

## The biodiversity we want to maintain and the reasons we want to maintain it

Kathryn Williams

School of Resource Management, Institute of Land and Food Resources,  
The University of Melbourne

### Abstract

This paper seeks to broaden our discussion of biodiversity to consider the more personal, psychological aspects of its protection. Biodiversity is a poorly understood concept, and public and landholder concepts of biodiversity differ significantly from the views of those with ecological expertise. It is not a simple task to identify the 'biodiversity we want to maintain'. Landscape preference research offers some insight to this, but the ways in which stakeholder groups understand and value biodiversity are ultimately shaped by local and historical contexts and so vary significantly across Australian society. Researchers in Australia have traditionally emphasised the importance of financial incentives for encouraging biodiversity protection. This paper takes a broader perspective. Non-financial motives, including well-being, love of nature, and aesthetic enjoyment, may provide important motives for biodiversity protection. The paper outlines Stern's value-belief norm, which describes the relationship between a range of value orientations and environmentally significant action.

### Keywords

attitudes to conservation, biodiversity conservation, social values, value-belief norm

### The biodiversity we want to maintain

To understand biodiversity protection, we need to consider its meaning for land managers and the broader community. When a farmer or other land manager makes a decision about grazing, fencing, cropping or fertilising an area, the concept of biodiversity is probably not uppermost in his or her mind. On the other hand, everyday concepts that underpin the meaning of biodiversity — native vegetation, wildlife habitat, wetlands, native grasslands, bird life, insects — may in fact be relatively important to that decision. Similarly, when a resident of an urban fringe housing estate is deciding whether to protest against a proposed development, biodiversity may not be a consideration, but everyday biodiversity-related concepts of nature, open countryside, and wildlife reserves may well be important ideas. Biodiversity is not well understood by the general public, but the personal and practical meaning of biodiversity may be profound. This paper explores a psychological understanding of biodiversity and its protection. It argues that the concept of biodiversity is poorly understood, but biodiversity itself has significant meaning to humans. It suggests that, while economic values of biodiversity may be important, action to protect biodiversity may be motivated by diverse human values.

### Understanding biodiversity

Research undertaken overseas suggests that biodiversity — both the term and the concept signified by it — are poorly understood. A telephone poll of 1500 residents of the USA conducted in 2002 found that 68% of respondents had not ever 'heard about the loss of biological diversity, or biodiversity' (Belden Russonello and Stewart 2002, page 2). Knowledge of the concept is improving, however: a similar biodiversity poll conducted in 1996 showed that 80% of respondents had not heard the term. Similar patterns have been found in research conducted in Canada (Enviro-nics International 2002). Poor awareness of the term does not mean that people are unconcerned about biodiversity protection. When the term was explained, the vast majority of respondents to the USA survey agreed that biodiversity protection was very

(55%) or somewhat (39%) important to them personally (Beldon Russonello and Stewart 2002, page 8). In general terms however, biodiversity protection is likely to be a lower priority relative to other environmental concerns such as pollution of air and waterways (Bidwell and Barro 1996). The reason for this lower priority is not clear, but it may relate to better appreciation of the personal relevance of air and water pollution for the largely urban populations of Australia and northern America. The link between city smog and respiratory disorders may make such issues personally salient.

A recent Australian study suggests that there is mixed appreciation of the biodiversity concept among Victorian graziers. Watson and Pryor (2002) conducted group discussions with graziers from the Riverina and Volcanic Plains regions of Victoria. The study participants had all heard of the term biodiversity, but many indicated they had little understanding of the concept. Despite this, many participants were nevertheless actively protecting biodiversity on their own properties and were aware of plant, wildlife and insect interactions that had a positive influence on both environmental health and productivity. It should be noted that participants in this study were all nominated by extension officers and were therefore unlikely to be representative of the wider population of graziers; their contact with extension officers was likely to mean that their knowledge of biodiversity was greater than that of other landholders. But this limitation only reinforces the significance of my first point: it is unlikely that 'biodiversity' is what we want to maintain. The biodiversity we do value is more likely to be 'nature' and natural places, 'wildlife' and perhaps 'native vegetation'.

The second point to be made is that the biodiversity that the broader public want to maintain is unlikely to be the same biodiversity that ecologists and others consider important. A range of studies suggest that what farmers and the wider public believe is desirable in natural systems may differ markedly from the views of experts such as ecologists. For example, van den Berg and others (1998) asked Dutch farmers to evaluate photographs of agricultural landscapes. They asked participants to indicate whether they thought there were 'many different types of animals and vegetation in this landscape'. Farmers and experts ratings of the landscapes differed markedly, even using this very simple indicator of biodiversity. Similar differences between lay and expert views have been found in Australia. Lamb and Purcell (1990) asked a sample of students to assess the naturalness of vegetation shown in a series of photographs. They found that taller, denser vegetation was judged to be more natural than lower, more open vegetation, no matter what the ecological naturalness was. This study is consistent with work by Williams and Cary (2001) regarding perception of grasslands. We asked farmers to assess photographs of agricultural landscapes. The image of a single base landscape was altered by computer to show a range of landscape configurations. Some landscapes included native woodland vegetation, others had no native vegetation at all, and one scene showed native grassland. Participants were asked to rate each scene on a number of criteria including 'How valuable is this paddock for protecting native plants and wildlife? While the native grassland scene depicted the greatest extent of native vegetation — something landscape ecologists might consider a desirable characteristic — it was judged as having significantly lower ecological value than other scenes depicting much smaller areas of woodland vegetation. So not all biodiversity is recognised as such: the biodiversity we want to maintain is unlikely to reflect a scientific understanding of that concept.

### **The biodiversity we prefer**

The challenge of exciting interest in protection of less appealing animals is widely recognised. The Koala, for example, enjoys much greater levels of public concern than animals that are less 'cute and cuddly', such as invertebrate and reptiles. Ecosystems and plant life are subject to a similar variation of interest and concern; this is reflected empirically in research concerned with landscape preferences. In the context of south-eastern Australia, Williams and Cary (2002) investigated rural and urban residents' relative preference for a limited range of native vegetation. We found a significantly higher preference for woodland dominated by eucalypt species over woodland dominated by she-oaks. The reasons for this were complex, but poorer recognition of she-oak species appeared significant, as did an apparent dislike for what was

described as the 'messy' form and foliage of these trees. The biodiversity we want to maintain may be shaped in part by the aesthetic appeal of species and ecosystems.

A number of other studies provide evidence of relative low preference for ecosystems that do not fit cultural expectations of natural beauty: messy ecosystems (Nassauer 1995), vegetation that is relatively dense and difficult to move through (Kaplan, Kaplan and Brown 1989), vegetation that is open and has relatively little variation to the untrained eye (for example, grasslands as in Williams and Cary 2001). One must be cautious in equating low preferences with low support for protection; people may accept the protection of species and ecosystems they find unappealing if their importance is understood (Ribe 1999; Brunson and Reiter 1996). There is some evidence, however, that preference judgments and aesthetic appeal are linked to broader behavioural preferences and patterns. For example, in a study of perceptions of native grasslands (Williams and Cary 2001), landholders were asked to rate each landscape with regard to ecological, aesthetic and agricultural value, and also to indicate relative preference for having this landscape on their own property. In relation to native grassland, a person's preference for their own property was most closely correlated with the perceived aesthetic value of grassland. Similarly, Williams and Cary (2002) shows a significant relationship between preferences for native vegetation and self-reported actions taken to protect native vegetation. Landholders reporting fewer actions to protect native vegetation tended to have lower preferences for vegetation of high ecological quality. Aesthetic appeal appears to be a salient aspect of decisions regarding biodiversity protection.

If some ecologically preferable landscapes are unattractive, we face the ongoing and difficult task of asking residents of rural and urban areas to accept landscapes they find unappealing. Landscape architects Joan Nassauer (1995) and Paul Gobster (1995; 1999) take a different view. They argue that education and the careful introduction of some design elements into selected natural ecosystems can encourage the adoption of a more 'ecological aesthetic'. People holding an ecological aesthetic find intrinsic enjoyment in landscapes where ecological integrity is maintained. Further exploration of this potential is required, but the link between an understanding of biodiversity and preferences for ecologically desirable landscapes provides an opportunity for new approaches to extension.

The biodiversity 'we' want to maintain is not readily identified. In the title of this paper the term 'we' refers primarily to land managers and the broader public, but these are hardly homogeneous groups. While we can make some observations regarding patterns of ecosystems and species that are generally preferred, the meaning and value of biodiversity will vary significantly across social groups and across time (Harrison, Burgess and Clark 1998; see also Williams 2002 on the meaning of natural ecosystems). Preference studies provide some insight, as do qualitative investigations. In the development of policy and extension programs it is important that we routinely use social research and consultation processes to understand the local meanings of biodiversity.

### **The reasons we want to maintain biodiversity**

While biodiversity is poorly understood, attraction to nature continues to be an important aspect of human experience. Landscape preference research consistently provides evidence of a preference for environments that are largely natural or that have natural elements, over environments that are predominantly built (Kaplan and Kaplan 1989). People want biodiversity — or at least an approximation of biodiversity — even though they may not understand this diversity in the same way that ecologists and other experts do. Our reasons for maintaining this biodiversity are diverse. There has been a tendency to assume that environmental action (particularly the action of farmers) is primarily motivated by financial outcomes, and so the key to biodiversity protection has been sought in the identification of appropriate economic incentives. This is undoubtedly important. My aim in this paper, however, is to highlight some of the many non-financial motivations for maintaining biodiversity.

## **The psychological basis of biodiversity protection**

Theorists have suggested that all humans have an innate attraction to nature. E.O. Wilson and Steve Kellert (Kellert and Wilson 1993; Kellert 1997) have put forward the 'biophilia hypothesis', which claims that our attraction to nature is biologically based and that our well-being depends partly on our connection with the natural world around us. Other researchers view our concern for nature as something that is learned, and there is ample evidence that social learning is critical to environmental attitudes and experience. For example, Bixler and Floyd (1997) explored the experiences of people who find nature 'scary, disgusting and uncomfortable', an experience apparently inconsistent with the biophilia hypothesis. Within this broad spectrum of theoretical approaches, psychologists have identified a wide range of motivations for protecting nature. The following represent only a few of the less tangible motivations.

### *Nature and well-being*

A large number of studies have shown the importance of nature experience for human well-being and stress reduction (Kaplan and Kaplan 1989). Ulrich (1984) for example, compared the recovery experience of surgery patients with and without a view of nature. He showed that patients with a view of nature had shorter hospital stays and required less strong painkillers than patients without such a view. These and other studies have led some to believe that human well-being is dependent on our engagement with the biosphere, and on its protection (Roszak, Gomes and Kanner 1995). Values placed on spiritual and physical well-being can therefore provide a motivation for action that protects biodiversity.

### *Affinity with nature*

Kals, Schumacher and Montada (1999) showed that love or emotional attachment to nature can be an important motivation for environmental protection. They considered this affinity to be forged by both biological and social forces (particularly early childhood experiences of nature) and found that it was closely related to a more cerebral 'interest' in nature or desire to understand ecological processes. Their research shows that affinity with nature helps predict self-reported behaviour and behavioural intentions regarding the environment. Biodiversity protection therefore, may be motivated by emotions such as love for nature.

### *Feelings of social and environmental responsibility*

Social norms provide a powerful motivational force in situations where there is conflict between personal interests and public or common good (Gardner and Stern 1996). Some theorists have likened pro-environment behaviour to altruistic behaviour, where one's own interests are sacrificed for the good of others (including the good of future generations). Altruistic behaviour is in turn explained as the internalisation of social or moral norms for action, engendering a sense of one's own responsibility to act. In many people, motivations for biodiversity protection may have their basis in social expectations and obligations, and a sense of personal responsibility (Stern 2000).

Other more widely recognised motivations for biodiversity protection include aesthetic enjoyment and utilitarian outcomes such as erosion and salinity control (Wilson 1992, Cary 1993, Cary and Williams 2000, Hodgkins et al. 2000). While many researchers emphasise the centrality of financial incentives, the reasons people want to maintain biodiversity in the landscape go well beyond the bank account. For many of us, biodiversity protection may mean looking after the place where we 'get away from it all', protecting our favourite views, or 'doing our bit for the environment'.

## **Values and biodiversity protection**

Underpinning each of these perspectives is the concept of social values. We seek to maintain the things we value. And while we may neither understand nor value biodiversity *per se*, when those aspects of biodiversity that we value are threatened, we are likely to seek to reduce that threat. If we understand biodiversity to be critical to the things we value (the well-being of

ourselves, our family or future generations, the nature we have come to love, the aesthetic beauty of our living environment, the productivity and health of stock or crops) we will seek to maintain it. This perspective is consistent with a model of environmentally significant behaviour outlined by Stern (2000). An understanding of this model helps us appreciate the range of values and motivations that may inspire biodiversity protection.

Values are ideals or 'goal states' that have a powerful influence over thought and action. Rokeach (1973) defined a value as 'a conception of something that is personally or socially preferable'. Values tend to be relatively abstract and enduring: a comfortable life, an exciting life, a sense of accomplishment, a world at peace, a world of beauty, equality, family security, freedom, happiness, and inner harmony are some of the ideals described by Rokeach. Rokeach contended that we all share these values but hold them to different degrees, so that while a healthy environment is valued by everyone, we may see it as less or more important than other ideals. With regard to biodiversity protection, this points to the likelihood of personal trade-offs between environmental quality, wealth and other ideals.

Stern's model recognises the importance of a wide range of external and internal factors (see particularly Gardner and Stern 1996). These include external factors such as incentives and regulations, financial capacity and social expectations, and internal factors such as knowledge and beliefs about one's responsibility and ability to act. But the motivational core, however, relates to our values: the things we consider important, and our beliefs about the events that threaten them. To understand the ways in which people respond to biodiversity loss, we must understand both their values and their beliefs about the relationship between biodiversity and these values. Thus, individuals who value family security highly are likely to seek to protect biodiversity only where they think its loss would threaten that security. If they believe that future generations will depend on or benefit from native vegetation, they are more likely to act to protect this resource. Similarly, where individuals value equality they will seek to protect biodiversity only if they believe that its loss threatens the equitable sharing of resources. If, for example, she believes that clearing native vegetation will limit the right of future generations to utilise or otherwise enjoy the Earth's resources, she is more likely to act to protect biodiversity.

In considering Stern's model at a societal level, we must clarify two things: the range of values held by land managers and the broader community, and their beliefs about the relationship between biodiversity and these values. The remainder of this paper considers a number of studies describing the range of values and orientations observed within society. Stern and Dietz (1994) described three value orientations that summarise typical sets of ideals:

- 1 An egoistic value orientation predisposes people to '...protect aspects of the environment that affect them personally, or to oppose protection of the environment if the personal costs are perceived as high'.
- 2 A social-altruistic value orientation — extends the field of concern to a circle broader than the self. Thus, such people '... judge phenomena on the basis of costs or benefits for a human group, such as community, ethnic group, nation-state, or all humanity'.
- 3 A biospheric value orientation places emphasis upon living, non-human organisms. Thus judgments are based upon the costs or benefits to ecosystems or the biosphere.

Stern (2000) contended that altruistic and biospheric value orientations are more likely to be associated with pro-environment action, but this is not always the case. An egoistic value orientation may readily lead to action to protect biodiversity if an individual believes that reducing the threat to biodiversity will also reduce the threat to individual interests. So a belief that nature is important to one's personal well-being may result in action to protect biodiversity.

A number of studies have explored value orientations similar to those described by Stern and Deitz (1994) within Australian communities. Sandall (2001) interviewed 202 farmers, conservationists, scientists, extensionists and policy-makers in Queensland and New South Wales. She identified their value orientation based on a standard values scale. The analysis identified the relative preference for individual, social and environmental goods. The interpretation of these values (Table 1) is similar to the three orientations outlined by Stern and Dietz (1994). Sandall found that the value orientations of primary producers differed

significantly from those of other participants in the study. The majority of primary producers (60%) expressed strong individual value orientations. A further 20% expressed values that reflected a strong orientation toward social good, and a moderate orientation toward individual good. Much smaller proportions of primary producers expressed value orientations emphasising social and environmental good.

**Table 1** Outline of three value orientations, based on Sandall (2001).

<b>Individual good</b>	<b>Social good</b>	<b>Environmental good</b>
Physical security	Social justice	Ecological justice
Economic security	Stewardship	Ecosystem integrity
Hard work	Cooperation	Unity with nature
Individual freedom	Altruism	Quality of life
	Social belonging	

Other researchers have reported greater diversity in value orientations. For example, Dreher and Harrison (2000) explored the values of 100 farmers in the Mortlake district of Victoria, using in-depth interviews. Their findings highlight four key values: security that is derived from material wealth, importance of self image (independence and flexibility), achieving happiness (lifestyle, communing with nature, limited stress) and the family unit. Current research by Bob Edgar (in preparation) from the University of Melbourne investigates the values of rural landholders specifically within the context of biodiversity protection. His research follows up work reported in Williams and Cary (2002), using photographs to explore the value basis of people's evaluations of native vegetation. In this study, participants were shown photographs of Eucalypt and Casuarina woodland varying in relative ecological integrity. Rural landholders described the reasons for their vegetation preferences. Researchers then coded each response to identify the value orientations underpinning each response. The value orientations explored were developed by Steve Kellert (1997) to describe what he refers to as 'biophilia values'. Kellert describes nine values:

- 1 Utilitarian: Natural world valued for exploitation of material benefit.
- 2 Naturalistic: Natural world valued for satisfaction obtained from direct experience.
- 3 Ecological–scientific: Precise study and systematic inquiry into the natural world is valued.
- 4 Aesthetic: Value placed on wondering at the physical appeal and beauty of the natural world.
- 5 Symbolic: Natural world valued as a means of communication and thought.
- 6 Humanistic: Deep emotional attachment to individual elements of the natural world is valued.
- 7 Moralistic: Intrinsic value of natural world — strong affinity, ethical responsibility and reverence for the natural world.
- 8 Dominionistic: A desire to master the natural world.
- 9 Negativistic: Fear, aversion and antipathy towards various aspects of the natural world.

A content analysis of landholder's comments (Edgar in prep.) suggests that the most common biophilia values were utilitarian, naturalistic, ecologicistic–scientific and aesthetic. Edgar has identified the dominant value orientation of each participant (Table 2).

**Table 2** Frequency of expression of dominant value orientations of rural participants ( $n = 132$ ).

<b>Dominant value orientation</b>	<b>Rural landholders</b>	
	Count	%
Utilitarian	56	42.0
Naturalistic	11	7.2
Ecological–scientific	40	31.5
Aesthetic	25	19.4

While utilitarian value orientations are still most frequent in this sample, ecological–scientific and aesthetic value orientations are also held by a significant proportion of landholders within this study. There is still much work to be done to understand the values and motivations of Australian landholders. Edgar’s study is important however in highlighting the diversity of value orientations expressed by rural participants, including less tangible aesthetic and naturalistic values. The diversity of value orientations may be particularly relevant to our discussion of biodiversity in the context of land use change. Land use change is often associated with change of ownership, and change of ownership means the incorporation of new landholders and managers into existing rural communities and industries. These landholders may not share the values of people who manage more traditional enterprises, and their value orientations may differ significantly from those identified in more traditional industry groups, such as graziers. Biodiversity protection depends on recognising and engaging with the range of values that motivate the actions of both new and more traditional land users.

## Conclusions

The concept of biodiversity is poorly understood. Its meanings and values vary between scientists and lay people, and between local and historic contexts. The meaning of biodiversity and its importance to us is not fixed. This is an observation that many will find uncomfortable. If the concept of biodiversity is poorly understood by the general public and constructed within particular social and historical contexts, does this mean that we should rely solely on experts to determine how it should be managed? The answer is certainly no: the meaning of biodiversity is evolving partly through dialogue between scientists, land managers and the wider public. Local knowledge of biodiversity and how it can be protected is critical to the development of understanding, as is the knowledge of those in a range of disciplines (Harrison, Burgess and Clark 1998).

Biodiversity protection — in the broadest sense of nature protection — is of great importance to many people, but for a wide range of reasons. Economic benefits and incentives are important to biodiversity protection, but many less tangible benefits also motivate nature protection. This is particularly important when we consider why land managers maintain biodiversity in rural landscapes. British researchers have pointed out the folly of treating farmers as technicians ‘motivated only by financial rewards, rather than as knowledgeable experts who also have emotional attachments and ethical values for nature’ (Harrison, Burgess and Clark 1998). As we think about biodiversity in the context of land use change, we need to bear in mind the diverse reasons for purchasing and developing land, and develop policies and extension programs that reflect this multiplicity of meanings and motivations.

## References

- Belden Russonello and Stewart (2002) *Americans and Biodiversity: New Perspectives in 2002, Questionnaire and Topline Results*. Belden Russonello and Stewart: Washington DC, USA.
- Bidwell, D. and Barro S.C. (1997) Biodiversity and roadblocks to understanding it. In Skosey, J. (ed.), *Tools for Teaching Biodiversity*. Proceedings from the Chicago Wilderness Educators’ Conference on Biodiversity (pp. 14–20), 5–6 February 1997, Chicago Wilderness: Chicago, USA.
- Bixler, R. and M. Floyd (1997) Nature is scary, disgusting, and uncomfortable. *Environment and Behavior* 29(4): 443–467.
- Brunson, M.W. and Reiter, D.K. (1996) Effects of ecological information on judgements about scenic impacts of timber harvest. *Journal of Environmental Management* 46: 31–41.
- Cary, J.W. (1993) The nature of symbolic beliefs and environmental behavior in a rural setting, *Environment and Behavior*, 25(5): 555–576.
- Cary, J.W. and Williams, K.J.H. (2000) The value of native vegetation: urban and rural perspectives. Research Report 3/00. Land and Water Research and Development Corporation: Canberra.

- Dreher, I. and B. Harrison (2000) Farm family values. Report to Watershed 2000, Catchment and Management Services, South West.
- Edgar, R. (in prep.), Perception of natural ecosystems. Masters Thesis, School of Resource Management, The University of Melbourne (unpubl.).
- EnviroNics International (1999) Public Opinion and the Environment 1999: Biodiversity Issues. [www.bco.ec.gc.ca/documents/EnviroNicsPoll\\_web\\_e.pdf](http://www.bco.ec.gc.ca/documents/EnviroNicsPoll_web_e.pdf) (accessed 26 July 2002).
- Gardner, G.T. and Stern, P. (1996) *Environmental Problems and Human Behavior*. Allyn and Bacon: Boston, USA.
- Gobster, P.H. (1995) Aldo Leopold's ecological esthetic: Integrating esthetic and biodiversity values, *Journal of Forestry* **93**(2): 6–10.
- Gobster, P.H. (1999) An ecological aesthetic for forest landscape management, *Landscape Journal* **18**(1): 54–64.
- Harrison, C.M., Burgess, J. and Clark, J. (1998) Discounted knowledges: Farmers' and residents' understanding of nature conservation goals and policies, *Journal of Environmental Management* **54**: 305–320.
- Hodgkins, D., Goldney, D., Watson, G. and Tyson, G. (2000) The attitudes of landholders to a range of environmental issues, including the values of remnant bushland in the central western region of New South Wales. In Hobbs, R. and Yates, C. (eds) *Temperate Eucalypt Woodlands in Australia*. Surrey Beatty & Sons, Chipping Norton, NSW, pp 336–350.
- Kals, E., Schumacher, D., and Montada, L. (1999) Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behavior* **31**(2): 178–202.
- Kaplan, S. and Kaplan, R. (1989) *The Experience of Nature: A Psychological Perspective*. Cambridge University Press: USA.
- Kaplan, R., Kaplan, S. and Brown, T. (1989) Environmental preference: a comparison of four domains of predictors. *Environment and Behavior* **21**: 509–530.
- Kellert, S. R. and Wilson, E.O. (eds) (1993) *The Biophilia Hypothesis*. Island Press: Washington DC, USA.
- Kellert, S.R. (1997) *Kinship to Mastery: Biophilia in Human Evolution and Development*. Island Press, Washington DC, USA.
- Lamb, R.J. and Purcell, A.T. (1990), Perception of naturalness in landscape and its relationship to vegetation structure. *Landscape and Urban Planning* **19**: 333–352.
- Nassauer, J. (1995) Messy ecosystems, orderly frames, *Landscape Journal* **14**(2): 161–170.
- Ribe, R. (1999) Regeneration harvests versus clearcuts: Public view of the acceptability and aesthetics of Northwest forest plan harvests. *Northwest Science* **73**: 102–117.
- Rokeach, M. (1973) *The Nature of Human Values*. Free Press, New York, USA.
- Roszak, T., Gomes, M.E. and Kanner, A.D. (eds) (1995), *Ecopsychology: Restoring the Earth, Healing the Mind*. Sierra Club: San Francisco, USA.
- Sandall, J. (2001) *Understanding the Role of Values in the Remnant Native Vegetation Debate*. School of Marketing and Management, University of New England: Armidale, NSW.
- Stern, P.C. (2000) Towards a coherent theory of environmentally significant behavior. *Journal of Social Issues* **56**(3): 407–424.
- Stern, P. C. and Dietz, T. (1994) The value basis of environmental concern. *Journal of Social Issues* **50**: 65–84.
- Ulrich, R. S. (1984) View through a window may influence recovery from surgery, *Science* **224**: 420–421.
- van den Berg, A., Vlek, C. and Coeterier, J.F. (1998) Group differences in the aesthetic evaluation of nature development plans: A multilevel approach. *Journal of Environmental Psychology* **18**: 141–157.
- Watson, P. and Pryor, R. (2002) Grazing for biodiversity and profit: farmer segmentation study and evaluation of research and extension worker attitudes. Report for Grazing for Biodiversity and Profit project, Ecologically Sustainable Agriculture Initiative (ESAI 05115). Department of Natural Resources and Environment: East Melbourne.
- Williams, K.J.H. and Cary, J.W. (2001) Perception of native grassland in south eastern Australia. *Ecological Management and Restoration* **2**(2): 139–144.

- Williams, K.J.H. and Cary, J.W. (2002) Landscape preference, ecological quality and biodiversity protection. *Environment and Behavior* **34**(2): 258–275.
- Williams, K.J.H. (2002) Beliefs about natural forest systems, *Australian Forestry* **6**(2): 81–86.
- Wilson, G., (1992) A survey of attitudes of landholders to native forest on farmland. *Journal of Environmental Management* **34**: 117–136.