History and Attributes of Selected Australian Multi-tenure Reserve Networks

JAMES A. FITZSIMONS & GEOFF WESCOTT, Deakin University, Australia.

ABSTRACT The need for conservation planning across the landscape, regardless of tenure, is widely recognised. In Australia, attempts to coordinate the management of conservation lands are characterised by models such as Biosphere Reserves and Conservation Management Networks. This paper outlines the history behind the formation and development of three networks in Australia—the Bookmark Biosphere Reserve, the Gippsland Plains Conservation Management Network, and the Grassy Box Woodlands Conservation Management Network—with particular emphasis on the tenure and protection attributes of the various components within these networks. Despite having a similar number of components, the total area represented in the networks varied markedly. There were few similarities in the proportion of components of various tenures and protection mechanisms among networks. Composition of networks is likely to be strongly influenced by both historical factors (degree of subdivision, land ownership and remaining vegetation) and contemporary factors (aims of the network and willingness of landowners to participate). Continued research into both the evolution and the physical and social dynamics of multi-tenure reserve networks enables a better understanding of their operation, and will ultimately assist in improved conservation planning across the landscape.

KEY WORDS Biosphere reserve; conservation management network; protected area; private land; conservation planning; landscape.

Introduction

To maintain current levels of biodiversity, it is widely recognised that conservation efforts cannot be constrained to the public reserve system and that a landscape-scale approach to management is required across all land tenures (Saunders 1990; Miller 1999; Hobbs 2002). Land ownership is a significant determinant of the types of conservation that take place in particular areas of the landscape, although little studied (Crow et al. 1999; Lovett-Doust & Kuntz 2001). Although there has been much theoretical discussion about the need for the integration of management across different land uses and tenures, and particularly conservation lands, detailed analyses and comparison of on-ground examples are rare. When this has occurred, it is usually of single networks (e.g. Walker & Solecki 1999; Prober et al. 2001; Silori 2002). There has been
an increased interest in the multi-tenure approach to conservation in Australia, particularly in the last decade, with a number of new networks established and many others in the formative stages of development. Such models are characterised by Biosphere Reserves (BRs) and Conservation Management Networks (CMNs), collectively referred to herein as ‘multi-tenure reserve networks’.

Biosphere Reserves are concerned primarily with integrating biodiversity conservation with ecologically sustainable development across a variety of land tenures and uses (UNESCO 1995; Brunckhorst et al. 1997). The theoretical BR model revolves around a ‘core’ protected area managed primarily for nature conservation, a ‘buffer’ zone where activities that impact on the biodiversity of the core are minimised, and a ‘transition’ zone, where the sustainable use of natural resources is encouraged (see Batisse 1993; Parker 1993; Brunckhorst et al. 1997). The ‘Man and the Biosphere Program’, which coordinates the world network of BRs, was launched by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) in 1971, and has since seen 440 BRs established in 97 participating nations (UNESCO 2004).

A CMN is a network of remnants managed for conservation, their managers and other interested parties. The CMN model essentially provides a coordinating or ‘umbrella’ body to help coordinate the protection and management of fragmented ecological communities across a range of tenures and with a variety of protection mechanisms (Binning & Young 1997; Thiele & Prober 1999, 2000). The model was in part necessitated by a perceived lack of mechanisms to quantify the contribution of the non-government sector to achieving nature conservation objectives (Binning 2000).

The BR concept is a recognised and accepted means of integrating public and private conservation lands, as well as for developing sustainable land-use practices in many parts of the world, including Australia. While the Commonwealth government has a national strategy on BRs (Parker 1993), this is in need of review in light of more recent advances in cross-tenure conservation mechanisms.

Commonwealth government recognition of the concept of ‘informal protected area networks’ was given in the document National objectives and targets for biodiversity conservation 2001–2005, although no definition was provided (Commonwealth of Australia 2001). A recent attempt to have a nationally accepted framework for the establishment and definition of CMNs (i.e. Thiele et al. 2002) has yet to be accepted by government institutions. Nonetheless, the CMN concept is broadly accepted by both New South Wales and Victorian State governments and is utilised as a mechanism for conservation planning at a catchment (Corangamite CMA 2005) and landscape (ECC 2001; Ross et al. 2003) level in Victoria and for threatened community recovery planning in New South Wales (Environment ACT 2003; Dobbie 2004).

**Australian examples of multi-tenure reserve networks**

Here, we compare the history behind the formation and evolution of selected Australian multi-tenure reserve networks, with particular emphasis on the tenure and protection mechanisms of components, and discusses the implications for conservation planning and future networks.
Three networks were chosen as case studies for this research: the Bookmark Biosphere Reserve (South Australia), the Grassy Box Woodlands Conservation Management Network (New South Wales) and the Gippsland Plains Conservation Management Network (Victoria). These networks were selected based, in part, on their stage of development; all networks were established or had just become established at the commencement of this research (late 1999). Furthermore, their location in three different States enabled greater scope for investigating the role that various jurisdictions play in shaping the success and management of such conservation networks.

The Fitzgerald River Biosphere Reserve in Western Australia was the only other Australian BR to have incorporated tenures other than the core public protected area in 1999. However, as the inclusion of these other tenures was ‘notional’ rather than formally recognised as part of the BR (Watson & Sanders 1997), it was not included in this analysis. A variety of other networks which aim to integrate public and private conservation lands have been formed, or have come to greater prominence since this research began. A summary of some of these networks is presented in the Appendix (Table A1).

Methods

Recognising that the networks are likely to continue to evolve, a point in time was required to provide a ‘snapshot’ of network attributes for analysis. The location, tenure and protection mechanisms for the embryonic Gippsland Plains CMN was collected immediately after its official launch in February 2000, while data for the Grassy Box Woodlands CMN was provided by NSW National Parks & Wildlife Service (NPWS) in May 2000. Basic attribute data were obtained again for all networks in January 2002 and allowed a comparison of changes in both the number and area of components over that period.

As components entering Bookmark BR required official registration with UNESCO, an entry date for each component enabled a chronological timeline to be developed. As component entry requirements for the CMNs were somewhat less formal, particularly early in their formation, it was not feasible to construct a timeline. Thus comparisons between network attributes in early 2000 and early 2002 are presented.

Geospatial data sets were either created from information provided by the network coordinating body (Gippsland Plains and Grassy Box Woodlands) or supplied by the network itself (Bookmark). Areas of individual components were calculated within a geographic information system (ArcView GIS 3.3). Areas for the Grassy Box Woodlands components were provided by the CMN.

Land tenure and protection categories used for comparison were based on those usually applied by either the network coordinating bodies or by the jurisdiction of origin (referred to here as ‘on-ground’ categories). This resulted in varying degrees of separation of tenures and protection mechanisms between networks (e.g. ‘private land’ is a single category in the Grassy Box Woodlands, but was further delineated in Bookmark BR and Gippsland Plains CMN based on the primary aim and/or protection mechanism). We thus standardised the various tenure and protection types of network components using the Conservation Lands Classification (see Fitzsimons & Wescott 2004) to compare the relative contribution of various components to networks.
The formation and development of case study networks

*Bookmark Biosphere Reserve*

The 253,000 ha Danggali Conservation Park was one of nine Australian protected areas to be designated as a BR under the UNESCO Man and the Biosphere Program in 1977. At that stage, the Danggali Conservation Park had only recently been declared (in 1975), with Commonwealth government funds having been made available to facilitate the purchase of four pastoral properties (DENR 1995). Located in the northern part of the South Australian Murray-Mallee region and to the north of Renmark, it adjoins the border of New South Wales (see Figure 1).

As with the other Australian BRs, Danggali was restricted to the core protected area until late 1993. The purchase of a 240,000 ha pastoral lease, Calperum Station, adjoining the southern boundary of Danggali, by the Commonwealth government, with support from the Chicago Zoological Society, heralded the formation of the renamed Bookmark BR. The purchase initially caused ‘consternation amongst the local community’, with fears it would become an underfunded and unmanaged national park (Punturiéro 2002, p. 6). Other public reserves, both adjoining and nearby, were also included in the expanded BR in 1993 (see Figure 1).

![Figure 1. Location of components in the Bookmark Biosphere Reserve (as of January 2002). Abbreviations: CP (conservation park), FR (forest reserve), GR (game reserve), LGR (local government reserve), NP (national park), NT (National Trust reserve), PL (pastoral lease), PLC (private land—conservation) PLS (private land—sustainability), RR (regional reserve). Some small components are not labelled.](image-url)
The purchase of Gluepot Station by Birds Australia and its inclusion within the BR was important in protecting a large area of long-unburnt mallee and populations of the nationally endangered black-eared miner (Manorina melanotis). This purchase introduced a fourth national non-government organisation (NGO) to purchasing land for the purpose of nature conservation (the others being Australian Bush Heritage Fund, Australian Wildlife Conservancy and Earth Sanctuaries Ltd). The Commonwealth furthered its involvement in Bookmark by purchasing the Taylorville Station pastoral lease and consolidating Calperum and Gluepot (see Figure 1). Much of the recent focus within Bookmark BR has been on encouraging the development of production industries (e.g. citrus production) which espouse the principles of environmentally sustainable development (Brunckhorst 2001; Muldoon 2001).

Since the expansion of Danggali to Bookmark in 1993, both the total area and number of individual components have increased, but patterns of growth have been quite different (see Figure 2). The major increases in total area were the addition of three large pastoral leases, namely Calperum Station (along with various public protected areas) to the expanded BR in 1993 (some 362,000 ha), Gluepot Station in 1997 (54,000 ha) and then Taylorville Station in 1999 (94,000 ha). In contrast, while increases in the number of properties were sporadic between 1993 and 1997, from 1997 to 1999 relatively high and steady increases have occurred. This latter growth is due mainly to the participation of private landowners and the inclusion of reserves owned by the National Trust of South Australia, which together contributed over 90 per cent of the total number of components added since 1997. There were no additions to Bookmark BR between 2000 and 2002. The number and area of components within ‘on-ground’ categories as of 2002 are presented in Table 1.
The Bookmark Biosphere Trust (formerly the Murraylands Community Trust), established under the South Australian National Parks and Wildlife Act 1972, was formed to manage the BR and included representatives from key stakeholder groups (Bookmark Biosphere Trust 1995; Milliken 1995). More recently a community committee has been formed to oversee the reserve (Cottam 2003).

Two local government authorities in the region, Berri-Barmera and Renmark-Paringa, are officially components of Bookmark as part of its ‘transition zone’ (see Figure 1). The attributes of these areas as a whole have not been included in the analysis of Bookmark in this paper as residents of those councils have not decided individually to become part of the biosphere, and it is probable that some, if not many, residents would not know or necessarily be interested in the aims of the network. Also, a number of properties, both public and private, which fall within these local government areas, are registered separately as part of the BR.

Grassy Box Woodlands Conservation Management Network

The grassy white box woodlands once covered several million hectares of the inland slopes of the Great Dividing Range stretching from northern Victoria, through New South Wales, into southern Queensland. Located in what is now the wheat-sheep belt of eastern Australia, the community has been largely cleared and degraded, with only about 200 ha (0.01 per cent) estimated to remain in near original condition in NSW (Prober & Thiele 1993). In an extensive range-wide study of the woodland’s history (Prober & Thiele 1993), floristics (Prober 1996), genetics (Prober & Brown 1994; Prober et al. 1998) and management (Prober & Thiele 1995), it was found that often the best quality remnants occur on non-reserved public land or on private land and that to ensure the survival of the ecosystem in the long term these blocks needed to be managed for conservation.
Recognising that acquisition of private land by government agencies would not be appropriate in many situations for social, economic and management reasons, a more flexible approach was developed that involved the application of various forms of protective instruments under an umbrella body—the Conservation Management Network (see Prober & Thiele 1996; Thiele & Prober 1999, 2000; Prober et al. 2001; Thiele et al. 2002).

The ‘Grunsky White Box Woodlands Protected Area Network’, as it was then known, was established in September 1998, with funding from the National Reserve System Program of the Commonwealth government’s Natural Heritage Trust. The network was to act as a model for the future integration of private lands into the National Reserve System. The network changed its name in 1999 for two main reasons:

(1) it was recognised that a number of other grundy box woodland vegetation types with similar histories of clearance were in need of coordinated management and protection and were thus included in the network (Prober et al. 2001); and

(2) the term ‘Protected Area Network’ potentially conflicted with the IUCN (1994) definition of ‘protected area’, and ‘Conservation Management Network’ was considered to reflect the focus of the network more accurately.

The location of components in the Grunsky Box Woodlands CMN is presented in Figure 3, and the change in the number and area from 2000 to 2002 is presented in Figure 4. The CMN’s initial focus was on protection of sites which contained the highest quality remnants of grundy white box woodland (Prober et al. 2001). As a result, cemeteries, which often contained largely ungrazed remnants spared from agricultural use, contributed the greatest number of individual components in

![Figure 3. Location and components of the Grunsky Box Woodlands CMN (as of January 2002).](image-url)
both years, comprising 61 per cent and 44 per cent of all CMN components in 2000 and 2002, respectively. However, the small size of such sites becomes apparent when considering that cemeteries comprised only 5.2 per cent of the total area protected in the network in 2002. The Tarcutta Hills Reserve, owned and managed by the Australian Bush Heritage Fund, and a Private Protected Area under the National Reserve System, is the largest single component in the network, protecting some 430 ha. Whilst there was little change in the number of components and their overall area between 2000 and 2002, a further 10 sites were considered to be ‘under negotiation’ for addition in early 2002.

Gippsland Plains Conservation Management Network

The lowland Gippsland Plain (or Munro Plain) originally supported extensive grasslands, grassy forests and woodlands, and riverine scrubland. Since European colonisation in the 1840s, most indigenous vegetation has been cleared or modified, and the original grassland ecosystems are now extinct (Lunt 1997a, b, c).
The fragmented nature and potential threats to the remaining remnants prompted the formation of a ‘Perry River Protected Area Network’ by the Trust for Nature (Victoria) in late 1999 (Edwards 1999). The network was based on the Grassy Box Woodland CMN model but applied a more geographic approach, focusing on remnants around the Perry River and Providence Ponds Flora and Fauna Reserve, with particular emphasis on plains grassy woodlands (Foreman 2000). At that stage, the Trust had just purchased two properties (the Bush Family Reserve and Frair's Reserve) through the National Reserve System Program which it was to own and manage, as well as signing a number of new conservation covenants, the result of a targeted extension approach (Edwards & Traill 2002).

Whilst initially there were no formal arrangements for the network’s structure, the concept had broad support from local landholders and government agencies at the regional level. At a workshop of stakeholders to advance the network in May 2001, it was decided to expand its geographic focus to encompass much of the lowland Gippsland Plain which once contained forest red gum plains grassy woodland. This area stretched roughly from Bairnsdale in the east to Heyfield in the north down to Sale and bordered by the Gippsland Lakes to the south (see Figure 5). Adoption of the ‘CMN’ moniker also occurred in May 2001.

Figure 5. Location of components in the Gippsland Plains CMN (as of January 2002). Abbreviations: NCR (nature conservation reserves), NFR (natural features reserves), OPL (other public land), SPZ (State forest special protection zone), TFNR (Trust for Nature reserves). Note: component abbreviations in parentheses are those that fall within the standardised public land categorisations of the LCC (1988) even though their official name is different. For example, flora & fauna reserves are now known as nature conservation reserves, yet some (e.g. Providence Ponds) have had no official name changes. Some small components are not labelled.
Coordination arrangements for the network have evolved rapidly since its formation. The then Victorian Department of Natural Resources and Environment assumed much of the coordination following the appointment of a native vegetation officer in the region in mid-2001, and the formation of a steering committee, including key stakeholders, followed soon after. The steering committee approach was formalised when the network became an incorporated body with elected representatives and paid members. A ranger was employed in 2002 specifically to coordinate adaptive management and research trials within network components.

Almost all protection types increased in the Gippsland Plains CMN between 2000 and 2002, in both number and total area protected (see Figure 6). Much of this increase, particularly in public protected areas, can be attributed to

**Figure 6.** Development of the (a) number and (b) area (ha) of components of the Gippsland Plains CMN between 2000 (open columns) and 2002 (solid black columns). Component abbreviations: NCR (public protected area—nature conservation reserves), NFR (public protected area—natural features reserves), OPL (other public land), SPZ (State forest special protection zone), TFNR (Trust for Nature reserves), RF (Revolving Fund properties), COV (conservation covenants), PRI (private land with non-binding agreements).
the expansion of the geographic scope of the network, although some increase was the result of strategic land purchase in the region (Fitzsimons & Ashe 2003).

The one on-ground category which decreased was the ‘Revolving Fund’ properties. These properties were donated to or purchased by the Trust for Nature specifically for the purpose of ‘on-selling’ with an attached conservation covenant. The status of these properties therefore changed and they were thus classified as conservation covenants in the CMN in 2002. The increase in conservation covenants and non-binding protection programs on private land is the result of both the geographic expansion of the network and a number of new signings during that time.

**Application of a standardised tenure and protection classification**

The variety of both public protected area categories and private land conservation mechanisms currently in existence throughout Australian jurisdictions necessitates comparison of jurisdictional conservation lands through a standardised categorisation. Components in each of the networks were classified into broad tenure and protection mechanism categories, referred to as the Conservation Lands Classification (see Table 2 for a brief description; for further details, see Fitzsimons & Wescott 2004).

Despite the three networks having a similar number of components, the total area represented in the networks varied markedly (see Table 3). Other reserves (category 1.3) and private land with non-binding agreements owned by individuals or families (category 4.4) contributed to a similar proportion of the total area of the three networks (see Figure 7). Otherwise there were few similarities in the number and area of components in categories between networks.

Public protected areas (categories 1.1 and 1.2) contributed approximately 90 per cent of the total area of Bookmark BR1 and 80 per cent of the Gippsland Plains CMN, yet only 10 per cent of the area in the Grassy Box Woodlands CMN. Conversely, other public land without a conservation agreement (category 2.2) contributed the greatest number of components in the Grassy Box Woodlands CMN, yet this category was not represented in the other networks.

**Conclusion: implications for biodiversity conservation**

A number of studies have described the chronological development of public protected area networks in various Australian jurisdictions (e.g. Wescott 1995; Pouliquin-Young 1997; Bryan 2002; Mendel 2002; Mendel & Kirkpatrick 2002). Recognising the motives behind particular declarations or phases of growth is important to the understanding of existing reserve systems. Likewise, tracking the growth (or decline) within multi-tenure reserve networks and understanding the reasons for any changes are increasingly important to assist both the ecological and social fields of conservation planning. Of particular interest is whether the networks act as a ‘stepping stone’ for private landholders to increase the level of protection on their properties from non-binding to permanently binding agreements.

Constraints on the number and size of components and the total area within a network are likely to be influenced by a number of interrelated factors.
These include historical factors such as the number and size of allotments (i.e. the degree of subdivision), the tenure of those allotments and the amount of native vegetation or other conservation assets remaining in a region; as well as contemporary factors such as the aims and/or geographic constraints of the network and the willingness of landholders to participate.

Formal transboundary (cross-jurisdictional) management partnerships for Australian protected areas currently appear limited to the Australian Alps National Parks (ACT, NSW and Victoria) and the Central Eastern Rainforest Reserves (Australia) World Heritage Area (NSW and Queensland). Interestingly, there are conservation lands in neighbouring states that adjoin or are in close proximity to both Bookmark BR and the Grassy Box Woodlands CMN but as

<table>
<thead>
<tr>
<th>Category name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Public reserves</td>
<td></td>
</tr>
<tr>
<td>1.1 Highly protected area</td>
<td>Protected areas on public land which are focused primarily towards nature conservation (i.e. equivalent to IUCN Protected Area categories Ia, Ib, II, III and IV)</td>
</tr>
<tr>
<td>1.2 Less protected area</td>
<td>Separated from the above categories as per reporting for the Australian National Reserve System. Equivalent to IUCN categories V and VI</td>
</tr>
<tr>
<td>1.3 Other public reserves</td>
<td>Public land managed usually named a ‘reserve’ or ‘park’ and incorporating natural features but may have a stronger recreation, historical or potential extraction focus OR not considered to have stronger enough protection mechanisms to be considered an IUCN protected area. Includes reserves owned and managed by local government for conservation purposes</td>
</tr>
<tr>
<td>2.0 Other public land</td>
<td></td>
</tr>
<tr>
<td>2.1 Other Crown lands—binding conservation agreement</td>
<td>Public land with a primary purpose unrelated to nature conservation but managed sympathetically for nature conservation with a legally binding protection mechanism</td>
</tr>
<tr>
<td>2.2 Other Crown lands—other/no agreement</td>
<td>As above but without a legally binding mechanism</td>
</tr>
<tr>
<td>3.0 Indigenous land</td>
<td></td>
</tr>
<tr>
<td>3.1 Protected Indigenous lands</td>
<td>Land owned and managed by Indigenous peoples with conservation as the (or one of the) primary aims</td>
</tr>
<tr>
<td>4.0 Private land</td>
<td></td>
</tr>
<tr>
<td>4.1 Private land—organisation (binding agreement)</td>
<td>Land owned by an organisation with a legally binding agreement on the title or by a land trust with specific aims to manage conservation lands</td>
</tr>
<tr>
<td>4.2 Private land—individual (binding agreement)</td>
<td>An individual, couple or family-owned property with a protective, conservation covenant on the title of the property or through a legally binding agreement with a government agency</td>
</tr>
<tr>
<td>4.3 Private land—organisation (non-binding agreement)</td>
<td>As for 4.1 but lacking a binding protective agreement</td>
</tr>
<tr>
<td>4.4 Private land—individual (non-binding agreement)</td>
<td>As for 4.2 but without a protective, legally binding agreement</td>
</tr>
<tr>
<td>Other</td>
<td>Land not managed for biodiversity conservation but may be included in some networks (e.g. managed for sustainable production)</td>
</tr>
</tbody>
</table>
Table 3. Number and total area of components within networks categorised under the Conservation Lands Classification

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of components</th>
<th>Total area of components (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bookmark</td>
<td>Gippsland Plains</td>
</tr>
<tr>
<td>1.1 Public protected areas (high)</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>1.2 Public protected areas (less)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1.3 Other public reserves</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2.1 Crown lands—protective agreement</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2.2 Crown lands—no agreement</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4.1 Private—org. (binding agreement)</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>4.2 Private—individual (binding agreement)</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>4.3 Private—org. (non-binding agreement)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4.4 Private—individual (non-binding agreement)</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Oth. Other</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>46</td>
</tr>
</tbody>
</table>
Figure 7. Proportion of (a) number of components and (b) total area protected in networks as of January 2002. Bookmark BR (solid black column), Gippsland Plains CMN (shaded grey column), Grassy Box Woodlands CMN (white column). Abbreviations: 1.1 = public protected areas (high), 1.2 = public protected areas (lesser), 1.3 = other public reserves, 2.1 = Crown lands—protective agreement, 2.2 = Crown lands—no agreement, 4.1 = private—organisation (binding agreement), 4.2 = private—individual (binding agreement), 4.3 = private—organisation (non-binding agreement), 4.4 = private—individual (non-binding agreement), Oth. = other.
yet are not part of those networks. In both cases, inclusion of these areas would not only meet the aims of the respective networks but also enhance them. The non-inclusion of inter-jurisdictional conservation lands may suggest that while it may not be the policy of a network to restrict their operations within State boundaries, existing administration, coordination or financing arrangements by State nature conservation agencies could be placing administrative boundaries on the area of operation. The proposed Barkindji BR aims to coordinate public and private conservation lands in north-western Victoria and south-western NSW (Catherine Brown & Associates Pty Ltd 2002), and is probably the first example of a transboundary, multi-tenure reserve network in Australia.

It is interesting to note that each network contained at least one relatively large private reserve owned by an NGO. The involvement of the NGOs may act to strengthen existing networks in two ways: (1) by increasing the profile of the network and (2) by acting or being perceived as a respected and impartial land manager linking public and private land managers. Furthermore, the purchase of land within a region may also act as a stimulus for the formation of new networks. The involvement of NGOs owning conservation lands is likely to increase if overseas trends are followed in Australia.

To measure past and future progress towards national conservation objectives, such as achieving a comprehensive, adequate and representative reserve system, date-stamping of gazettal dates for public protected areas is increasingly important for spatial data sets (Pressey et al. 2002). At a regional level, this is equally if not more important for multi-tenure reserve networks, as the non-binding nature of some private land agreements and the change in status of some components may make such information difficult to gain retrospectively. Modern conservation planning increasingly requires analysis of reserve design (both at site and network level) as well as assessments of the comprehensiveness, adequacy and representativeness of the reserve system. Such assessments are currently underway for the three case study networks.2

There is demonstrated growth in existing multi-tenure reserve networks and widespread interest in the establishment of new networks. Multi-tenure reserve networks are used increasingly as an on-ground means of implementing cross-tenure ecosystem management in Australia. Considering this, continued research into both physical and human dynamics and the evolution of such networks is likely to enable a better understanding of their operation, and ultimately assist in better planning for the conservation of biodiversity across the landscape.

Acknowledgements

We thank representatives from the networks for providing important information during this research, particularly Ed Cottam and Mike Harper (Bookmark BR); Robyn Edwards and Trish Fox (Gippsland Plains CMN); and Erica Higginson, Suzanne Prober and Kevin Thiele (Grassy Box Woodlands CMN). Benno Curth (SA Department of Environment & Heritage) created and supplied GIS data sets for Bookmark BR. J. Fitzsimons was supported during this research by a Deakin University Postgraduate Research Scholarship. Constructive comments from Hugh Robertson, Dianne Simmons, Jim Forrest and two anonymous reviewers on previous drafts of this paper were greatly appreciated.
NOTES

[1] Calperum and Taylorville Stations, whilst not currently counted as IUCN protected areas (Hardy 2001; Environment Australia 2002), were included in category 1.1 for this analysis considering the owner of the leases (Commonwealth Director of National Parks) and that biodiversity conservation is the primary use for the majority of both properties.

[2] Currently being undertaken as part of PhD research by J. Fitzsimons.

REFERENCES


History and Attributes of Reserve Networks

IUCN (1994) Guidelines for protected area management categories, CNPPA with the assistance of WCMC, IUCN, Gland, Switzerland and Cambridge, UK.


APPENDIX

Table A1. Some other multi-tenure reserve networks operating in Australia

<table>
<thead>
<tr>
<th>Network name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitzgerald River Biosphere Reserve</td>
<td>Located on the southern coast of Western Australia and based around the core Fitzgerald River National Park which constitutes half of the BR's 'notional' area of 1 355 000 ha (West 2001). Other public protected areas, and vegetated and cleared private lands managed for sustainable agricultural production comprise the remainder (Watson et al. 1995). The 'Gondwana Link' proposal plans to link the biosphere reserve with other large protected areas in the landscape</td>
</tr>
<tr>
<td>Mornington Peninsula and Western Port Biosphere Reserve</td>
<td>Australia's newest BR, declared by UNESCO in 2002. Located to the south-east of Melbourne, it claims to be the first BR to incorporate an urban area. Initiated by the community and local government, its core area is based around French Island and Mornington Peninsula National Parks, with sustainable production and urban living likely to be its focus (Anon 2002)</td>
</tr>
<tr>
<td>Southern Tablelands Grassy Ecosystems CMN, Monaro Grasslands CMN</td>
<td>Based on the Grassy Box Woodland CMN model, the NSW NPWS has recently established two more CMNs (with assistance from the World Wide Fund for Nature) in the south-east of the State to coordinate the protection of remnants of the heavily cleared and fragmented grassy ecosystems of these regions</td>
</tr>
<tr>
<td>Broken-Boosey CMN</td>
<td>Proposed by the former Victorian Environment Conservation Council (ECC 2000, 2001) and based around the recently declared Broken-Boosey State Park. Initiated by the Trust for Nature prior to the government's acceptance of the proposals and originally referred to as a Biodiversity Management Network (Edwards et al. 2002)</td>
</tr>
<tr>
<td>Northern Plains Grasslands CMN</td>
<td>Formed by the Trust for Nature and based around the purchase of the Korrak Korrak and Glassons Grasslands by that organisation. Will focus on other Victorian Northern Plains grassland remnants on private land (Edwards et al. 2002)</td>
</tr>
<tr>
<td>Wedderburn-Wychitella CMN</td>
<td>Proposed by the ECC (2000, 2001) and based around the expanded, but fragmented, Wychitella Nature Conservation Reserve. Originally referred to as a Local Habitat Conservation Network. Significant areas of box ironbark and mallee vegetation types on private land link blocks of the public reserve. A facilitator was appointed by the Victoria Department of Sustainability &amp; Environment (Garbutt 2002)</td>
</tr>
</tbody>
</table>

Notes:
A number of other networks of similar habitats managed for a common purpose were outlined at a National Workshop on Conservation Management Networks in 2001 (see Prober et al. 2001 and case studies within, Bower and Parkes 2002, and McLellan and Brown 2002 for a brief description of some of these). There has been renewed interest in the establishment of BRs in Australia, particularly from local governments and communities, with a number of proposals before the Department of the Environment and Heritage as of December 2002 (J. Muldoon pers. comm. 2002; and see Australian Biosphere Reserve News for proposals, available at: http://www.deh.gov.au/parks/biosphere/working/news.html). In supporting the Mornington Peninsula and Western Port BR, the Victorian government placed an 18 month moratorium on new BR proposals (State of Victoria 2002). Interestingly, the proposed Barkindji BR in north-western Victoria (Catherine Brown & Associates Pty Ltd 2002) gained the support and financial backing from the Commonwealth government for its application to UNESCO (Stone 2003).