Linking landscape ecology to planning for koala conservation

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Introduction

We report on a new product for linking ecological science to planning for koala (*Phascolartos cinereus*) conservation: "Planning Guidelines for Koala Conservation and Recovery. A Guide to Best Planning Practice" (McAlpine et al., 2007, available at http://espace.library.uq.edu.au/view/UQ:124088). These planning guidelines ("The Guidelines") arose from a research project aimed at quantifying the impact of landscape change on koala populations and recognition of the need for practical tools to integrate ecological information into planning decisions. The Guidelines focus on the urban and peri-urban regions of Queensland, New South Wales and Victoria, although the general principles apply equally to rural areas.

The koala is an Australian icon that attracts over $1 billion annually in nature-based tourism revenues (Hundloe et al., 1997). Unfortunately, many koala populations are declining because of habitat loss to urban development and agriculture, compounded by threats from dog attacks, road traffic, and disease (ANZECC, 1998). One reason for this clash is that koalas predominantly occur in fertile, well-watered areas, particularly along the east coast, where most people also live and work. This means that only a fraction of koala populations are formally protected in reserves. Consequently, developing effective planning strategies for their conservation on private lands is essential. On these lands, the primary tools for conserving biodiversity include local and state government planning instruments and regional natural resource management planning strategies. For these to be effective, a framework is required that links ecological science to the planning process, but this link is often missing. The Guidelines specifically aim to address this issue.

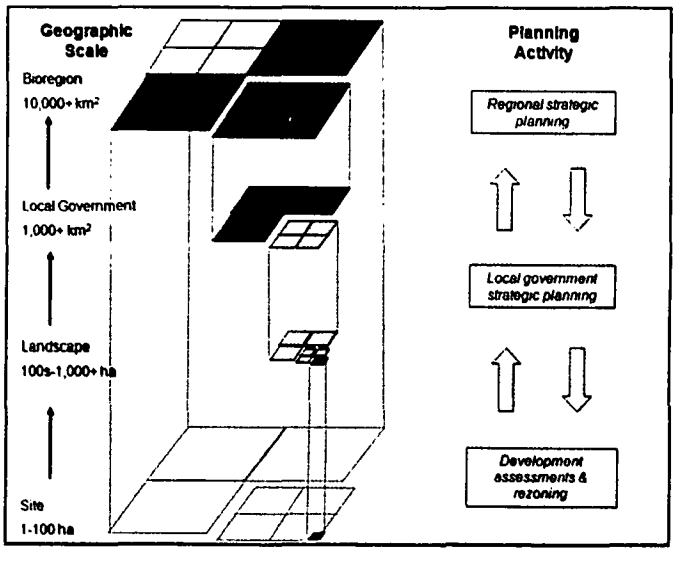
The Science

Between 2001 and 2005 a large collaborative Australian Research Council (ARC) Linkage project, involving The University of Queensland, the Australian Koala Foundation (AKF) and the Department of Environment and Climate Change NSW (DECC), aimed at understanding the effect of landscape change on koala populations. The research was conducted within three local government areas (LGAs) spanning much of the geographic range of the koala: Noosa in south-east Queensland; Port Stephens on the New South Wales central coast; and Ballarat in Victoria. One outcome was a clearer understanding of the effect of the loss of koala habitat, and the fragmentation of what remains, as well as other human impacts (Rhodes et al., 2005a, Rhodes et al., 2005b, McAlpine et al., 2006a, McAlpine et al., 2006b, Rhodes et al., 2006, McAlpine et al., 2008, Rhodes et al., 2008). Up to this point, a landscape-level understanding of koala ecology was largely lacking from the literature. Gaining such an understanding is now recognised as being critical for strategic, landscape-level planning, and we are now much better placed to make informed, evidence-based, planning decisions for koala conservation. The science underpinning The Guidelines was drawn from this research and related studies on the consequences of landscape change for koalas.

The Guidelines

An important characteristic of The Guidelines is its recognition that both planning processes, and the effect of landscape change on koalas, occur at a hierarchy of scales (Figure 1). For example, planning occurs at the property scale for decisions on development, subdivision and rezoning applications, but this is nested within a broader strategic planning framework that encompasses local government, regional, state and national levels. Similarly, the effects of landscape change on koalas occur at the site-level in terms of the loss of individual trees, at the patch-level in relation to loss and degradation of habitat patches, up to landscape and regional levels in terms of the amount and fragmentation of habitat. Linking planning decisions to their impact at site-, patch-, landscape- and regional- levels is therefore critical. As a consequence, The Guidelines are divided into two main sections; one addresses landscape-level planning (areas of 100s–1000s ha in size), and the other addresses site-level planning. The landscape-level section covers local government and regional strategic planning, while the site-level section focuses on development applications and rezoning of individual properties. A second important characteristic of The Guidelines is that they present quantitative planning targets and criteria for koala conservation. This substantially improves current approaches by providing planners with tangible measures upon which to evaluate their decisions.

Figure 1. The hierarchical framework for linking planning decisions at multiple scales



The Guidelines are organised as a series of specific guidelines that are nested within a number of broad planning objectives. For each guideline, a list of possible actions are presented. To ensure the link between each guideline and the underlying science is explicit, a commentary on the scientific basis for each objective is also presented showing how the recommendations were derived. As an illustration, the landscape-level planning objectives and guidelines are summarised in Table 1.

Table 1. Landscape-level planning objectives and associated specific guidelines. Quantitative guidelines are shown in bold.

Objective 1. Maintain a sufficient amount of habitat to sustain viable koala populations

a Aim for landscapes that consist of at least **40–50%** koala habitat
b Aim for landscapes that consist of at least **50–60%** native forest

Objective 2. Maintain habitat patches (or clusters of patches) large enough to sustain viable koala populations

a Aim for koala habitat patches that are larger than **50–100ha** in size
b Aim for clusters of highly connected koala habitat patches (separated by less than **100–200m**) that are larger than 100 ha in total size

Objective 3. Maintain habitat patches with shapes that minimise edge

a Aim for koala habitat patches that are more circular than elongated

Objective 4. Maintain habitat patches that are sufficiently connected to sustain viable koala populations

a Aim for a network of habitat patches and corridors linking blocks of koala habitat
b Aim for areas between blocks of koala habitat to be free from barriers to koala movement (e.g., roads)
c Manage blocks of koala habitat that are separated by more than **10km** as separate populations

Objective 5. Maintain the quality of habitat patches and linkages

a Aim for greater than **30%** of mature trees in koala habitat to be species preferred by koalas (where consistent with the historic vegetation type)
b Avoid internal fragmentation of koala habitat patches and reductions in tree density
c Maintain structural and species diversity of trees within koala habitat

Objective 6. Minimise the impact of roads on koala populations

a Avoid constructing new roads, or expanding existing roads, within, between, and adjacent to koala habitat patches
b Minimise the risk of koala-vehicle collisions on roads using measures such as slow speed zones, signage and lighting, or exclusion fencing, in conjunction with effective fauna crossing structures

Objective 7. Minimise koala predation by domestic and wild (feral) dogs

a Reduce potential contact between domestic dogs and koalas using measures such as dog-free developments in key areas, or increased dog controls between dusk and dawn
b Reduce, control and monitor wild (feral) dog populations within areas containing koalas

Planning Implications

The aim of The Guidelines is to provide assistance to local government planners, regional natural resource managers, community organisations, developers and environmental consultants to achieve outcomes that result in the conservation and restoration of koala populations in fragmented landscapes. In contrast to many environmental planning guidelines, they provide quantitative estimates of appropriate planning targets to enable transparent and justifiable strategic planning decisions across all levels of planning. The Guidelines are not meant to be prescriptive. Rather, they identify objectives to assist planners to design and implement compatible development that manage threats in areas that still support koalas, and facilitate the longer-term recovery of koala populations. The intent is that The Guidelines will provide a basis for improved planning for koala conservation and act as a useful framework for linking science to environmental planning. We intend to update The Guidelines as new scientific evidence becomes available.

Acknowledgements

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