Determining conservation priorities

Ralf C. Buckley
Principal Environmental Scientist, Consultant Division, AMDEL, Flemington St., Frewville, SA 5063, Australia.

ABSTRACT
One important component in achieving an optimal compromise between mineral development and environmental conservation is to rank different geographical areas according to their priorities for development and conservation respectively. The latter is considered here.

There are three main steps in assigning conservation priorities: (i) acquisition and assessment of information on the existing baseline environment and on potential impacts; (ii) assignment of values to the environmental components concerned and integration of these to yield overall values for alternative possible conservation targets; and (iii) incorporation of logistic considerations to determine the practical priorities for conservation.

One particularly critical aspect of this process is the relative significance of different conservation criteria, specifically including the presence of rare species, high diversity, pristine condition and representativeness. These criteria all reflect the same underlying conservation values, but their relative significance varies from case to case. Their integration is based on professional judgement rather than any formal algorithm and explicit guidelines for such judgement are needed to promote consensus in the determination of conservation priorities.

INTRODUCTION
To achieve a balance between mineral exploration and other forms of development on the one hand, and environmental conservation on the other, the relative value of land areas for different purposes must be assessed and compared. Ideally, these values should be assessed in the same units, but no satisfactory unit for measuring both value for development and value for conservation has yet been found. An alternative approach is to rank different geographical areas according to their development value on the one hand and their conservation value on the other, and compare the two rankings so that, other factors permitting, areas with high development priority and low conservation priority can be allocated to development, and vice versa. This is more straightforward since numerical comparisons are made only within each set of units rather than between two sets, and the final comparison is non-parametric. Such a comparison is of course only one component in the overall process of attempting to optimise resource allocation. Use of land for one purpose, for example, may change its value for another, and hence it is important to assess the sensitivity of the areas concerned to the impacts associated with different potential forms of development.

Priorities for development are generally assigned according to the estimated net economic return to the intending developer or the assessed socioeconomic benefit to the region or community involved, and these can generally be expressed in dollar or dollar-convertible terms with reasonable repeatability. How should conservation priorities be assigned? This contribution attempts to analyse the processes involved, and to identify the most critical steps.

To those professionally involved in nature conservation, most of the considerations outlined here will be second nature, but this analysis may help to focus attention on the critical issue of explicit weighting and ranking of conservation values as a step in assigning conservation priorities.

To those who are not themselves involved, but whose activities may impinge on the processes of nature conservation – for example, those involves in the development of mineral resources, primary industries, and tourism – this analysis provides a rationale for assessing conservation significance which may be of value in management, particularly at the project planning stage where alternative sites, techniques and management strategies are available.

The process of practical conservation can usefully be subdivided as follows:

A. Determination of conservation priorities:
   - information acquisition and assessment
     - baseline
     - impact
   - value assignment
   - priority assignment

B. Implementation of conservation measures:
   - legislation
   - physical protection (and positive management, where appropriate)
   - public education

This discussion is concerned only with determination of priorities, but the implementation steps are relevant since the logistic aspects of assigning conservation priorities include the feasibility of implementing them. The difficulties in converting information to policy have recently been examined in general terms by Sebek (1983), Ruckelshaus (1983), and Harris (1984), and a specific example by Shapiro (1984). In principle the first three steps under (A) above, are consecutive: since information acquisition requires time and money, however, they are generally performed iteratively in practice.
INFORMATION ACQUISITION

The first step, information acquisition and assessment, is an objective process in the sense that it is amenable to scientific testing. It aims to determine what there is to conserve and how it functions – the baseline assessment – and what changes would be produced by external disturbances – the impact assessment. The first involves inventory, mapping, pattern analysis, experimental process studies (see e.g., Buckley 1984, Prodgars 1984). In practice such information is never complete, and a degree of subjectivity is involved in estimating the magnitude and nature of the deficiency. Such deficiencies, however, can always be reduced by collecting further data. Similarly, impact assessment is largely a process of comparison and deduction, but is still classed as objective since the assessment is a prediction that can – and often is – tested by actual application of the external disturbance considered. The detailed processes and problems of environmental impact assessment have been reviewed recently by Baggs (1983), Beanlands and Duinker (1984), and Hirst (1984).

Assessment may be compelled to rely on expert opinion when data are lacking, but though the distinction between data and opinion is of course important, opinion on baseline and impacts can always be subjected to test by further observation or experiment.

VALUES AND PRIORITIES

Values, in contrast, are by definition untestable, and differ from one person or organisation to another, particularly in the relative weighing of commerce and conservation. The two do not always conflict, but when they do their relative importance is a continual bone of contention. This aspect will be considered later, but first it is necessary to determine how conservation values can be established. As demonstrated in the recent review by Roome (1984), many different criteria have been proposed. In general, high conservation value is assigned to items, species, assemblages, areas, heritage artefacts – which are irreplaceable or unusual. Things which are common and easily replaceable may also be very valuable, but are generally not in such urgent need of conservation – though there is the danger that items which are initially common will continue to be exploited without control or conservation long after they have been reduced to rarity, since they are still perceived as common. The overall philosophy of nature conservation has been discussed in detail by Ratcliffe (1977) and more recently by Salim (1984).

The presence of rare or endangered species or their support systems, or unusual species assemblages and associations, thus provide primary conservation criteria. Support systems comprise food and habitats, particularly those required for critical life stages such as breeding and migration. High diversity, either of species, communities, habitats or terrain types, is another major criterion, as is pristine condition: freedom from weeds, feral animals, clearance, overgrazing, overburning, pollution, and engineering structures or activity. High diversity and pristine condition are often exceptional in their own right, largely as a result of past and present human activity. They also embody the endangered-species criterion indirectly, as follows. On a global scale, existing data on species taxonomy, distribution and populations are very incomplete. Hence many species may become endangered before we have even become aware of their existence. Such species are more likely to be present in diverse than depauperate communities. Hence conserving diverse though incompletely described ecosystems may be more effective, overall, in conserving as many individual species as possible, than conserving small remnant populations of species known to be endangered. This argument is often supported by the suggestion that such remnant populations may become extinct in any event despite our best efforts to conserve them and it is therefore wasteful to squander limited resources on their behalf. This, however, is surely an unduly pessimistic view, since there are numerous examples of species which have been successfully rescued from the threshold of extinction and bred back to self-sustaining populations. Such measures certainly are expensive, however, and conservation resources certainly are limited, so the practical feasibility of conserving remnant populations will depend on the life history characteristics of the species concerned, together with a range of logistic aspects.

The criterion of “representativeness” has also been used in assigning conservation values, particularly in recent years, and the creation of representative reserve networks to conserve an example of each ecosystem within a given area is often a major aim of conservation organisations. This criterion still embodies the same primary values, but more indirectly. If an effective way to conserve as many species as possible is to preserve diverse ecosystems, then the most effective way to preserve the greatest diversity on a global scale is to conserve a representative section of as many different ecosystems as possible. Representative reserve networks are hence a means to the conservation of maximum diversity overall. They have an additional advantage in providing reference areas against which to assess future change in unprotected portions of the ecosystems concerned.

There are hence a number of different conservation criteria – rare species or assemblages, high diversity, pristine condition, representativeness – which are all valid and which are all related in principle. Effective conservation of individual species, communities or heritage items generally requires protection of defined geographical areas where they occur, however, in addition to any legislation giving them formal protected status. Hence in practice conservation values are rarely assessed independently: they must be combined or integrated to assign overall values to alternative areas. The four major criteria listed above do not always coincide for any given set of areas, so to assign overall conservation values the criteria must be ranked or weighted in some way. There is no fixed ranking, because the significance of each criterion is variable, depending on the degree of rarity, diversity, modification, and so on. In addition the value attached to a rare species depends on the actual species concerned, and its significance in determining overall conservation values depends on its overall conservation status; specifically on its representation in existing conservation reserves elsewhere. Similarly, there are many different possible measures of diversity and of condition.