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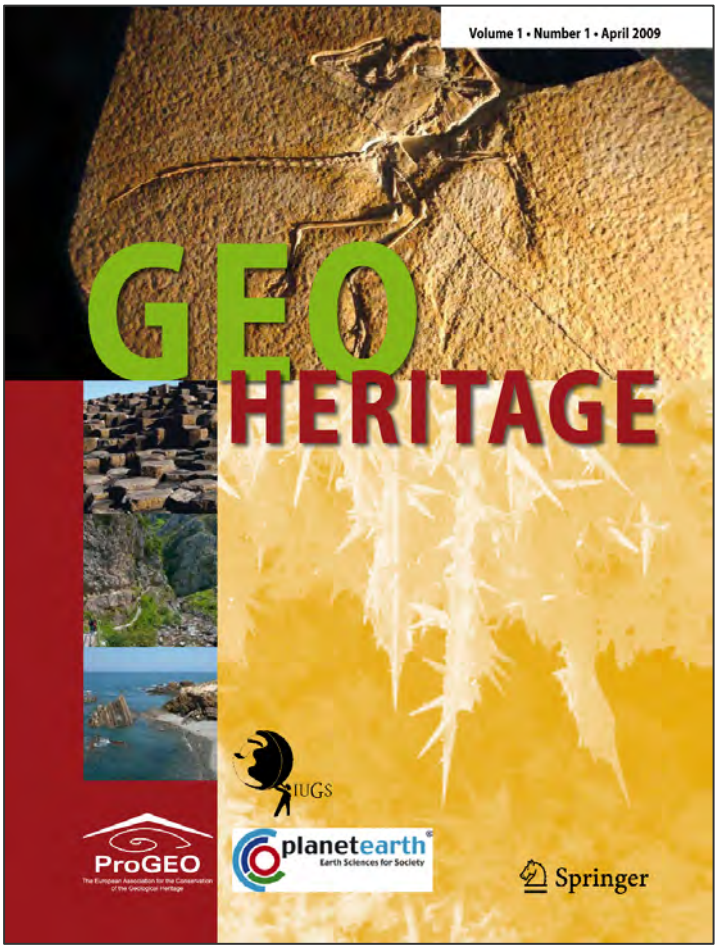

A milestone for GEOHERITAGE and for ProGEO

The first papers of our new journal available online

José Brilha and Bill Wimbledon (Editors in Chief)

The Geoheritage journal is an international journal dedicated to discussing all aspects of our global geoheritage, both in situ and portable. The journal will invite all contributions on the conservation of sites and materials - use, protection and practical heritage management - as well as its interpretation through education, training and tourism.

The first papers published on Geoheritage are already available online at:

http://www.springer.com/earth+sciences/geology/journal/12371.

Geoheritage is our journal. Submit your manuscripts on-line and assure the continuity of the Geoheritage project.

References:

Reis & Henriques, 2009. Approaching an Integrated Qualification and Evaluation System for Geological Heritage. GEOHERITAGE

Puga et al. 2009.The Betic Ophiolitic Association: A Very Significant Geological Heritage That Needs to be Preserved. GEOHERITAGE

Remember for 50 Euro per year (185 for institutions) GEOHERITAGE is included in your ProGEO membership subscription!

A major achievement towards geoconservation

For the first time in its 60-year-long history, the IUCN incorporates the conservation of geological heritage and geodiversity in its agenda.

Despite the fact that geodiversity underpins natural systems and is an essential part of nature, geological heritage has traditionally been not been a focus of the conservation movement, both by governments and by other organizations.

The General Assembly of the International Union for the Conservation of Nature (IUCN) took place in Barcelona (Spain) this last October 2008 within the framework of the Fourth World Conservation Congress. This international meeting takes place every four years, and at this opportunity the General Assembly of IUCN adopted a new resolution called **"Conservation of geodiversity and geological heritage."**

The adoption of this resolution achieved significant increased visibility for geodiversity. It's proposers aimed to initiate a new period to stop the loss of irreplaceable geological heritage. In other words, it is an attempt to avoid the continued loss of the memory of the Earth.

What is so special about this new resolution?

During the sixty years of history of the IUCN, the oldest and largest global environmental organization, most of its efforts have been towards the conservation of the biotic aspects of nature: species, habitats, ecosystems, biodiversity. However, the concept of nature conservation is holistic: natural diversity also includes abiotic aspects such as geodiversity and geological heritage. These should also need to be considered when declaring and managing natural protected areas, both in their own right and as key components that support biodiversity conservation and sustainable develpment.

IUCN has taken a lead in recognising geological heritage since 1972 through its work advising on natural World Heritage Sites, where currently 76 of the 199 sites listed are included on the World Heritage List because of their geological values. The motion aims to increase the focus on geodiversity within other forms of protected area and as a part of the consideration of the future of conservation.

The resolution adopted by the General Assembly does not imply any big changes in strategies or budgets for IUCN, which might have been a drawback towards its adoption. Instead, its short-term objective (4 years) is to include geological heritage and geodiversity in the agenda of IUCN. In other words, it calls to begin talking about these issues, which includes acknowledgement that they exist and need to be dealt with.

The General Assembly of IUCN during the World Conservation Congress at Barcelona

The motion asks IUCN to design, organize and host workshops, seminars and conferences on the conservation and management of geodiversity and geological heritage. It requests IUCN members and other partners to assist in this aim.

The long-term objective of this resolution is to incorporate the abiotic component of nature into conservation plans and strategies worldwide, so that the conservation of natural diversity and natural heritage is truly holistic and not just restricted to biotic aspects. IUCN's World Commission on Protected Areas is identified as a focus for responding to the motion, which also requests IUCN to identify a focal point for this work.

Who is behind this initiative?

The Commission on Geological Heritage of the Geological Society of Spain is responsible for the drafting of this motion and its proposal to the General Assembly of IUCN.

This scientific society became a full member of IUCN in March 2008. During the months of April and May, the Commission received some input from ProGEO (the European Association for the Conservation of Geological Heritage) and WCPA (IUCN's World Commission on Protected Areas) to improve its content.

In late May, the motion got the required support from several IUCN members, and in early June it was submitted to IUCN for consideration by the General Assembly meeting at the World Conservation Congress. During the afternoon of Saturday October 11th, the motion was voted and adopted as a new resolution by the General Assembly of IUCN.

Why is geological heritage so important?

All we know about the evolution of life is "written" (recorded) in the rocks. The same is true for past climate changes as well as other phenomena taking place ever since the formation of our planet. If we lose access to the archive recording all the events that have happened in the

Enrique Díaz-Martínez works for the Geological Survey of Spain, and Nadia Herrero for the Government of Catalunya. Both are members of the Commission on Geological Heritage of the Geological Society of Spain, and presented the motion at the General Assembly of IUCN.

past, and which is written in the big open book with the memory of the Earth (sediments and rocks), we will never be able to understand current climate processes and changes affecting the Earth.

Should we not worry about the archive containing our birth certificate or our genealogy tree? If this archive is lost or destroyed, future generations will always regret it. Similarly, we should worry about any threat or possibility of destruction of those most significant and representative geological elements of interest which record that information.

The scientific community is becoming more conscious about problems affecting geological heritage and is making efforts to educate society about them. However, management policies need support from nature conservation organizations, both governmental and non-governmental.

That is why it is important that organizations with Earth-science background become members of IUCN. With its participation at the latest World Conservation Congress in Barcelona, the Geological Society of Spain has taken the first step in this direction, hopefully to be followed by many others.

The text of the resolution adopted by IUCN explains that geodiversity is the natural diversity of abiotic elements, features and processes, including minerals and rocks, fossils and meteorites, landforms and surface deposits, groundwater and fossil energy resources.

Conservation of geoheritage is therefore important in its own right as part of a strategy to conserve the planets natural diversity. But geodiversity is also crucial because it underpins biological, cultural and landscape diversity as it forms the abiotic foundation for life. The methodology to quantify biodiversity was developed a few decades ago, and we now also have methods to quantify geodiversity. The text explains that geological heritage consists of a selection of those elements, features and processes with high interest or value (scientific, aesthetic, cultural, educational, etc.), and which must be preserved for future generations.

What is IUCN and why is this resolution so important?

The International Union for the Conservation of Nature (IUCN) is the oldest and largest global environmental organization. It is a worldwide democratic institution with more than 1,000 member organizations, both governmental and non-governmental, and almost 11,000 scientific experts volunteering from more than 160 countries.

IUCN contributes to find pragmatic solutions to the world's environmental and development challenges. Its efforts go to support scientific research, manage projects throughout the world, and coordinate the work of governments, non-governmental organizations, United Nations agencies, businesses and local communities to develop and implement policies, legislation and best practices.

The Geological Society of Spain is now part of IUCN with the objective to contribute towards the conservation of geological heritage and geodiversity. The newly adopted resolution constitutes a major achievement towards geoconservation and is only the first step forward. Much work remains to implement and put in practice the contents of the resolution at all levels. To be able to do it, all professionals and organizations working on natural heritage conservation must also get involved in this effort.

Internet links:

- Geological Society of Spain:
http://www.sociedadgeologica.es
- International Union for the Conservation of Nature:
http://www.iucn.org
- Original text of the motion:
http://www.iucn.org/news_events/events/congress/assembly/policy/index.cfm
- First news on the resolution:
http://www.sociedadgeologica.es/documentosPDF/Terraviva01ingles.pdf

Commission on Geological Heritage
Geological Society of Spain
December 2008

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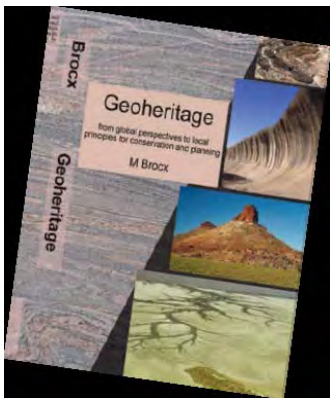
New books

Geoheritage

from global perspectives to local principles for conservation and planning.



The book is written by Margareth Brocx and published by Wetlands Research Association inc. in Australia.

It describes geoconservation history and ideas, international initiatives, legislation and policy, management philosophy and practices, and places Australian endeavours into an international perspective.

It is useful for the international public interested in Australia as well as Australian readers interested in the developing field of geoconservation.

It is practical and concrete in its approach with the aim to improve the management of Australian geodiversity so that its geoheritage may be conserved for future generations.

Based on the book Margaret Brocx was invited to present some Australian experiences for the readers of ProGEO NEWS. These are found in the following and together with the next book and our new journal it does highlight the global perspective of geoconservation.

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The History of Geoconservation

This book is edited by C.V. Burek and C.D. Prosser and published by Geological Society; UK (Special Publication 300) The book describes the history of geoconservation. It draws on experience from the UK, Europe and further afield, to explore topics including: what is geoconservation; where, when and how did it start; who was responsible; and how has it differed across the world? Geological and geomorphological features, processes, sites and specimens, provide a resource of immense scientific and educational importance.

We hope to return to the book with a review in a later issue.

Developing a tool-kit for geoheritage and geoconservation in Western Australia

M Brocx[1] & V Semeniuk[2]

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2) V & C Semeniuk Research Group; 21 Glenmere Rd., Warwick, WA, 6024, Australia

Globally, geoheritage has become important because it has been recognised that Earth systems have a story to tell, and that they are linked to the ongoing history of human development, providing the resources for development, and a sense of place, with historical, cultural, aesthetic, and religious values. In addition, Earth systems are the foundation of all ecological processes, and part of the heritage of our sciences (Torfason 2001).

To place geoheritage and geoconservation on a robust footing in Western Australia, building on Geoheritage: from global perspectives to local principles for conservation and planning (Brocx 2008), we have developed a "tool-kit", firstly to define the scope of geoheritage, the scales at which geoheritage features can be identified, and levels of significance that can be assigned to such features, and secondly, to identify geoheritage features from small scale to large scale that occur as an inter-related suites in a given area and that should be conserved as an ensemble.

Scope, scale, and levels of significance of geoheritage features

We argue that since geoheritage and geoconservation are concerned with geology, then all components of geology should be part of geoheritage. This includes the subsidiary disciplines of geology such as igneous geology, metamorphic geology and sedimentary geology, igneous, metamorphic and sedimentary petrology, structural geology, mineralogy, palaeontology, geomorphology, pedology, hydrology and surface processes such sedimentology. This range of subsidiary disciplines also traverses a wide range of scales, from global tectonics, mountain building, and landscape evolution; to Earth surface processes such as weathering, erosion and sedimentation, and at microscale, it includes diagenesis, crystal defects and deformation, amongst others. This perspective definitively places many aspects of geology, previously perhaps not recognised as part of the spectrum of geoheritage, under the umbrella of geoheritage.

The term geoheritage is used, following Brocx & Semeniuk (2007), in the following manner:

Globally, nationally, state-wide, to local features of geology, such as its igneous, metamorphic, sedimentary, stratigraphic, structural, geochemical, mineralogic, palaeontologic, geomorphic, pedologic, and hydrologic attributes, at all scales, that are intrinsically important sites, or culturally important sites, that offer information or insights into the formation or evolution of the Earth, or into the history of science, or that can be used for research, teaching, or reference.

While geoheritage concerns the heritage of features of a geological nature, geoconservation is the action that works towards the preservation of sites of geoheritage significance i.e., preserving sites of geoheritage significance once the level of significance has been determined.

Scale is important to consider in geoheritage and geoconservation since sites of significance can range from landscapes and geological phenomena at montane-scale, to that of a crystal. In many locations of the world, geological sites are important because of crystal-sized phenomena, and crystal fabrics, because it is often at this scale that the story of the Earth unfolds (e.g., the snowball garnets of Vatterbotten, Sweden, or the zoned zircons from Jack Hills in Western Australia). At the next scale in increasing size, features of geoheritage significance are represented by fossil sites such as the Precambrian Ediacara fauna in South Australia, or Hutton's classic unconformity site. Important geological and geomorphological phenomena continue to occur in increasing scale, right up to the scale of mountain ranges and major drainage basins. The level of significance assigned to sites of geoheritage significance has been defined for Western Australia in Brocx & Semeniuk (2007), but the principles are applicable worldwide. While various levels of significance have been used globally, nationally in Australia, and within Western Australia (viz., International, National, State-wide, Regional, and Local), there generally is not a definition of these terms (see discussion in Brocx 2008).

Framework to pursue identifying sites of geoheritage significance

Having defined the geological scope, scale, and levels of significance that may be assigned to geoheritage sites, we have devised a diagram showing the scope of geoheritage in terms of its conceptual categories, scales of application, and potential levels of significance. This forms the template to describing, defining and assessing sites of geoheritage significance, and for systematically obtaining information from questionnaires and literature.

Using this diagram as a framework, we identify the category (or categories) to which a site may belong, identify the scale (or scales) at which sites of geoheritage significance may occur, and assign a level of significance to the various features in a given location

Identifying sites of geoheritage significance in Western Australia

There are a number of ways that sites of geoheritage significance may/can be identified. The British and European literature provides a history of how this has been achieved, with the final outcome being an inventory-based approach. Since 1949, the assessment and subsequent selection of

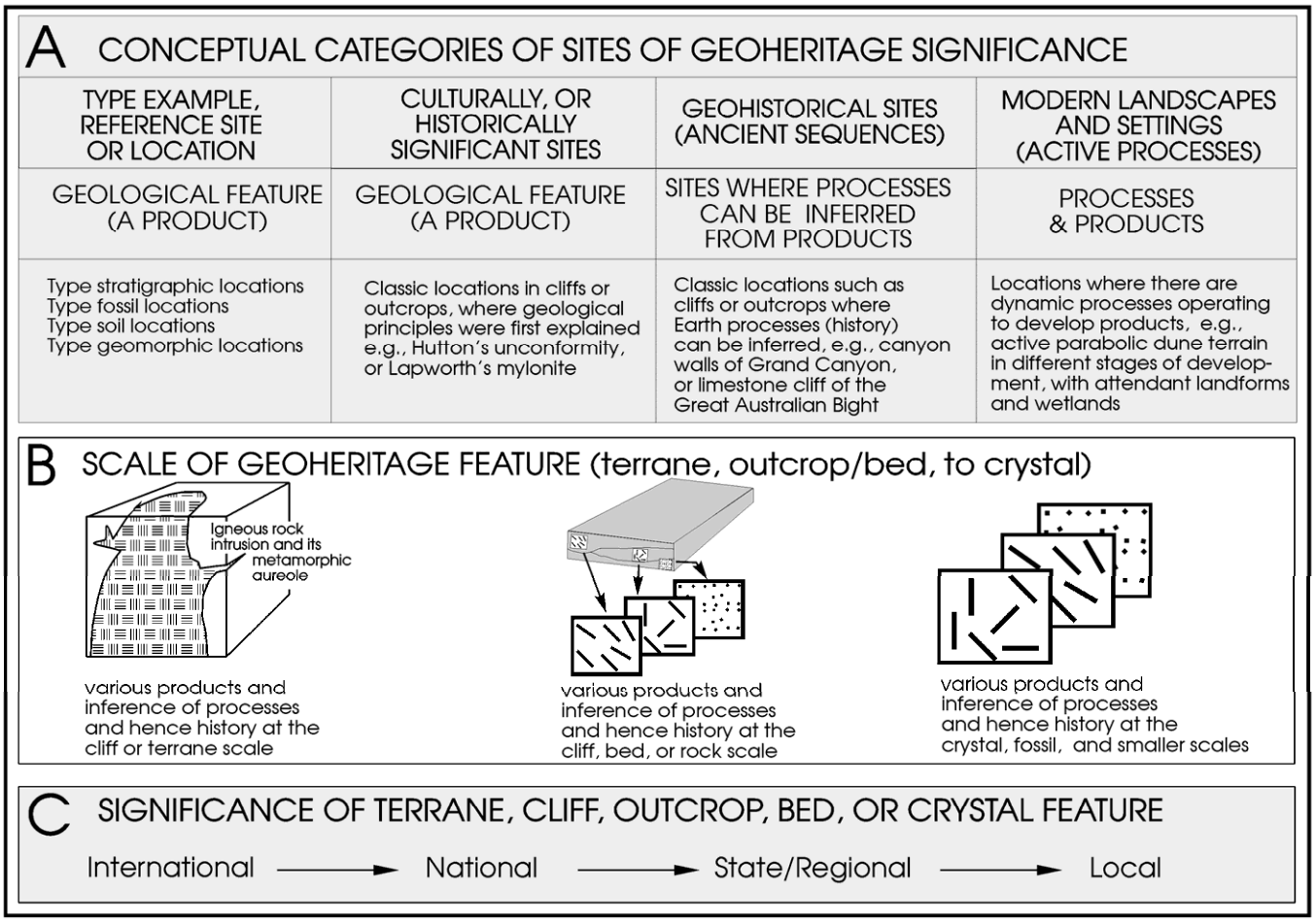

Figure 1: Diagram showing the scope of geoheritage in terms of its conceptual categories, its scales of application, and potential levels of significance

sites in the United Kingdom has been undertaken on the basis of a series of blocks which may be based on time, subject or regional divisions or combinations thereof. In Australia, as part of the Regional Forests Agreement, geoheritage was assessed within a regional framework (Semeniuk 1998). In this context, in Western Australia, we have proposed a staged three-fold approach to compiling an information database of sites of geoheritage significance. The first draws on the experience of geologists now practising in the field, i.e., people approach (questionnaires/interviews). The second draws on the experience of geologists published in the literature. The third, after identifying gaps in information, seeks to develop a State-wide systematic ordered and considered approach based on natural geological regions and identifying the geoheritage essentials of a given region. For all three approaches, there will be some degree of overlap in information and outcomes.

Geological regions provide a framework to a systematic inventory based approach, but what constitutes the geoheritage essentials of a given region? Clearly not all aspects of geology of the Earth are present in the one region, and clearly not all aspects of the geology of a region may be of geoheritage significance. The Chalk, for instance, with its geoheritage significance, is well exposed along the southern coast of England, along the Cliffs of Dover, and is an essential feature of geoheritage significance of the south-eastern and southern coast of England. Similarly, The Grand Canyon in Arizona USA is a feature of global heritage significance not found outside of its area of occurrence. In Australia, the Shark Bay area with its seagrass banks, coquina, and stromatolites is a World Heritage site not to be found or replicated elsewhere globally and so is an essential feature of geoheritage significance in coastal Western Australia.

As such, our approach is to identify those features peculiar to, or that characterise the geology of a given natural region. Identifying the various regions, and then identifying features therein, therefore, is the first stage of a systematic inventory based approach to developing a database for sites of geoheritage significance. The next stage would be to locate good examples of these features, and assess them according to the scope we have placed onto geoheritage (i.e., all matters geological), and according to the scalar and assessment techniques we have developed.

A case study of identifying the essentials of geoheritage significance in specific area (from the Walpole-Nornalup area of Western Australia) is provided below wherein the range and scope of geoheritage features in a region are identified and the ideas encompassed in Figure 1 are applied.

The Walpole Nornalup Inlet System – a case study

The Walpole-Nornalup Inlet System along the southern coast of Western Australia provides an excellent case study of how our tool-kit works. The Walpole-Nornalup Inlet System is one of four large estuaries located along the southern coast of Western Australia (see Semeniuk et al 2009 for more detail). Of necessity, the text below is a much-summarised version, drawing only on the essential concepts and patterns.

For the Walpole-Nornalup Inlet System, there are several features that comprise its geoheritage essentials. Firstly, as a marine-flooded monadnock area, forming a ria coast, it uniquely occurs in this southern Western Australia coastal region. A rocky "tombolo" as a landform (called the Coalmine Beach Peninsula) is another features uniquely occurring in this area. The style of intra-estuarine deltas, and the type of estuarine shoreline stratigraphy are characteristic of this system. On the other hand, granite and gneiss, as rock types, to the north of the area, though perhaps geochemically distinctive, are not globally unique, and while part of the regional geology, they are similar to these rocks in other parts of the World, and hence not generally of geoheritage significance.

We have identified the key features of geology and geomorphology, at various scales, that are important and distinctive to the region, as listed in Table 3. The large-scale features of the Walpole-Nornalup Inlet System are listed only to identify the important geological framework for this region. It is also axiomatic that if features at smaller scales within the Walpole-Nornalup Inlet System rank as significant at the National or State-wide level, then the system that contains them also should be ranked as significant at the National or State-wide level.

Table 3: Features of geoheritage significance in the Walpole-Nornalup Inlet area

- *Precambrian rock sequences and landforms developed on them*
- *gneissic control of estuarine form (morphology of the estuary)*
- *twin basin ria estuary*
- *the Coalmine Beach Peninsula (a rocky "tombolo"*
- *the Coalmine Beach stratigraphy*
- *Tertiary sediment sequences*
- *Frankland River to barrier landform relationships*
- *Quaternary stratigraphic sequences*
- *Quaternary landforms*
- *open coastal dune zone landforms*
- *estuary shore landforms*
- *complex and unique stratigraphy of the estuary shores*
- *complex stratigraphy of the barrier dune*
- *stratigraphy and hydrology of the estuary shores*
- *intra-estuarine deltas*
- *asymmetric, heterogeneous, and polygenetic nature of the intra-estuarine deltas*
- *the tidal delta*
- *wetlands along the estuary margin*
- *Lake within the Circus Beach Barrier*
- *mean sea level history*
- *stratigraphic type sections*
- *features of special interest*

Figure 2 illustrates what categories of geoheritage sites occur in the Walpole-Nornalup Inlet System, what scales of features occur there, and what level of significance can be assigned to the geological features (more detail is provided in Semeniuk et al (2009). Note that that all the features listed in Table 3 are illustrated on Figure 2.

In terms of geoconservation, addressing the various features of geoheritage value in the Walpole-Nornalup Inlet area that individually rank from Regionally significant to Nationally to Internationally significant, is best achieved by viewing the system holistically as an integrated geopark of interactive processes, geology, and geomorphology. Given this background, the important and unique nature of the Walpole-Nornalup Inlet area should be viewed as a National or State geopark integrating the many smaller-scale features of geology and geomorphology into a single geoconservation unit, i.e., a geopark.

In the definition of a geopark, the Walpole-Nornalup Inlet area qualifies in containing numerous "geological heritage sites of special scientific importance". Thus, the various components of the geoheritage of the Walpole-Nornalup Inlet area should be viewed not in isolation, as type locations, or "best example of a given feature", but as the integrated system of geological products and as integrated systems of processes-and-products.

Bedrock and landscape relationships are an example of the first. Intra-estuarine deltas, and their asymmetric, heterogeneous, and polygenetic nature, the wetlands, the dunes of the barrier dunes, and the distinctive and complex estuarine shore stratigraphy are examples of the second.

A summary

We have endeavoured to provide here a description of the "state of the art" of geoheritage and geoconservation in Western Australia, and a case study of where geoheritage and geoconservation is heading in Western Australia. Our main objectives from our earlier work were to define geoheritage within a broader context of geology, conceptualise the various categories of what constitutes geoheritage, deal with the issue of scale in geoheritage, and more rigorously define levels of significance.

We consider that these outcomes are essential foundations to designing classification and assessment systems to identify sites of geoheritage significance in Western Australia.

In addition, in a case study along the southern coast of Western Australia, we believe we have successfully applied the tool-kit for identifying sites of geoheritage significance, at various scales, and assigning them levels of significance, and highlighted the need for an integrated geoconservation system in that area.

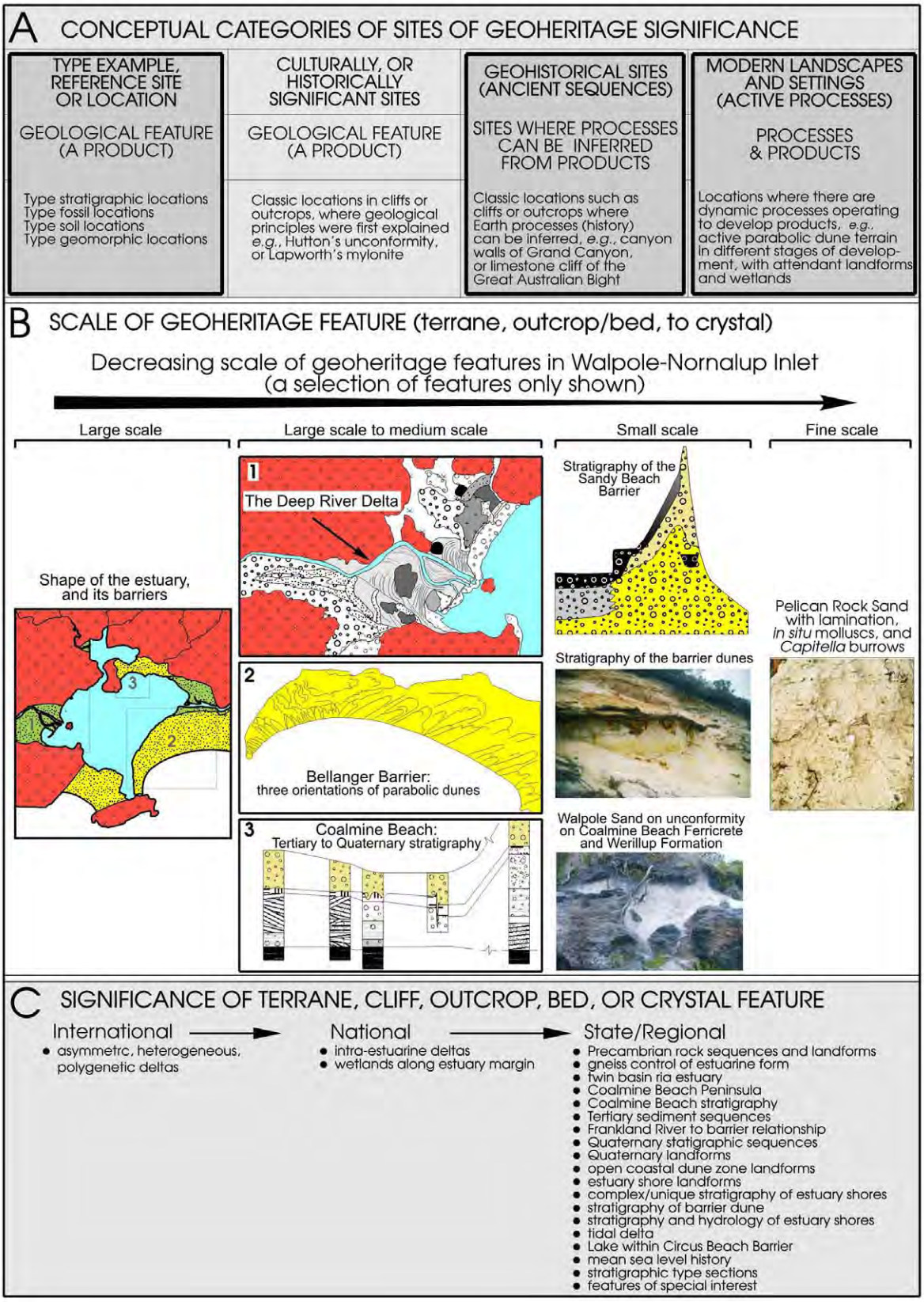

Figure 2: Application of the conceptual diagram of Figure 1 to the Walpole-Nornalup Inlet area. In inset A, the categories of geoheritage applicable to this area are highlighted in darker grey.

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Brocx M & Semeniuk V 2007 Geoheritage and geoconservation – history, definition, scope and scale. Journal of the Royal Society of Western Australia 90: 53-87.

Semeniuk V 1998 Identifying sites of geoheritage in the region of the RFA (Regional Forest Agreement), Southwestern Australia - a Discussion. Report to Department of Conservation & Land Management, Manjimup, and to Australian Nature Conservation Agency (now Environment Australia), Canberra, ACT.

Semeniuk V, Semeniuk CA, Tauss C, Unno J, & Brocx M 2009 Walpole and Nornalup Inlets: landforms, stratigraphy, evolution, hydrology, water quality, and biota. Western Australian Museum, Perth, Western Australia. (in press).

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The authors:

Margaret Brocx is an Earth Scientist and Geoheritage Practitioner who has worked in the Environmental Sciences for over 20 years, and in the arena of Natural Resource Management for nearly 15 years. Margaret is the Geoheritage Convenor of the Geological Society of Australia (W.A. Division), and her research interests include the classification and geoheritage significance of coastal types on the Western Australian coast, and geoheritage policy development.

Dr Vic Semeniuk is an Earth Scientist and Geoheritage practitioner, and has worked in Australia and overseas as a researcher in environmental and natural history science for over 40 years. Vic has authored over 90 publications in refereed scientific journals, dealing with a wide variety of interests from geoconservation, classification systems, geology, coastal geomorphology and coastal processes, coastal ecology, and wetlands, and groundwater. He is co-director of an Environmental, Educational, and Research & Development Firm, namely the V & C Semeniuk Research Group, and is an active member and former President of The Royal Society of Western Australia.

Coming events

Consult the ProGEO website www.progeo.se to keep updated!

ProGEO VI International Symposium on the Geological Heritage

The Geoheritage Section of the German Geological Society invites to the next ProGEO International Conference, to be held in the Ruhr area, in late May–early June 2010, Germany. More information will come.

ProGEO WG3 meeting 2009

Geodiversity, Geoheritage & Nature and Landscape management, 19–23 April 2009, Drenthe, The Netherlands. Please visit the meeting web site at: **http://www.progeo2009.drenthe.nl/** where all information is found, including first and second circular.

ProGEO WG3 meeting 2010

ProGEO WG3 and the Polish Geological Institute organises a WG3 meeting and international Conference: Geodiversity, natural and cultural heritage of the Kaszuby region (Eastern Pomerania, Poland), 6–10 September 2010, Gdansk, Poland. Please read the first circular:
http://www.progeo.se/gdansk1circ_2010.pdf

62nd Geological Congress of Turkey

All countries are invited to the long tradition of geological meetings in Ankara, Turkey, 13–17 April, 2009. There will be a separate session on geoheritage. Please read the invitation letter, and visit the web site at **http://www.jmo.org.tr**.

Meetings on EGN and GGN geoparks

The coming events and meetings of the European Geoparks Network (EGN) are announced on their web site **http://www.europeangeoparks.org/**.
The coming events and meetings of the Global Geoparks Network (GGN) are announced on their web site **http://www.globalgeopark.org/publish/portal1/tab59/.**

Deadline next issue of ProGEO NEWS: June 10th 2009

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