KARST RESOURCE MANAGEMENT

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Abstract

Karst is a complex natural resource which can be used and abused in a vast number of ways. Resource management techniques provide a basis for reconciling the different needs of the various uses competing for the same resource. This paper offers a perspective on the rationale for management and conservation of caves and karst landscapes.

Resource management, at a national level, is a strategy of optimal use, or non-use, of resources. Its elements include the analysis of resources and potential uses, the definition of resource use options, and ultimately the selection of appropriate management or exploitation regimes. It is essentially a long-term planning process, and one which assists in the progressive definition of socially (and environmentally) desirable goals. One of its basic objectives is to minimise conflict for resources between various uses.

Resource management has not yet been applied to Australian karst in any systematic way. This paper is concerned with the philosophy and principles of national management of karst resources, rather than with a description of current resource management practice.

Karst, as Jennings (1971) defines it, is: "terrain with distinctive characteristics of relief and drainage arising primarily from a higher degree of rock solubility in natural waters than is found elsewhere"; the term thus embraces far more than caves alone. The central concept of karst is essentially an ecological one – it is part of a dynamic natural system. It happens to have particular characteristics that are of significance to speleologists. As a matter of perspective, it is important to appreciate that caves are just one component of this complex system. Even if caves offers outstanding opportunities for research and similar activities (Poulson and White 1969), their unique characters are frequently dependent on the surrounding karst. Although there are cases where conservation of individual cave sites is called for, deliberative management of caves and karst as a collective resource is a fundamental ecological necessity (Dwyer 1976; Hamilton-Smith 1974; Legrand 1973; and Poulson 1976). External Factors of climate, geology, topography, hydrology, vegetation, and numerous others, clearly have critical relevance to an understanding of the cave component of karst.

I emphasise all this for an important reason: that speleologists in general are very often preoccupied with caves, without necessarily taking much notice of other components of karst. So it is without apology that I shall continually refer to karst, rather than caves, in the context of this paper. Conservation of caves is a very short-sighted preoccupation unless it is accompanied by energetic attention to conservation of karst as a whole.

It should be noted that although discussion in this paper is confined to karst environments, similar principles would apply as readily to basalt caves, sea caves, or any other cave environments. Decision-making about such caves without reference to their environmental context is likely to be extremely hazardous.

Before examining principles and problems of karst resource management any further, discussion of some more basic considerations is justified. Dwyer and Harris (1973) have drawn attention to the fact that most of our conservation problems have their origin in continuing disequilibrium of the human species with global ecosystems; perhaps this should be a more urgent preoccupation for us than narrower interests such as karst. Nevertheless, an awareness of process and problems at a global level has implications which are relevant even for short-term conservation strategies. Our rationale for cave conservation has long been somewhat preservationist in outlook, with some justification, but it seems likely that the need to safeguard evolutionary processes is a more logical rationale for karst resource management (Harris and Williams 1975).

Too often speleologists expect that caves can and should be preserved at all costs. This approach contrasts with the reality that caving itself is a threat to the preservation of caves (Hamilton-Smith 1968; Davey 1976). Such an attitude also fails to acknowledge that our modern technological society (of which cavers, with their sophisticated equipment, are often spectacularly a part) depends

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on exploitation of material resources. Until our society undergoes fairly radical change, there will continue to be a need to commit karst resources to many different, and at times conflicting, uses.

Resource management is not the responsibility of speleologists, but rather, of governments and society in general; however, speleologists should be aware of the advantages and hazards of the process, and its potential for karst conservation. In most cases, it will first be necessary to see that an adequate resource management framework is established. Advocacy by speleologists for the application of such an approach is not in conflict with an activist conservation role so long as the different functions of government and conservationist are kept in mind (Clark 1974).

For karst, resource management would require a definition of use options in advance of conflict occurring between particular uses. The desired outcome is that resource use strategy which minimises such conflict. To take the most obvious of the conflicts which might arise in a karst context – that of quarrying – as an example, this approach would require a detailed knowledge of the distribution of suitable limestones, and of the alternative uses of the various resources. A decision then requires a knowledge of national priorities and values, so that the options which minimise conflict can be chosen. In this way it should be possible to direct prospective quarriers to limestone deposits which can be utilised with minimum conflict with other values. Compromise on both sides will clearly be necessary – the quarrier may have to accept a material which is not as close to his requirements as is available, and the conservationist may ultimately have to accept that some karst features will be disturbed.

This kind of process is already taking place. The best example, on a regional scale, is for the Mendip Hills area in the UK (Somerset County Council 1971 & 1973). The outcome is necessarily a compromise, but within the confines of historical, legal, and political contexts, it can be argued that even such a compromise is quite an achievement. An examination of alternatives is surely a better approach to compromise than political expediency alone.

Another of the conflicts which is amenable to resolution in this way is the separation in space of different forms of recreation. Recreation users with differing and conflicting resource requirements must inevitably compromise somewhat, but at least there might be a systematic framework for defining potential conflicts and settling on planning and management strategies which minimise that conflict. Technical inputs to this process can be defined fairly clearly; by survey techniques it is quite feasible to establish the physical limits of resources and to document features in particular places. What is difficult is the process of value judgement which must inevitably accompany the trade-off between various competing uses. My earlier preoccupation with ecosystems and the dynamics of karst is justified here because an awareness of the system nature of karst is essential to this value judgement phase; one cannot isolate particular features from their system context.

It should not be assumed that a resource management approach is necessarily capable of producing technically desirable outcomes. One must progress from each politically acceptable state to the next. Faced with this incremental characteristic of decision-making, even an ability to accommodate detailed resource and use analysis in the process is open to question (Libby 1974). Despite this, the value of resource management is as a systematic frame-work for identifying alternatives. Particularly when the choice is between preservation and development, conventional approaches to the optimal use of natural resources are not likely to succeed (Shefer 1974).

There are numerous problems associated with adoption of a resource management approach for karst conservation. In the case of resource analysis, it is clear that some progress has been made in Australia, but that there are some crucial deficiencies. We have only a very incomplete knowledge of the distribution of karst rocks, let alone sufficient information of their chemical and physical characteristics to permit a national assessment of their usefulness for various purposes. On the karst features side, however, the picture is a little more encouraging. Australian speleologists can be justly proud that this country is relatively advanced in the documentation of its karst features, and the ASF Handbook Commission, assisted by a grant under the National Estate Programme, has now developed methodologies which will aid in the provision of an authoritative input into resource management processes. Perhaps the major deficiency in knowledge of karst features is of the more specialised attributes of the resource – palaeontological and archaeological sites, for example. This problem highlights the need to ensure a degree of flexibility in decision-making which allows the incorporation of new specialist information as it arises, and the subsequent modification of resource use strategies. Even if we are ultimately in a position to reasonably assess the dimensions of our resources of karst features, we must still maintain a perspective relative to such resources internationally. The inescapable conclusion is that karst is relatively scarce in Australia (Jennings 1975).

By contrast, use analysis in the Australian karst situation is not nearly so far advanced. Of the various uses which exploit the materials of karst, the industries themselves have not as yet clearly

defined their resource requirements even under specified economic and transport conditions. To take the cement industry as an example, it is clear that the industry is so market-based that the actual chemical and physical characteristics of the raw material are of secondary importance. This makes it rather hard for a government to conduct a predictive survey of suitable resources for that industry.

For the various uses which do not physically exploit karst – recreation, for example – use analysis is a more difficult task still, but I can report that we seem to be making some progress. The current National Heritage Assessment Study (Hamilton-Smith 1976 a & c), which like the documentation project referred to earlier is funded under the National Estate programme, will provide a much better basis than has hitherto been available for defining the values and preferences at least of speleologists and others with an interest in karst. The most serious deficiency remaining in the use analysis of karst is an understanding of the relative contribution this particular resource makes to the recreation, tourist, and conservation uses which are based on it in part only.

Having suggested some of the analytic tasks ahead, it remains to emphasise the subjective nature of the ultimate decision-making. With specialist advice, it is possible to define where some of the resource use options lie, but the decisions themselves remain subjective because they involve elements of social preference. Emotions, conflict, and demands are the substance of planning as a process of reconciling human preferences (Libby 1974). This subjectivity inevitably means that the process is political. There is, then, a responsibility on the part of specialists to respond to this political situation in a constructive fashion, and in a way relevant to the needs of the decision-making process (Jeffers 1973).

In most Australian situations, there is usually inadequate public involvement in resource management decision-making. As Weisbrod (1976) asserts, people who have been allowed to effectively participate in a decision are much more likly to accept the result, even if they don't completely agree with it. Because of this particular deficiency, a concentration on the substance and implications of environmental law at all levels of government is essential if every opportunity for influencing public preference (and amending the decision-making process) is to be exploited. And, as Clark (1974) points out, it is essential that conservationists learn and understand the processes and capacities of government. One deficiency here is that conservationists and others very frequently fail to respond early enough to opportunities to contribute information and opinion. In that sense at least, a major responsibility for bringing about active and deliberative management of karst resources by government lies with the speleologists themselves (Hamilton-Smith 1976 b).

Decision-making processes in resource management vary enormously (for a discussion emphasising public involvement, see Lassey and Ditwiler 1975). Political reality is that any given system will not necessarily fit well into a local political context without extensive modification (Clark 1974). Perhaps the most realistic way to achieve public involvement (in a favourable political climate) is to evolve several progressively refined proposals each of which is subject to comment and criticism. Governments must inevitably reserve the final say; politics is such that clearly defined technical solutions to resource conflicts will not necessarily be acceptable. At least a resource management approach enables options which may not otherwise have been considered to be given adequate assessment. That in itself is an achievement.

An aspect of the resource management decision-making process which is often overlooked is the need for it to be incorporated into the machinery of government. There are many examples of excellent inquiries which have produced wide-ranging and useful reports but which have not directly influenced government decisions, because they were not a formal part of the decision-making process. The Report of the National Estate (Committee of Inquiry into the National Estate, 1974), an innovative and far-reaching document, almost certainly falls into this category. By contrast, the operations of the Land Conservation Council in Victoria *(Land Conservation Act,* 1970) are an example of a process which achieves political acceptance on account of its incorporation into the workings of government. The difference is that virtually every one of the recommendations made in the latter case are actually implemented; an important difference indeed.

It is rather doubtful that the various environmental impact procedures now emerging in some states can ever be a substitute for a wider approach to resource use planning. Bambrick (1975) points to the deficiences inherent in a system which requires a project to be well planned and fully documented before the environmental impact assessment procedures are capable of coping with it. The investment of entrepreneurial resources to take a project even to this stage often becomes a very powerful factor in pressure for development-oriented outcomes from the ultimate deliberations. A further problem is the difficulty of providing any systematic basis for isolating impact as a discrete phenomenon in the dynamic context of a karst system (Lapping 1975). Also, Weisbrod

(1976) suggests that environmental impact procedures have serious limitations in the assessment of values, as distinct from facts, and that adequate new techniques have yet to be applied.

It is depressing to note that little of what I have said here is new. Our most immediate task remains the education of the very people who have the most active interest in caves and karst – the speleologists. Then we must turn our attention to analysis of our karst resources and uses, and reform of decision-making processes to ensure reasonable consideration of all resource us options.

In the meantime, there must still be a readiness on the part of speleologists to fulfil an activist role in the conflicts over karst resources that will inevitably arise while there is no resource management basis for karst conservation.

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