Research into Remnant Management Issues: Nuts and Bolts and the Big Picture

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INTRODUCTION

Plant ecological research at the Kellerberrin study site over the past nine years can be separated into four main areas:

- survey and collection;
- basic research on ecological processes;
- review and synthesis;
- "advancement of theory".

Here I outline the major components of each of these, indicate relevance to management where applicable, and discuss the ease with which results from each can be utilised by managers. I suggest that only results from the review and synthesis phase can be transferred effectively to management.

SURVEY AND COLLECTION

An important and ongoing component of the research has been documentation of the flora and vegetation of the region. This has consisted of intensive specimen collection and identification, intensive vegetation surveys of particular areas, and more extensive surveys of the study area and beyond. In addition, the use of remote sensing as a rapid assessment technique was explored (Hobbs *et al.* 1989). None of this work has any direct management application, apart from the provision of information on new localities for rare and endangered flora. Nevertheless, the work has formed the background to much of the research conducted in the area. The taxonomic knowledge and information on plant distributions have also been utilised extensively by others, and provided a basis for the development of a revegetation guide (see section on "Review and Synthesis").

BASIC RESEARCH ON ECOLOGICAL PROCESSES

This work has focused on factors which impact on native vegetation in remnants. In particular, fire, weed invasion, grazing, and interactions between these have been investigated, and the relevance of these factors to rehabilitation of degraded areas has been assessed.

Much of the work on fire is still in progress, but the experimental fire program at Kellerberrin has indicated that patch burns within remnant areas are possible, and can be conducted with little risk to surrounding areas. Initial results indicate that post-fire vegetation recovery is good and that fire stimulates regeneration of a wide suite of species. The studies lack generality, however, and yield little useful information on the effects of variation in fire regimes.

Studies on weed invasion and control have highlighted the importance of disturbance and nutrient additions to the facilitation of invasion (Hobbs and Atkins 1988; Hobbs 1989, 1991a). We have shown that fire need not enhance weed invasion, but that roadside vegetation is an important exception to this (Hobbs and Atkins 1991; Hester and Hobbs 1992). Weed control may enhance regeneration of some tree species, but is expensive and time-consuming (Hobbs *et al.* 1993a). Grazing studies have highlighted the role of sheep grazing in promoting weeds (Scougall *et al.* 1993). Indeed, the effects of grazing are extensive and pervasive, and affect not just the vegetation but also soil characteristics. All these factors have important implications for rehabilitation. In particular, in many cases fencing is not enough to encourage regeneration, and more intensive management is required (Hobbs 1991b).

REVIEW AND SYNTHESIS

In conjunction with others, we have made several attempts to synthesise results to date and to mesh these with other relevant work. The outcome of workshops on corridors and landscape reconstruction has been a synthesis of existing information on these areas, and a heightened awareness of the issues involved on the part of the wider community (Saunders and Hobbs 1991; Saunders *et al.* 1993). The effectiveness of this has been increased by these publications being used for material by magazines such as *Ecos* and *Rural Research*, and by other media exposure.

The most important synthesis work was, to my mind, the Rottnest workshop, which resulted in the production of the Springer-Verlag book *Reintegrating Fragmented Landscapes* (Hobbs and Saunders 1993) and the *Revegetation Guide to the Central Wheatbelt* (Lefroy *et al.* 1991). The first of these collected available information, from numerous disciplines, on the history of development in the central Wheatbelt, its current

problems and its potential solutions. It represents an attempt to provide an integrated approach to the region's problems, and has been used extensively, both on a local scale by catchment groups and universities teaching inland management courses, and more widely on a national and international scale.

The aim of the revegetation guide was to provide a "user-friendly" version of information gathered in the Springer-Verlag book. It was developed in consultation with managers and was aimed directly at them. It was well received when published, and a subsequent survey has indicated that it has had a reasonable rate of use. Of 100 households contacted one year after the publication of the guide, 50 remembered receiving it, 25 had used it and six stated that it had changed their management methods. The guide has also been used as a model for similar guides in the northern and southern Wheatbelt and elsewhere in Australia.

"ADVANCEMENT OF THEORY"

An important part of our research serves not only the management community but also the broad scientific community. Advancement of theory in the sciences of conservation biology and landscape ecology is an important step in ensuring that research carried out by scientists may be integrated and useful in a management context (Hobbs 1992a, b; Hobbs and Huenneke 1992; Hobbs 1993a, b; Hobbs *et al.* 1993b). We have been emphasising that much conservation science has little to do with real world situations, and that there is little time to waste on research which does not address real world problems. We have had some success in doing this, and our Western Australian laboratory is recognised as a leading group in conservation biology and landscape ecology. This in itself is important in promoting the transfer of research findings: acceptance is more likely if the promulgators are recognised leaders in their field.

IMPORTANT ISSUES TO BE FLAGGED FROM THE RESEARCH

The research to date has highlighted the following areas which deserve attention:

- External influences on remnants, and the need for a landscape context are important (Saunders *et al.* 1991; Hobbs 1993b). Remnant management is (or should be) mostly concerned with problems arising outside the remnant, but this is not necessarily recognised.

- The research brings into question the extent to which rehabilitation of degraded remnants is practical. Rehabilitation is possible, but is not easy and may be expensive. Can we expect extensive rehabilitation programs to occur?

- What is the correct emphasis between revegetation and remnant management? Both are valuable, but, given a choice, which is better to pursue?

- The latter questions are predicated on the larger question of "what are the conservation and management priorities?". These are poorly defined except in broad "motherhood" terms, but are essential if research is to address the relevant questions.

CONCLUSIONS: NUTS AND BOLTS AND THE BIG PICTURE

Initially when writing this paper, I found it hard to place much of the research conducted over the past nine years in a useful management context. It then became apparent that, on their own, individual bits of research resulting in individual research papers were seldom of direct use. They are an essential part of the process of examining the "nuts and bolts" of the problems being addressed, but do not necessarily plug straight into a management problem, except in a very broad sense. It is only when a number of such individual pieces of research are linked together, either by the individual researcher, or in conjunction with other researchers and managers, that the relevance to management becomes more apparent. The assembly of a "big picture" enables all the individual bits of research to be placed in context and to be made more readily accessible to managers. This process of assembling the "big picture" entails stepping back from the field quadrat or mist net or whatever, and taking stock of what the information already gathered can tell us. This pursuit has, in the past, not been accorded the same scientific merit as going out and discovering really exciting new things. However, this is changing, which is just as well, since I conclude that the synthesis process is essential if the transfer of research findings to management is to succeed.

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AND MANAGEMENT

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