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KARST AND THE BIODIVERSITY CONTEXT

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ABSTRACT

The United Nations Convention on Biological Diversity (1992), to which Australia was one of the founding signatories, gave an invaluable boost to nature conservation throughout the world. However, it also had a downside in that it focussed conservation priorities upon biota, and in the mind of the general public (hence also politicians) biota means birds, mammals and the larger plants. The result is that creatures with fur, feathers and leaves are usually the winners in the race for conservation resources.

Now, if we turn to the earth upon which the biota depends, we find all too little attention being given to soil fauna, which is an indispensable element of soil quality and even to the proper care of groundwater. Karst fares a little better when it is of high aesthetic quality. But of the 43 karst areas on the World Heritage Register, only 9 were so inscribed for their karst values. Perversely, karst managers may neglect biodiversity in their thirst for the tourist dollar that results from the scenic features of their lands.

HISTORICAL INTRODUCTION

Nature conservation has a very long history indeed, extending at least back to the Stone Age. It appears to have been initially based upon a sense of spirituality inherent in the human response to the place concerned or striking scenic beauty. Certainly, the First Australians recognised places of this kind and in various ways endeavoured to ensure their conservation. As a rich and powerful class emerged over the last 5,000 years, not only were these qualities usually still recognised, but conservation also provided hunting grounds for the rich and powerful. Although this may well be unacceptable to modern conservationists, it did in fact provide for both conservation and sustainability by excluding the *hoi polloi* who might otherwise have hunted the same species for food!

But along with 19th century enlightenment, conservation was seen as being achieved by setting lands aside specifically for conservation purposes. This was argued on the basis of both science and public pleasure, but in fact, conservation areas were still usually chosen on the basis of scenic beauty. Thinking about conservation was often related to the sense of the sublime that grew out of the work of philosopher Edmund Burke. This was certainly paramount in the early visions for the Blue Mountains expressed by Du Faur, Judge Docker and their associates (Stanbury 1988).

However, in Australia the early public reserves were often based in utilitarian motives, including reserves for water supply or droving of stock. Wombeyan and Jenolan Caves reserves were, as far as we can find, the first proclaimed for aesthetic considerations. But the other common and almost utilitarian idea was the "lungs for city" idea which argued that natural areas should be set aside for the enjoyment and health of the working class. This was explicit in the establishment of the first National Park in Australia. In turn this merged into the emphasis upon the recreational purpose for public reserves, which resulted in considerable environmental impacts upon early conservation areas. We saw this expressed in the designation of "National Pleasure Resorts" (one of which was the Naracoorte Caves) in South Australia.

Then, generally in the 20th century, an increasing recognition of the beauty of much fauna and flora led to sites being chosen in terms of their biotic values. This led us to a bio-centric perspective, with the highest value being given to beautiful, rare or threatened species, argued on a range of humanitarian, philosophical or scientific grounds. Today there is a steady movement towards recognition of cultural and social meanings as a basis for conservation and a new paradigm for National Parks is emerging (Phillips 2003, Cubit 2003).

However, on this occasion, I want to focus upon the bio-centric view and its implications for cave and karst management and conservation.

FORMALISING BIODIVERSITY

Perhaps the first statements on the importance of nature conservation through protected areas were the RAMSAR Convention of 1971 (see UNESCO 1994 for a revised statement) and the World Heritage Convention (UNESCO 1972). However, both of these were focussed upon sites of special importance, and natural sites were a relative latecomer to the evolution of the World Heritage concept, which had been led by those concerned with the great buildings and other cultural sites of the world.

Living creatures were much more recognised at an international scale by the UN World Charter for Nature (1982). This certainly argued for the protection of natural phenomena and the obligation of governments to accept responsibility for action. In retrospect, it had limited impact, partly because there were inadequate infrastructural arrangements for implementation and perhaps because the Charter itself was somewhat bland and uninspiring.

However, it laid the foundation for the Convention on Biological Diversity (1992). Despite its legal-political character, this document manages to convey a vision for biodiversity in an eloquent yet practical way. It has clearly inspired an expansion of interest in biodiversity conservation and had a significant influence upon policy. One only has to look at the Australian initiatives in biodiversity policies and programs to appreciate its impact, even though most programs have only been established when much of our biodiversity had been destroyed by human greed and environmental neglect. Further the relative shortage of funding for such initiatives means their effectiveness can only be described as questionable. One hopes the recently released audit will result in a new commitment from governments.

TWO PROBLEMS

As I see it, the new enthusiasm for biodiversity has highlighted two problems for those of us interested in karst protection.

The first is reinforcement and reification of what has long been an issue. Public interest (and hence political interest) is all too often focussed primarily upon mammals, birds and plants – having fur, feathers, or flowers gives you a head start in the race for recognition in the conservation arena. Paradoxically, but fortunately, this also has a positive benefit in protection of karst that I will discuss further below.

The second is the subtler problem of what I sometimes call the two-dimensional perspective on assessment of environmental values. Biologists and others are readily able to map vegetation patterns, with sometimes climatic or other patterns built into a multi-factorial schema. There is no question this is useful. However, it usually omits adequate consideration of biota of the atmosphere, lakes or oceans, soils, underground waters and in particular, karst.

As a simple example, one World Heritage site was assessed and is recorded as having no biodiversity interest because it was largely covered with domestic crops of exotic species. The fact that it is located upon a karst with rich subterranean biodiversity was not even considered. The only recognition of the karst was the statement that karst landforms were of no significance as there were other WHAs on karst in the same country, even though there is not a good example of the specific landforms concerned on any other World Heritage site anywhere in the world.

Although this was doubtless due to geomorphological ignorance, it may also depict another flaw in the two-dimensional approach, and that is the matter of scale. Maps can only depict what will show up on the cartographic scale that is utilised. Scattered small features are not readily portrayed, either on paper or in the two-dimensional mind.

THE POSITIVE SIDE

The World Heritage Register highlights the intriguing paradox that karst is actually quite widely recognised. In many countries, including Australia, examination of national patterns of reservation sites will demonstrate a comparable pattern. Table one below details the WHAs that include karst lands. It is admittedly based upon a personal analysis of the sites, and the criteria upon which they were inscribed as world heritage. It does include an inevitable degree of personal assessment of what the data really means.

Apparent Primary Reason for Inscription	**Number of sites**
Karst, and/or caves	9
General biodiversity and/or geodiversity	20
Aesthetic Values	3
Palaentology and/or Archaeology	4
Cultural landscapes	7

Table 1: Key Values of World Heritage Sites including karst

The good news is that many karst areas do in fact provide for a very high degree of biodiversity, particularly in wet temperate or tropical land systems. The erosional patterns of karst in these climatic conditions often provides for a multitude of small irregularities in the land surface with distinctive soils and microclimates, often isolated from each other by ridges of limestone. This presents numerous opportunities for evolutionary radiation and adaptation probably best exemplified by terrestrial snails. Vermeulen and Whitten (e.g. 1998) have demonstrated this throughout South-east Asia while Solem's (1988) work in the Ningbing Ranges and Jeremiah Hills of the Eastern Kimberley has identified some 30 locally endemic snails of the family Camaenidae, each occupying a separate and very small geographic range. Many others of the relatively immobile invertebrate species and a number of plants demonstrate similar patterns. Overall, the result is that many karst areas, e.g., the Humboldt National Park of Cuba and the Northern Annamites of Laos and Vietnam, actually have an exceptional level of biodiversity

A second reason for this phenomenon is that the multiple values of karst may well lead to recognition of areas for other quite specific values – areas valued for their aesthetic or other cultural values or for research purposes.

IMPLICATIONS FOR KARST MANAGERS

Although this paper so far has used World Heritage sites as a valuable indicator of conservation patterns and trends on the world scale, it must be emphasised that the issues discussed also apply at the local level and may well be relevant to any land managers whose responsibility includes karst or cave areas.

One of the common problems which karst managers face is that all too often, caves have been recognised but only protected by small reserve areas, often only encompassing the entrance of the caves, and much more often, ignoring the importance of the groundwater catchment in holistic management. In Eastern Australia, this has been compounded by the fact that many caves are located in small areas of impounded karst. This in turn has been coupled with a primary emphasis upon the tourism dollar, with conservation being seen only in economic or utilitarian terms.

So, first of all, all karst managers would do well to

- recognise and manage for biodiversity conservation at all levels of their site or region, using this to build further stakeholder partnerships
- use the very special opportunity which they have to help visitors more fully appreciate the nature and importance of biodiversity
- look towards management for sustainability in the full sense of that term (economic/social/environmental), not just visitor impact control
- foster public awareness and sensitivity to the notion of holistic management, and the extent to which any given site should not just a place for a cave, but for a broader karst system
- but at the same time, emphasise the extent to which geodiversity is important in itself, while also providing the foundation upon which most biodiversity depends

Finally, let us to return to the more rarified level of World Heritage (or Ramsar) recognition. The international group of karst scientists and managers at the Workshop on Karst Ecosystems and World Heritage in the Asian-Pacific Region (Wong et al, 2001) held at Gunung Mulu identified key priorities for a higher level of conservation management.

Those in Australia and New Zealand are:

- The Nullarbor Plain
- Cape Range
- Limestone Ranges of the West Kimberley
- The Ruined City (Sandstone karst in Arnhem Land)
- Kahurangi (Mt. Owen)
- Chillagoe - Mitchell Palmer
- Impounded Karsts of the Eastern Highlands
- The Syngenetic Karsts

Each of these needs its own task force to both prepare the necessary background report on the values of the area and to negotiate for the nomination of the site. I would be glad to advise, but I am responsible for developing implementation of action arising from the workshop in a number of other countries as well.

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