

Biodiversity maintenance in agricultural landscapes: a spectrum of views and understandings

Geoff Park

Biodiversity Officer, North Central Catchment Management Authority

Abstract

The conservation of biodiversity in rural agricultural landscapes is one of the most critical natural resource management issues confronting Australian communities. Throughout Victoria the emergence of a bioregional approach to planning and implementation has provided a challenging arena for the development of integrated natural resource management programs that maintain biodiversity and meet the aspirations of the community. The development of 'biodiversity action plans' in north-central Victoria has revealed a spectrum of understandings and ideas about what the term 'biodiversity' means, and has challenged the way that agencies and natural resource management professionals 'do business'. This has led to the redesign of extension and community development programs that incorporate stakeholder concerns and objectives regarding nature conservation outcomes. The effectiveness of major investment through programs such as the Natural Heritage Trust and the National Action Plan for Salinity and Water Quality will be compromised unless the primary importance of extension is recognised. We need skilled professionals who understand the ways in which rural communities operate, who can build long-term relationships with landholders and community groups, and who can promote and develop a culture of learning and leadership. These people need to be able to work at the interface between knowledge and practice with land managers in order to facilitate the landscape change that we know will be required.

Keywords

biodiversity, biodiversity action plans, bioregions, catchment management, ecosystem services, landscape

We, the descendants of miners and woodcutters who have lived here for generations, have a few names for people that have moved here because of the beauty of this area, then straight away try to change it ... go for a drive through our bush and see the weed infestation, the coffee bush, dead trees hanging up in other trees or rotting on the bush floor ...

(letter to the Editor, *Midland Express*, 30 July 2002)

Planting has started in earnest in Sandon in a project to restore local wildlife habitat and biodiversity. Some of the bird species that we hope to encourage in the area are the Speckled Warbler, Diamond Firetail and Hooded Robin. To help achieve this we will be planting over 8000 plants this year.

(Living Landscapes Project Report, *Newstead Echo*, August 2002)

Introduction

Conservation of biodiversity in rural agricultural landscapes is one of the most critical natural resource management issues confronting Australian communities. The magnitude of biodiversity loss in farming ecosystems is well documented (Hobbs 1993, Hobbs and Saunders 2000). A significant effort is being made to assess the impacts of this loss and to redesign the agricultural landscape to maintain biodiversity and enhance ecosystem function within the

context of positive social and economic outcomes. At a national level, organisations including the CSIRO, Land and Water Australia and the Murray–Darling Basin Commission are collaborating with agriculture and industry groups (e.g. the Grains Research and Development Corporation and Rural Industries Research and Development Corporation) to investigate this issue. The National Action Plan for Salinity and Water Quality, together with the extension of the Natural Heritage Trust, are identifying the threats posed to biodiversity in rural landscapes and signalling major investment in the development of new and innovative farming systems at a landscape scale.

The Victorian Biodiversity Strategy, released in 1997, provided a bioregional framework for responding to the challenge of managing and restoring biodiversity (Figure 1). Importantly, the strategy reinforced the need for a landscape approach, involving planning and coordination of effort across all land tenures. In particular it identified agricultural landscapes as a focus for biodiversity conservation, and that a key management approach was ‘to integrate catchment management into the planning framework to achieve sustainable development of natural resource-based industries and the conservation of biodiversity’. The formulation of the State Native Vegetation Framework and associated Regional Native Vegetation Plans affirmed this direction and identified that the conservation of native vegetation and habitat in a landscape depends the maintenance of catchment and ecological processes which provide productivity, salinity, water quality and other land management benefits.

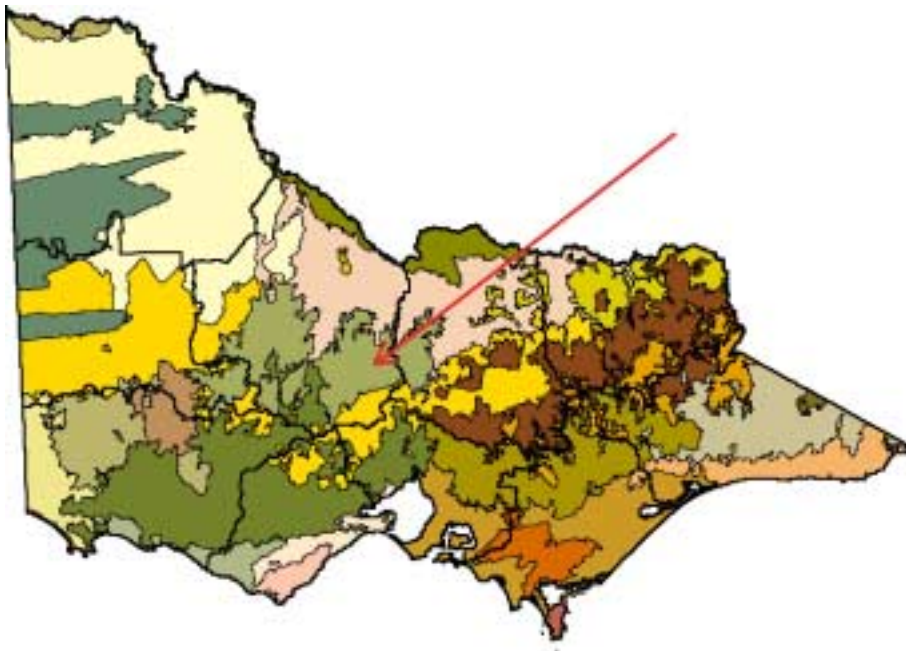


Figure 1 Victoria's bioregions, with the Victorian Goldfields bioregion arrowed.

Defining biodiversity

The term biodiversity has only entered common parlance in recent times. Most definitions focus on the variety of living things.

‘Victoria’s natural ecosystems support at least 3140 native species of vascular plants, 900 lichens, 750 mosses and liverworts, 111 mammals, 447 birds, 46 freshwater and 600 marine fish, 133 reptiles, 33 amphibians and an untold number of invertebrates, fungi and algae. This richness — in the number of different ecosystems and different species, and the genetic variety they exhibit — is what we call biodiversity.’

(DNRE 1997)

'Biodiversity is defined as the 'the variety of life forms – the different plants and animals, micro-organisms, the genes they contain, and the ecosystems of which they are part'.

(ANZECC 1996)

Biodiversity is the variety of life forms, the ecological roles they perform and the genetic diversity they contain.

(Wilcox 1984)

Implicit in all definitions of biodiversity is the functional role of living things in the provision of ecosystem services. The ecosystem services provided by biota depend on there being a diversity of life forms performing a range of functions. This diversity is part of what we call biodiversity. Diverse species underpin processes that help prevent erosion and control salinity, filter and purify water and assimilate wastes, provide protection from floods, control of pests and diseases, maintain fertile soils that are the basis for agriculture, attract tourists, and provide cultural, spiritual and intellectual fulfillment in different ways to all people (CSIRO 2001). This embracing, process-related and functional view of biodiversity, when combined with the more conventional notion of species richness, is becoming a powerful way of expanding our understanding of landscape dynamics. Recher (1993) noted that 'a definition of biological diversity should not exclude human effects. Disturbed communities, cultural landscapes, and the spread of exotic species by humans are as much a part of the world's biotic diversity as are landscapes with little or no human presence'. As one Landcare member expressed it, 'Biodiversity ... I reckon it's the karma of nature.'

The North Central Regional Catchment Strategy (NCCALP 1996) identified biodiversity loss as a key regional issue. It established a biodiversity program under which the protection of remnant habitat and the conservation of threatened flora and fauna are key actions. but recognising the contribution of biodiversity to ecosystem function and landscape health is only now being discussed at a regional and local scale, as our institutional understanding has grown. The Loddon Dryland Salinity Plan was developed in 1988 to provide a framework for an integrated, community-based approach to the issue of dryland salinity in the Loddon catchment of North Central Victoria. The plan, and its subsequent implementation, is rightfully considered a landmark in the evolution of a more targeted, catchment approach to dryland salinity and associated natural resource management issues. The plan contains numerous references to the importance of remnant vegetation, wetland health and flora and fauna, yet the word biodiversity does not appear. In 1988 it was not on the radar!

Many people from all walks of life have an intuitive and deep understanding of the contribution of biodiversity to healthy landscapes. They are able to simply and elegantly describe the changes that have resulted from clearing, overgrazing, and rabbit and weed infestation on the nature and resilience of their local landscape. And they are able to express the connections between these impacts and the ecosystem processes driven by biodiversity that provide clear, fresh water and healthy soils.

Farming communities, land care and catchment groups are increasingly developing a more holistic approach to natural resource management that incorporates biodiversity maintenance as a foundation for tackling issues such as dryland salinity, soil acidification, water quality decline and soil erosion. Native biodiversity is being viewed not as a 'problem' that needs to be solved — perhaps by increasing reservation or protection — but as an integral part of the solution.

So what then is the spectrum of views and understandings of biodiversity of the people who live, work and enjoy recreation in our rural landscapes? This short paper endeavours to examine this issue through the prism of a local landscape in North Central Victoria, currently the focus for the development of Biodiversity Action Plans in the Victorian Goldfields bioregion.

The Goldfields bioregion and local landscape zones

The Goldfields bioregion covers 1.7 million hectares and extends over 17 local government areas and four catchment management regions, stretching from Stawell in the west to Rushworth in the east and from Wychitella in the north to Clunes in the south. It has a unique

and relatively early history of European settlement as a result of gold rushes, and the landscape has been radically and rapidly changed within the last 150 years. Most of the region is private freehold dominated by agriculture, and there are large blocks of public land.

Only 25% still has a cover of native vegetation, and less than 4% of this is in formal reserves. However, it still contains examples of most of its original vegetation types, and has a number of nationally important wetlands, including three of international importance. Of its remaining flora and fauna, at least 96 species are rare or threatened: 49 vascular plants, 3 mammals, 29 birds, 4 reptiles and amphibians, 8 fish and 3 invertebrates (Ahern et al. 2000).

A Biodiversity Action Plan for the Goldfields bioregion has been developed. This plan translates the state-wide biodiversity strategy to the regional scale. It provides the foundation for producing landscape-scale biodiversity action plans to direct on-ground works by private landholders, community groups, corporations and all levels of government, with the ultimate aim of achieving broad scale conservation of native biodiversity across the region. However, plans at a bioregional scale must translate into management at the landscape scale if they are to be adopted and acted upon by local communities of landholders and land managers. The Victorian Goldfields bioregion has been divided into 10 local landscape zones (Figure 2). Land management at a landscape scale might refer to one of the zones, or a substantial portion of a zone. Once a landscape scale plan has been developed for a local area or district, individual landholders and land managers, with advice from the Department of Sustainability and Environment, the Catchment Management Authority and other agencies or programs, will be able to decide on the type of patch or site management, revegetation, and so on that will best supplement the local biodiversity. Landscape-scale management refers to areas several to tens of kilometres across, usually involving a number of properties and individual land managers. At this level, consideration can be given effectively to differences in native vegetation type, vegetation coverage and quality, spatial configuration and connectivity of habitats, and other factors influencing biodiversity in the local landscape.

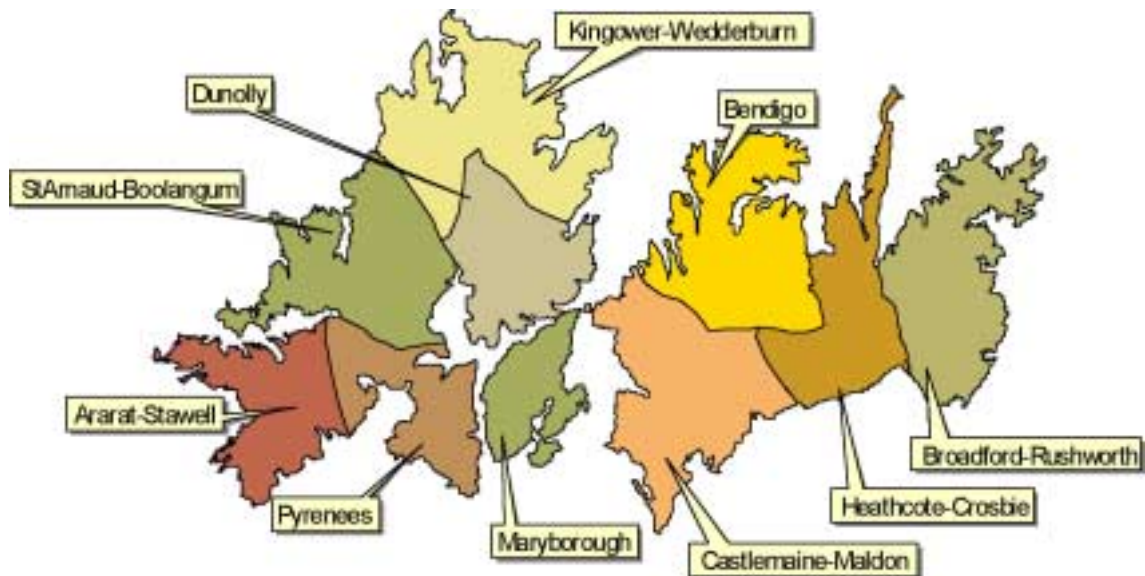


Figure 2 Local landscape zones in the Victorian Goldfields bioregion.

The Castlemaine–Maldon Local Landscape Zone

The landscape of this zone (Figure 3) consists of alluvial plains associated with the Loddon River system in the south and west, and extensive gentle sedimentary rises in the east and north. An arc of metamorphic ridges runs from east to west through the Harcourt, Walmer and Maldon areas. Gentle granite hills emerge further north. The zone is drained directly by the Loddon River, and via Muckleford and Joyce Creeks, and other tributaries. The pre-1750 vegetation featured extensive plains grassy woodland over roughly the western half of the zone, with box–

ironbark forest, grassy woodland, heathy dry forest and localised patches of hillcrest herb-rich woodland dominating the hilly eastern half. Nearly all plains woodland remnants have been cleared, while the forest cover of the hills has diminished by over 60%. Box–ironbark forest, dominated by Red Stringybark and Red Box, and heathy dry forest (also of box–stringybark), still occurs on the sedimentary hills, with remnant hillcrest herb-rich woodland of Yellow Gum and Grey Box on metamorphic ridges. However, all are greatly diminished in habitat quality and connectivity. The formerly extensive fertile woodlands associated with low rises and creeklines (Grey Box, Yellow Gum) have all but disappeared. Many creeklines still support River Red Gums, sometimes with scattered Yellow Gum, Grey Box, Long-leaf Box or Silver Wattle, but usually have a modified understorey. Cleared land in the zone is used mainly for grazing and cropping, and some areas (such as near Castlemaine) have been subdivided for rural residency.

Timber is harvested in a number of the forest blocks, and important historic mining sites are located around Maldon. Most streams carry heavy weed infestations (e.g. in Maldon Historic Reserve) and many are badly degraded. Roadsides are also generally fragmented and weedy, but are usually of better quality on hills and rises near other remnants. The declining condition of these linear connections exacerbates the problem of isolation of remnant blocks. Although there are numerous larger remnants on freehold blocks, mature and hollow-bearing trees have largely been lost from this tenure. Depletion of soil layers and loss of plant diversity are additional threats.

A suite of threatened fauna are found in the zone. These include Brush-tailed Phascogale, Chestnut-rumped Heath Wren, Swift Parrot, Barking Owl, Powerful Owl and Painted Honeyeater. Threatened flora include Weak Daisy, Naked Beard-Orchid, Crimson Spider-orchid, Goldfields Grevillea, Whorled Zieria and Hairy Anchor Plant. As is common across the Goldfields bioregion, a range of threatening processes is having a negative impact on biodiversity, the most significant of these being habitat fragmentation, overgrazing (especially by rabbits and kangaroos), changed fire regimes, invasion by environmental weeds, and introduced predators (Ahern et al 2001).

The zone has been the focus for the implementation of a number of local biodiversity action plans over the past two years. These plans have been developed as partnerships between the North Central Catchment Management Authority (NCCMA), the former Department of Natural Resources and Environment, local community groups, local councils and landholders. The process of plan development and associated activities has highlighted the spectrum of views and understandings of biodiversity within the community.

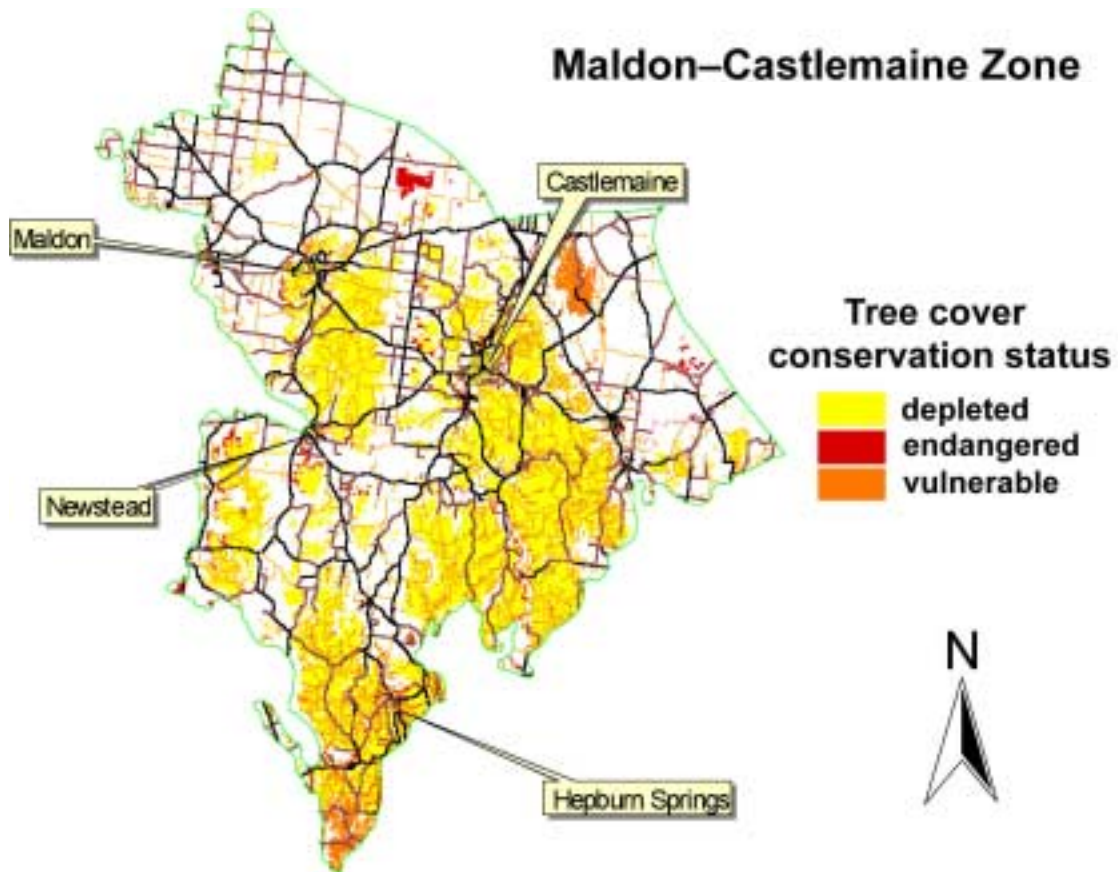


Figure 3 The Maldon–Castlemaine Local Landscape Zone.

Emerging issues: kangaroos and firewood

‘Biodiversity is having a whole range of plants and animals and things ... evening up the balance I suppose ... that’s what it’s all about, that’s what we’re trying to do’

(Beef producer, Taradale, July 2002)

Ours is a landscape out of balance. The box–ironbark forests and woodlands of Central Victoria are one of the most ecologically disturbed ecosystems in Australia. A history of clearing, mining, and over-grazing has left a legacy of altered soils and fragmented habitat that has promoted the spread of feral pests and weeds. To the uninformed eye there still seems to be much of the original vegetation cover remaining. Unfortunately, large old trees are hard to find, a once-diverse understorey is diminished in complexity, and the landscape lacks the mosaic patchiness that seems to be required by many declining fauna species. There have been winners and losers: closer settlement in recent times has led to an increase in available water for kangaroos and wallabies. This has in turn led to significant browsing pressure in remnants at a time when rabbits are at historically low levels. We always look for the quick fix, and the culling of kangaroos is frequently offered as the solution. However, like many natural resource management issues, kangaroo management is interwoven with political and social complexities that prevent an easy resolution. We must, however, look for a better way. Landholders in the Maldon–Castlemaine zone have noted a significant increase in kangaroo numbers over the past 20 years, while before the Second World War a kangaroo sighting was considered remarkable. Anecdotal evidence suggests that the current population in the district exceeds that of sheep.

To quote Andrew Campbell, ‘We have persisted for more than 200 years in trying to realise the visions and aspirations of the early European settlers using essentially the species that arrived on the First Fleet, and the farming systems based on them. These systems are profoundly maladapted to Australian landscapes, ecosystems, biota and climates, and their legacy has been mixed. They have historically made great contributions to the economy and to society and they

have generated good livelihoods for many. But we are only just beginning to count the long-term ecological debt that has been incurred, and we are as yet incapable of calculating its value.’ (Fenner Conference, Agriculture for the Australian Environment, Canberra, August 2002)

Why then are we not farming kangaroos?

‘Banning the collection by a farmer of his own firewood is a further attack on property rights ... and the more care these people have taken to keep their trees, the harder they’re hit by this singularly stupid proposal.’

(Letter to the Editor, *Weekly Times*, 31 July 2002)

This was the view of one landholder in response to the recent release of the Victorian State Government Firewood Strategy Discussion Paper (NRE 2002). There is ample scientific evidence that fallen timber is a critical habitat requirement for many species of woodland birds, reptiles and mammals (Platt 1996; McNally et al. 2000). Even hardened firewood gatherers rarely dispute this and will testify to the link with loss of species such as Bush Stone-curlew, Tree Goanna and Tuan (Brush-tailed Phascogale) from areas where they were once common. The recently endorsed recommendations of the Environment Conservation Council for the Box–Ironbark Forests and Woodlands (ECC 2000) proposed substantially increased protection for the ecosystem by upgrading the reservation status of areas that were previously an important firewood source for local communities. The recommendations deserve acclamation and have been largely well received in North Central Victoria. An unwelcome outcome, however, is potentially increased pressure for firewood resources (especially dead timber) on freehold land in areas where access to public land has been restricted. The issue is not one of ecology, but the long-held belief of most Australian’s that they have an unfettered right to do as they see fit on their own land. Managing the transition from a culture of exploitation of this seemingly endless (and renewable) resource will be difficult. Fostering the development of farm forestry is an obvious long-term solution, but a decade or more will pass before we can establish local, sustainably managed woodlots. Many areas of forest on both public and private land in Central Victoria have become even-aged and homogeneous in structure, lacking the patchiness that distinguished them prior to settlement. Ecological thinning for firewood production has been proposed as a possible short-term solution.

One of the more far-reaching themes in the final ECC report is the view of the region as a ‘community landscape’. It proposes the forging of a ‘community–government partnership working to make the necessary adjustments in industry and land use that will ensure a long-term vibrant economy, with private and public landowners cooperating to rebuild linkages between the fragmented remnants of forest and woodland and to encourage the return of endangered flora and fauna.’ The establishment of Conservation Management Networks (such as those planned for Broken–Boosey and Wedderburn–Wychitella) are seen as a key way of enabling private landholders and local communities to be involved in environmental management at a local level.

Many local communities in Central Victoria have the capacity to play an active leadership role in the creation of this ‘community landscape’. It will not be simple and will require considerable courage on behalf of government and agencies to deal with issues such as kangaroos, firewood harvesting and ecological thinning. The reaction of urban communities to the handling of these issues still drives political responses. Landscape design driven by local communities should be fostered.

From decoration to restoration

Land degradation in the form of soil loss, salinity and declining water quality were recognised in the early 1950s in the Castlemaine–Maldon district. Amelioration through the efforts of the Soil Conservation Authority focused on the impacts of these problems on agricultural production. Typical solutions involved the installation of concrete structures and the planting of fast-growing trees such as Willows and Poplars in eroding gullies, and chisel plowing to sow

exotic pastures such as phalaris. There is no doubt these interventions were successful in controlling erosion and run-off, and in maintaining farm production when used in tandem with increasing use of fertilisers and improved pasture species. But they had little impact on the pervasive threat of dryland salinity and associated loss of water quality in local waterways, including the Loddon River. The implementation of Salinity Management Plans through the 1980s and 1990s recognised the role of trees in reducing groundwater recharge. Significant revegetation has occurred throughout the zone, and there has been an increasing focus on the use of local indigenous species of trees and shrubs. Since the early 1990s Landcare groups in the district have been very active in a range of activities, including weed control, the creation of wildlife corridors and riparian restoration. This history of local responses to natural resource management challenges has provided a sound foundation for a more mature landscape approach that has emerged since the late 1990s.

An interest in landscape-scale planning and implementation has emerged over the past three to four years. Local groups with goals of increasing faunal diversity have established wildlife corridors in a number of strategic locations. These corridors were established using a range of local trees and shrubs and involved farmers and small landholders alike in the creation of a network of links across the landscape. The design of these links was thoughtful and was successful in encouraging previously uninvolved farmers in land care and conservation works. In retrospect these generally narrow belts may be of small value for fauna given what we know of the habitat requirements of local declining species such as woodland birds. But they have paved the way for the active participation of many of these landholders in the development of local landscape plans, facilitated through biodiversity action planning. This process has led to a focus on the identification of key remnants and their protection and enhancement, and plans for restoring functionality to the local landscape through riparian protection and the reconnection of ridges with creek systems. This planning has contributed to some significant institutional change that is beginning to be expressed and enacted at a local government level.

The following statement can be found in the recently revised Municipal Strategic Statement of the Mount Alexander Shire:

'The remnant native vegetation of the shire provides many (often unrecognised) 'ecosystem' services, including clean air and water and is a fundamental resource necessary for the survival of our unique flora and fauna. The forests and woodlands of the shire are important habitat for many threatened species, but fragmentation of remnant native vegetation continues to threaten ecosystem functions and services and the viability of many species' existence in the Shire'.

This statement not only recognises the importance of flora and fauna within the shire: it also emphasises the role that biodiversity plays in maintenance of ecosystem function and landscape health. A number of local councils within the NCCMA region have recently affirmed the contribution of healthy ecosystems to climate regulation, catchment processes and the reversal of land degradation.

The formation of the Central Victorian Greenhouse Alliance in 2000 signalled a commitment from all local councils in the region to mediate a local response to a global concern. This has led to the development of a Climate Change Action Plan for the NCCMA region involving large scale establishment of vegetation for carbon sequestration based on protection, enhancement and restoration of biodiverse systems (NCCMA, 2000).

Implications for extension and community development

Healthy biologically diverse systems keep soils healthy, water quality high and the air we breathe clean – without these things well...the ultimate effect would be a dead system that couldn't sustain life.

(Biodiversity Extension Officer, Castlemaine, July 2002)

Extension in natural resource management has reached a crisis point. The effectiveness of major investment through programs such as the Natural Heritage Trust and National Action Plan will

be compromised unless the primary importance of extension is recognised. We need skilled professionals who understand the ways in which rural communities operate, and who are able to build long-term relationships with landholders and community groups and promote and develop a culture of learning and leadership. These people need to be able to work with land managers at the interface between science and practice in order to facilitate the landscape change that we know will be required. Extension officers with short-term contracts, low wages and lack of institutional support are the norm through much of the natural resource management industry.

A new set of skills will be required to facilitate change in rural communities over the next 10 years. A wonderful opportunity exists to nurture a land repair industry by harnessing the wisdom and energy of country people. We need to design new landscapes, develop new enterprises and seek to integrate the skills, knowledge and aspirations of rural communities to ensure a sustainable future. Experience from biodiversity action planning throughout the Goldfields has reinforced the importance of face-to-face contact as a primary way of initiating change. Coupled with a range of other methods, including small group planning, community information gathering and the production of locally relevant extension materials, this has produced significant results in terms of community learning and practical action.

Conclusions

‘What makes sense to me about the term ‘biodiversity’ is that it is about “living things in relationship with each other and with the resources needed to nurture and support these relationships”. So, by “living things” I mean people, animals, birds, reptiles and plants (at all levels in the horizontal and vertical planes). I think that we need to broaden our notion of indicator species in this regard. By “resources” I mean things such as the soils, geological and geomorphological features, water, climate, air, etc. The “relationship” I refer to is complementary, other-regarding (in terms of, for example, predator–prey or richness–impoverishment, etc.) and, while the nature of this relationship appears, to our human eyes, to seek harmony and balance, it is more subtly chaotic on both the macro- and micro-scales. This sense of chaos-in-connection is, for me, the essential dynamic involved in the relationships that embody the notion of biodiversity.’

(Landholder, Strangways, July 2002)

These observations on the meaning of biodiversity to the communities of North Central Victoria barely scratch the surface. Experience with the implementation of Biodiversity Action Plans is revealing a spectrum of views and understandings of the term. I firmly believe that we must accommodate a broad interpretation of biodiversity in our work with rural and regional communities. Exploring understandings of the links between biodiversity, ecosystem processes and landscape function at a range of scales from the paddock to the subcatchment with farmers and ‘blockies’ is only just starting to pay dividends. It promises to be an exciting adventure!

‘In 2001 Australians were asked to celebrate one hundred years of nationhood. Maybe we should be doing more thinking and acting than celebrating ... How are we going to best govern ourselves, and maintain, restore, and enhance the health of the plants, animals, land and water that keep us and our country alive?’

(Dr Paul Sinclair, ‘Shared Visions’ 2001)

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