of information about the conserved part of the resource, and beyond that the British Geological Survey (BGS) and the Geological Survey of Northern Ireland have the largest collection of data for the non-conserved part of the resource (i.e. a record of mapped, actual, outcrops, together with borehold records). Academic institutions and museums will also have their own records of sites in which they have a particular interest. Therefore, data about the resource is distributed between geoconservationists, BGS and Universities/Museums. There are also local groups - geology clubs/fossil collectors (which are outside of the RIGS movement) - who have amassed data on sites.

3.3 There is, of course, a significant 'undiscovered' portion of the geological resource. Although there are no geological maps of UK with 'blank areas' on them, much of the geology as drawn is unexposed solid geology beneath soil; shown by geometric extrapolations made from a series of surface outcrops and borehole data. However, new quarrying, road cuttings and coastal erosion reveal previously unseen strata which have, hitherto, only been hypothesised and could be worthy of conservation for special features in the future. Under planning obligations, new excavations into bedrock are mapped by the BGS and often by local geologists, especially if the excavations are to be infilled afterwards.

Common standards monitoring

- 3.4 An agreed common standard for the monitoring of statutory protected sites has been developed by JNCC and implemented by the country agencies. Site monitoring data are collated and analysed at a UK level as part of common standards reporting. Further development of conservation monitoring standards and techniques is envisaged to tackle more complex or problematic sites such as caves, mines and active geomorphology sites; such work will feed into our ability to advise on geoconservation in the UK, through analysis of trends in the condition of geo-SSSIs. Likewise, further work on analysing the data to inform geoconservation and advice will be important. For example, it is beginning to emerge that Quaternary ('Ice Age') landscape sites are under significant threat, yet it is these sites which offer us the most data about climate change. Active geomorphological sites are already vulnerable to engineering works. As the effects of climate change and sea level rise intensify, natural process sites will be subject to change, including coastal, fluvial and mass movement sites.
- 3.5 Geosite monitoring practice and principles are continually developing and JNCC is involved in geological monitoring technique development, and is striving to understand trends in site loss and damage. Common standards monitoring techniques have been applied outside of SSSIs/ASSIs, for example to some RIGS, but our knowledge of the condition of geological features outside of designated sites is very imperfect and has not been collated at the GB or UK level.

4. Geoconservation and the landscape

- 4.1 Geoconservation at the landscape scale is expected to assist in conserving and managing geodiversity, influence national, regional and local planning policy, and also support biodiversity conservation and the sustainable use of natural resources. In this section, it is considered under the themes of general issues, and more particularly, in relation to soils.

General issues

- 4.2 The development of a landscape-scale approach to geoconservation follows naturally from the adoption of the 'ecosystem' approach to conservation, and from the further development of the remit of the country agencies towards a wider consideration of landscape in general. Historically, geoconservation has focussed in the UK on the protection of sites that have been supported in networks ('blocks') of sites with complementary interests, which remains the core area of activity. Whole-landscape considerations would build upon the network of nature conservation areas already established in providing a wider, landscape-based approach to geoconservation, thereby creating a greater awareness of the value and importance of geodiversity. This would also create the recognition that many habitat sites have geological interest, not so far identified, and would cement the link, through soils, of habitat with the solid Earth. This would also have tangible conservation benefits with the consideration of the impact of global warming, particularly with regard to

active processes in the coastal and river catchment areas. JNCC and the country agencies are well placed to provide advice to Government on the impact of climate change on the whole landscape.

- 4.3 Geological aspects have been taken into a wide range of conservation concepts, including in the characterisation of landscapes, consideration of climate-change issues including carbon sinks and sequestration, and in the management of natural processes, including the mass movement of surface substrates and in fluvial and coastal processes. Work on developing these concepts as part of overall geoconservation (and indeed wider biological and environmental conservation) is at a fairly early stage. JNCC's role will be to contribute to this concept-elaboration work, through, for example, working with the country agencies to sponsor debates externally through dialogue with universities, funding councils like NERC, bodies such as the British Geological Survey and Government. Current ideas include:
- i. increasing our understanding of the natural sensitivity of different kinds of landscape (terrains) to different land uses to ensure future land use is sustainable;
 - ii. managing whole river catchments in a manner which can accommodate changes in river flows consequent on climate change, allowing natural fluvial processes to operate to the extent practical;
 - iii. increasing understanding of the management of coastlines to accommodate the effects of changing wave energy and sediment patterns;
 - iv. management of peatlands and other organic soils for both habitat support and maintaining carbon sinks.

Soils

- 4.3 JNCC's work in soil conservation is being led by SNH and planned/ carried out as a Lead Co-ordination Network (LCN) activity. The Soils LCN will continue to deliver a programme of advisory and research work related to the natural heritage interests of soils. The need to conserve soils for conservation gain rather than agricultural objectives will be promoted actively. The LCN is already considering ecosystem sensitivity and responses to climate change and the links between geodiversity and biodiversity, and the research into this area will help focus country agency and JNCC work in this area.
- 4.4 As an LCN, the work of this group is considered elsewhere in JNCC, but the conservation benefit of greater geoconservation input to the soils work and the closer integration of soils in geoconservation activities have yet to be explored; for example in relation to landscape-scale and climate-change issues.

5. **Provision of Information**

5.1 Information provision contributes to all aspects of geodiversity. This section concentrates primarily on GCR-related information, support to the RIGS programme and on awareness-raising through the Earth Heritage Magazine.

GCR publications and database

5.2 Publication of the GCR volumes (paragraphs 2.1 to 2.4 above) has an important role in the provision of information.

5.3 Beyond the publication process itself, JNCC currently:

- i. maintains the GCR site register of sites (site addition and deletion on scientific and practical grounds)
- ii. maintains the GCR database (functionality improvements and data control); and
- iii. makes the content of published GCR volumes available in digital format via the internet.

5.4 It is important that the GCR information is maintained and updated authoritatively with appropriate quality control standards, so that it can continue to be used reliably by the country agencies.

5.5 The GCR Database is a digital ‘filing cabinet’ of the GCR site records, it is partially available ‘on line’. It is updated regularly with regard to data validation (corrections), but it is not planned to overhaul the already robust database structure during the course of the coming years. However, the structure retains capacity for addition of new ‘fields’ and data tables as necessary.

5.6 The Earth Science Conservation Review (ESCR) in Northern Ireland is the parallel to the GCR. Although preliminary links have been made with ESCR data in the GCR database structure, there is a future need and opportunity to connect this data more closely with the GCR data to create a full unified UK database for coherence in site interpretation, comparison, evaluation, justification and monitoring.

5.7 JNCC had produced on-line versions of some GCR volumes, which are available at www.thegcr.com. This website is a ‘holding site’ for eventual migration to the JNCC website proper. The intention here is to publish the whole series digitally, and add new site reports as necessary in the future. As the paper publication phase of the GCR draws to a close, this migration to digital dissemination is seen as a priority by agencies and partners, but not as a replacement for the remaining intended book publications. Libraries in Universities and the BGS value the published books highly and see electronic dissemination as a useful corollary, but with internet publications lacking the gravitas of the paper-published, refereed, scientific literature. That said, it

will not be cost-effective to produce 'Second Editions' of the published volumes when the initial publication phase is complete and updates will be maintained on electronic versions only. These versions should be active and searchable.

5.8 *RIGS support*

The RIGS (Regionally Important Geodiversity Sites) and Geology Trusts (another regional geoconservation group akin to RIGS) movements, comprising local groups, look after the important geo-sites (it is a site-based accolade, principally non-SSSI regionally important sites) in their area and promote cultural and educational activity in geological studies. JNCC has supported this movement through the provision of information, and database and monitoring models. JNCC's role in supporting the RIGS movement will become clearer as the UK Geodiversity Action Plan (GAP) is further developed. It is interesting to note that, in particular, JNCC has provided information from its archive about sites that were proposed for GCR status but did not ultimately make the SSSI grade but became RIGS sites; and that RIGS groups are beginning to adopt the Common Standards Monitoring approach for monitoring the condition of their sites, although this non-statutory monitoring activity is entirely driven by local geoconservation practitioners. The level of activity of RIGS groups across the UK is very variable.

5.9 *Earth Heritage magazine*

JNCC provides editorial input, and financial management, but no funding to this magazine (circulation over 5000), which is a key tool in dissemination of the conservation agencies' work and provides an opportunity to air geoconservation matters with the geological community, for example on fossil collecting policy. In the longer-term, it may be viable for the publication to be digital only, but consultations with the readership so far point strongly towards continuing with a paper publication for the time being. The work exemplifies and publicises inter-agency and JNCC co-operation and serves stakeholder needs in our communication goals.

6. **International Geoconservation**

6.1 This section deals with international geoconservation under two headings; international geoconservation advice, and geodiversity in the Overseas Territories.

International geoconservation advice

6.2 JNCC has formerly been much involved in international geoconservation through the work of Dr A Weighell, but since his move to Global Impact work full time, JNCC has been able to keep only an outline watching brief on developments in geoconservation abroad. The UNESCO GeoParks programme is now a firmly-established accolade for recognising internationally important sites that offer local economic and tourism benefits.

Although JNCC is involved in the GeoParks work through provision of GCR information, there are further activities that we could become more involved with, such as advice to International Union of Geological Sciences in future about 'stratotype' and 'type-locality' conservation and maintenance of their status to ensure their ongoing acceptance and validity as universal standard sites globally.

- 6.3 In the past, Earth heritage advisory work has focussed on international issues where JNCC is acting on behalf of the country agencies, providing advice to Defra, Department for Culture, Media and Sport and the devolved administrations or working directly with international organisations such as UNESCO or the IUCN. JNCC's international policy was then structured to assist - wherever possible and using the UK's experience in this area - the development of a coherent framework of international initiatives to promote geoconservation. This assisted in the establishment of the Dorset-East Devon World Heritage Site.
- 6.4 Colleagues in International Advice areas of JNCC continue to develop work that should incorporate a geoconservation element in order to be holistic, and in support of the JNCC's Global footprint work. There is a potential role for JNCC to become more involved with various committees and international initiatives concerned with geoconservation, but the benefits domestically are hard to evaluate. Without the existence of any international conservation obligations below the level of World Heritage (although the stratotype and 'type-locality' areas are a *de facto* international responsibility), and with only limited resources our impact in this area is likely to be less effective than in securing the completion of our information resource - the GCR. Our role in the future will be first to find out what geoconservation work is already being done, to identify the gaps and determine how we might contribute to the work.

Geodiversity conservation and the Overseas Territories and Crown Dependencies

- 6.5 The Overseas Territories and Crown Dependencies include some of the most important and visually impressive geodiversity in the world, including, amongst others: active volcanoes (e.g. Monserrat, Ascension Island), reefs and carbonate systems (e.g. Caribbean and Indian Ocean territories), glacial and periglacial processes (e.g. the Falkland Islands, South Georgia), and island territories with significant geological and palaeontological resources (e.g. Channel Islands, Gibraltar). The JNCC is well placed to stimulate geoconservation action in the Overseas Territories and Crown Dependencies. Clearly, such work would need to be in close collaboration with the Territories themselves, and, given limited resources, would naturally include partnership working with other bodies, and could take advantage of external funding opportunities. It is expected that growth in this area will focus on a whole-landscape/ecosystem approach assessment of specific Overseas Territories as the opportunity arises and would be taken forward in association with biodiversity conservation related work.

7. **Conclusion**

- 7.1 The coming three years will see the completion of the GCR publication series and, to the extent that resources allow, the establishment of an effective and flexible GCR database for updating and disseminating geoconservation information held by JNCC on behalf of the country agencies. The information is recognised as an essential part of the advice that JNCC offers in underpinning a wide range of activities in geoconservation in the UK, such as site safeguard (SSSI casework and management), the establishment of UNESCO Geoparks, and support to the RIGS movement for regional geoconservation activities.
- 7.2 With the completion of the GCR publication work, attention can be more fully focused on ensuring the GCR networks are maintained up to date, on the provision of GCR and other relevant information to support the wider geoconservation effort, on a more integrated approach to conservation activity based on whole landscapes, and on greater support to the Overseas Territories. Work in relation to geoconservation internationally more widely will be kept under review