Preferences and values for forests and wetlands: A comparison of farmers, environmentalists and the general public in Australia

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Abstract

Over the past decades, a trend towards environmental concern has been measured in general population samples. Natural resource management is a complex area in which multiple stakeholders compete for their different views to be heard. Different entities and natural areas must also compete with each other for access to resources such as funding for research and management. This paper describes the natural area management preferences of three samples (general public, environmentalists and farmers) based upon their intrinsic and instrumental values. A cluster analysis of the combined sample shows that while some clusters indicated strong and opposing management preferences, most respondents indicated a mid-range position. Respondents from all samples held the same level of conservation or use preferences regardless of whether the area was a forest or a wetland, but some differences were shown towards endangered species.

Keywords

forests and wetlands, scenarios, preferences, willingness to sacrifice, stakeholders, values

1. Introduction

In recent decades, a trend towards greater environmental concern has been observed in general population samples (Dunlap and Van Liere 1978, Dunlap et al. 2000). In the past however, Australians have held largely instrumental attitudes towards natural areas and although attitudes are changing, the future of many areas is still being debated (Dargavel 1995; Jeans and Spearritt

1980). Forests have been extensively cleared and wetlands drained for agricultural and other direct uses, the effects of which are now being seen in the occurrence of various environmental problems. The resolution and restoration of widespread environmental problems such as salinity and climate change will involve the decisions and cooperation of ordinary people, community groups, governments, and non-government organizations (Bright et al. 2002; Halford 1990; Moore et al. 2001). Many ecosystems are interrelated, and in developing solutions to address the problems it is important to know whether or not the general public and other stakeholders distinguish between ecosystem types with respect to their conservation and use.

Values are important in this respect because they are thought to underlie specific beliefs and attitudes, influence personal and social concepts such as norms and behavioral intentions, and motivate action and behavior. The links between values, attitudes and behavior has been empirically shown in a number of studies relating to natural resource management (Manning et al. 1999; Schultz and Zelezny 1999; Schwartz 1994; Stern and Dietz 1994; Stern et al. 1995; Vaske and Donnelly 1999). A value is a very stable and deeply held belief that relates to preferable conduct or an end-state of existence (Rokeach 1973, p. 5). Given that several competing values can be activated in a given situation (Rokeach 1973) it is important that instruments provide for measurement of a range of values, and that samples include groups who may hold values in different strengths.

Two types of values that are particularly relevant to natural areas are instrumental values and intrinsic values. According to O'Neill (1992, p. 119) *Intrinsic value is used as a synonym for non-instrumental value. An object has instrumental value insofar as it is a means to some other*

end. An object has intrinsic value if it is an end in itself. As Vilkka (1997, p. 14) states, *nature has intrinsic value if it has value for its own sake, and instrumental value if it has value for people*.

Instrumental value is related to both a "direct use" and indirect or "non-use" of natural resources. Direct use represents activities by industries such as mining, logging and irrigation, while non-use relates to indirect benefits for humans (Adamowicz 1995). Non-use value includes existence value which is the benefit received by those who derive satisfaction from knowing that a site is preserved in a certain condition (Brookshire et al. 1983; Krutilla 1967) and the 'bequest' benefit provided by its preservation for future generations (Cicchetti and Wilde 1992). The instrumental value of an entity incorporates its qualities that provide a benefit to humans, unlike intrinsic value, which is independent of its qualities such as rarity or 'naturalness' (O'Neill 1992). This suggests that different ecosystems may be valued differently according to the type of value being activated.

Natural resource management is a contested field in which the stakeholders include a broad range of groups, some of whom are concerned with a natural area's direct or extractive use for commercial purposes, others who are more interested in the area's indirect use, and those who are interested in the area's conservation and value for its own sake (Seligman et al. 1994). A number of studies have compared the values and orientations of apparently conflicting groups such as farmers, wildlife managers and biologists (Bjerke and Kalternborn 1999), loggers and environmentalists (Kempton et al. 1995; Steel et al. 1994) to help describe and explain their different behaviors and support for management strategies.

Many studies have been concerned with measuring anthropocentric and biocentric orientations, which are clusters of values (Stern et al. 1995) that may incorporate but do not distinguish one particular value from another. A similar study by Bright et al. (2000) showed that segments based on value orientations could be used to differentiate support for use and rights for wildlife. The study used several value types including use, existence, bequest and education, as well as ethics and rights, but did not include a specific intrinsic value.

The study reported here contributes to this body of work by reporting on the application of an instrument using a specific intrinsic value in addition to instrumental values. Australian stakeholder groups; the general public, environmentalists and farmers were sampled in order to understand the natural area management preferences and the personal sacrifices each group would be willing to make. The study also sought to determine whether or not preferences for management decisions would apply equally to a forest and a wetland.

Method

To help develop the items to measure a range of values, a number of instruments were reviewed, including the NEP scale (Dunlap and Van Liere 1978), the Forest Values Scale (Steel et al. 1994), Schwartz's (1992) universal values, and others including Kempton et al. (1995) Manning et al. (1996) Milbrath (1985) Stern and Dietz (1994) Thompson and Barton (1994) Vaske and Donnelly (1999). Literature from environmental philosophy such as Rolston (1989) Callicott

(1989) Vilkka (1997) and Devall and Sessions (1985) was reviewed to define intrinsic value. Definitions for instrumental values were derived from economic literature.

Eight focus groups were held in regional and metropolitan centers, with 45 people from the general public and environmentalist groups participating. Questions were asked to elicit participants' expressions of their intrinsic, direct use, bequest, option and existence values. The discussions were also used to determine the terminology people used and the types of natural entities that were relevant to their value expression. The respondents clearly understood all of the values, but found intrinsic value more difficult to express than instrumental values (Winter and Lockwood 2004). Ecosystems seemed to be more important than other entities such as species and individuals. The participants tended to use general and simple terminology to express their values and the questionnaire was designed accordingly, with only a general level of knowledge about the various entities and the issues being assumed. The focus group participants assisted in the testing of draft questionnaires. A pilot test of the questionnaire was sent to a sample of 600 people selected from a random sample of the electoral roll.

Scenario development

The focus groups, draft and pilot questionnaires were used to test different scenario formats through which respondents' preferences could be measured. A final scenario was developed which presented a dilemma about the management of an ecosystem using a narrative or story format, rather than a listing of factual information (Satterfield et al. 2000; Shanahan et al. 1999). Two variations of a hypothetical scenario were developed: a conflict between logging and protection of a forest (Appendix 1) and a conflict between irrigation water use and protection of a

wetland (Appendix 2). In acknowledgment of the oppositional nature of intrinsic and instrumental values, and in order that responses to management strategies could be compared with the value scores, the scenario was designed as a conflict situation. A variation of the wetland scenario that included the loss of endangered bird species was sent to the general public sample. Information for the scenario was sourced from readily available materials published by conservation groups, and a weekly news clipping service from rural newspapers. The forest scenario was based upon an actual local situation which was considered representative of other situations in Australia. The scenarios were expressed in general terms to be consistent with the general framing of the value statements (Ajzen and Fishbein 1977).

Development of the Park Preference (PP) and Willingness to Sacrifice (WTS) variables

The first question required respondents to indicate their preferred level of conservation/direct use for the area and was labeled as their Park Preference (PP). Five management options were provided which described different levels of conservation/use and the potential impacts of each. (Figure 1). The second question measured the respondent's personal commitment to their PP and it reflected Gigliotti's (1994, p. 40) "willingness-to-give-up" score based upon lifestyle and consumption behavior and its relationship with environmental concern. The Willingness to Sacrifice question (WTS) asked respondents to indicate the level of personal sacrifice they would be willing to make with respect to aspects of their employment, the possibility of moving their household to another area and a decrease in their incomes. This question accepted that the respondents could make their own assessment about the levels of sacrifice. Axelrod (1994) used narrative type scenarios described in simple terms which he argued required respondents to rely on their own beliefs and values for their decisions, rather than the information presented in the scenario itself. In this respect the question aimed to overcome some of the problems of monetary measures (such as Willingness To Pay) which can be criticized on the basis that its significance varies with the respondent's income. The six options shown in Figure 2 were provided. Only

those respondents who expressed some level of preference for park protection (Options 3, 2, 1 in Figure 1) were asked this question.

The data were collected using a mail questionnaire which comprised:

- a set of 34 items designed to measure respondents' intrinsic and instrumental values;
- a page of information (a scenario) for the future management of a natural area;
- a decision about the future management of a natural area (Park Preference);
- a decision about the level of personal sacrifice that a person would be willing to make; and
- socio-demographic and behavioral information.

Sampling procedure and survey administration

Versions of the instrument incorporating the different scenarios were mailed to a sample of 6000 people. This included 4000 people from a random sample of the electoral roll, 1000 people from the membership of a major environmental organization and 1000 people from the membership of a major farmer organization. The mailout procedure and administration were based on Dillman's (1978) *Total Design Method*. After adjusting for non-deliverable surveys, and removal of records for non-responses and another version not related to this paper, the total sample was reduced to 2391: 1282 members of the general public, 758 environmentalists and 351 farmers. The initial return rates were 56% for the general public, 82% for the environmentalists and 40% for the farmers. The samples were not mutually exclusive as 9.5 percent of the general public sample and 26.5 percent of the farmers indicated they were also members of an environment group.

Exploratory factor analysis of the 34 items reduced them to a 20 item psychometric scale (the Natural Area Value Scale) comprising 6 intrinsic value, 6 non-use, 6 use and 2 recreation value

items. The scale items are shown in Figure 3 and details of the analysis can be found in Winter and Lockwood (2004). The general public, environmentalist and farmer responses were combined for cluster analysis using factor scores generated through factor analysis of the Natural Area Value Scale. Five clusters, each possessing a unique combination of scores for the four values were identified using the Ward's method (Table 1). Details of the clustering procedure and a description of the results for the combined and individual samples are provided in Winter et al. (2003). The names of the clusters have been retained in this paper to provide consistency with other published work.

Table 2 shows how the members of the three samples were distributed after clustering of the combined sample. Environmentalists were mainly represented in clusters which had higher positive intrinsic values, with fifty two percent of the environmentalists being in the Pro-intrinsics (Cluster 5) and a further 27% in Green Moderates (Cluster 4). The farmer sample showed the opposite trend with half its members in Clusters 1 and 2 which had negative intrinsic values and positive use values. The general public group had relatively even membership across all clusters. Because the sample sizes differed significantly the relationship between the environmentalists and farmers in the clusters needs to be clarified. Clusters 1 and 3 contained relatively even numbers of farmers and environmentalists, clusters 4 and 5 were dominated by environmentalists and cluster 2 was dominated by farmers. Importantly, members of each sample were represented in all five clusters.

Results

Park Preference for the three samples

Table 3 shows the distribution of sample responses for PP, where options 0 and 1 relate to higher levels of direct use, and options 2 and 3 relate to higher levels of conservation. Almost 87 percent of the environmentalists (72.4 percent for option 2 and 14.5 percent for option 3) preferred higher levels of conservation. The farmers' responses are opposite to those of environmentalists with only 14.2 percent preferring option 2, and 1.7 percent option 3. A total 84.1 percent of the farmers preferred higher levels of direct use than conservation (options 0 and 1) compared with 13.1 percent of environmentalists. The general public responses were in between the environmentalists and farmers, and their preferences were evenly distributed between conservation and use, with a total of 48.4 percent preferring higher levels of conservation (42.2 percent for option 2, and 6.2 percent for option 3), and 51.6 percent higher level of use (48.9 percent for option 1 and 2.7 percent for option 0).

Park Preference for the clusters

The PP results for the clusters from the combined sample are provided in Table 4 which again shows the percentage frequencies for each option level. Mann-Whitney U (non-parametric) tests which compared the means for PP between pairs of clusters showed that they were significantly different ($p < 0.01$) with the exception of clusters 1 and 3 ($p = 0.61$). Cluster 2 shows that 75% opted for higher levels of direct use (options 0 and 1) and 25% opted for higher levels of conservation. The opposite situation is indicated by cluster 5 whereby 87% opted for higher conservation levels and 22% for use. Clusters 1 and 4 are opposed in their values but are far less

extreme than the preferences indicated for clusters 2 and 5. Cluster 4 tended towards slightly higher levels of conservation (58.7 for options 2 and 3) compared with 41% for higher use levels (options 0 and 1), whereas Cluster 1 indicated higher levels of use (53.1% for options 2 an 3) and lower conservation levels (47% for options 0 and 1).

There was a good positive correlation between PP and WTS for the combined sample, the three samples and the five clusters, meaning that higher levels of conservation were related to higher willingness to make sacrifices. (Spearman's r = 0.57, p = 0.00) for the combined sample, 0.42 for general public, 0.46 for environmentalists and 0.58 for farmers.

Willingness to sacrifice for the three samples

Table 5 shows the percentage frequencies of responses for the three samples for WTS. Environmentalists were willing to make higher levels of sacrifice than the farmers or the general public, with 75.4 percent willing to make a significant or higher sacrifice (58.8 percent for option 3 and 16.6 percent for option 4) . By contrast, only 16.3 percent of farmers were willing to make such sacrifice for forests (14.0 percent for option 3 and 2.3 percent for option 4). A large proportion of farmers (41.0 percent) opted for a small sacrifice (option 1) and 35.3 percent would not make any sacrifice (option 0). The general public were again in between these extremes. It is notable, that a relatively small percentage of all groups (7.4% to 10.2%) opted for the mid range position (option 2), suggesting that people take an interest in this issue rather than 'sitting on the fence'.

Willingness To Sacrifice for the clusters

Table 6 shows the willingness to sacrifice results for the clusters. Again the midpoint position was selected by only a small percentage of respondents (8 to 11.9%). Mann-Whitney U tests which compared the means for WTS between pairs of clusters showed that they were significantly different ($p < 0.01$) with the exception of clusters 1 and 3 ($p = 0.07$). Generally the results reflect the pattern shown in PP with clusters 1 and 3 tending towards higher levels of use, cluster 2 and 5 being strongly opposed and cluster 4 showing a moderate position but tending towards higher levels of conservation.

The influence of ecosystems

Non-parametric tests (Mann-Whitney U tests) were used to compare the means for the PP responses for the forest and wetland scenarios. No significant differences were found overall in any of the samples for the general public, environmentalist or farmers. No clusters distinguished between forest and wetland for their PP. Only the Pro-intrinsics cluster distinguished between these two ecosystems for WTS indicating a significantly higher WTS for forests (mean rank for forest = 345.2, wetland = 300.8, $p < 0.01$).

Three of the five clusters indicated a significantly higher PP for the endangered species wetland than for the forest (cluster 2, 4,5). Clusters 2 and 5 also opted for higher PP for the wetland with the endangered species than for the wetland without. Significantly higher WTS for endangered species wetland was indicated by the clusters 4 and 5. The significant difference levels are shown

in Table 7. These results apply only to the general public segments of the clusters because the environmentalists and farmers did not receive these versions.

Discussion and conclusions

The results show that intrinsic value is an important factor in the way that people conceive of natural areas and it can help to describe and understand their decisions. People who held higher intrinsic values opted for higher levels of area protection and those with higher use values opted for higher levels of direct use. The values illustrated the existence of significant differences between the three stakeholders, and a polarization of views between the environmentalists who indicated high levels of conservation and farmers who indicated higher levels of use and clearly show the link of intrinsic and instrumental values to these groups. The general public was in between these groups, and indicated preferences across all levels of PP such that the sample was evenly divided into pro-use and pro-conservation, with most indicating mid-range positions rather than the extremes. For the WTS a similar distribution was shown for each sample which correlated with their PP. A mid point was provided for the WTS question but only a small proportion of each sample selected it. This indicates that most people prefer to take up a 'position' but that most do not hold extreme views.

Members of all samples were represented in each cluster indicating that values can provide an alternate and more detailed method of grouping stakeholders. The results for the clusters showed a similar pattern to the three samples. Two clusters (clusters 2 and 5) who indicated extreme and opposing values, and which were dominated by environmentalists and farmers were clearly opposed in the decisions they made about each scenario. A further two clusters (1 and 3) were

each comprised of reasonably even numbers of environmentalists and farmers indicating that although these people belonged to opposing groups, their values and the decisions they made were similar. There may be an opportunity for cooperation and communication between these members using their values as a common point. The values of clusters 1 and 3 differed but the decisions they made were not significantly different. Cluster 4 which comprised a large proportion of environmentalists also preferred moderate PP and WTS. This cluster opted for higher levels of conservation than clusters 1 and 3 but again, there are opportunities for communication and negotiation between them.

This research suggests there may be greater opportunities for cooperation between people in different groups who hold similar values, albeit at varying magnitudes. It also supports the comments made by Leach (2002), that should information and opinions be sought from only a narrow range of groups, or if negotiations are conducted by only select representatives within the groups, the chances of conflict resulting from the interaction of people with extreme and polarized views is likely. The results also suggest that factors in addition to values operate in influencing the decisions and behaviors of group members.

Differentiation between the three ecosystems occurred only for small sub-groups within each sample with respect to respondents' PP and WTS. The exception to this was that the Pro intrinsics, the respondents with high intrinsic values, were willing to make a greater sacrifice for forest than wetlands. Three clusters (2, 4, and 5) indicated a higher conservation preference (PP) for the endangered species ecosystems, and clusters 4 and 5, were also willing to make higher sacrifices (WTS) for endangered species. These differences may also relate to other factors such

as advertising campaigns which tend to highlight endangered species over other entities, and may reflect the fact that forests have featured in much of the public conservation effort. The issue of endangered species then may provide a point of reference for these otherwise and apparently opposed groups.

The inclusion of a specific intrinsic value that acknowledges the value of nature for its own sake is an important value that warrants further research in order that it can be included in decision-making.

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Appendix 1 Australian Native Forests - How should they be managed?

What is the issue?

In a small town in your State is a timber mill. The current area of native timber has almost run out. The mill owners want to log a new area that will keep the mill going for several more years. This area has not been logged before. Other people think that the logging should not go ahead, and that the forest should be conserved as National Park.

What are these forests like?

The trees in these forests are very old (about 250 years) and tall. They have been virtually untouched since Europeans arrived in Australia over 200 years ago. This area is difficult to get to, so not a lot of people visit the area. A few people do go bushwalking there.

What are the benefits of logging?

Logging provides timber used in houses, furniture and various other products. The mill provides a range of jobs for the town. In turn, it also supports other businesses such as the petrol station, supermarket and restaurants. This has helped the town to keep the school, bank and the post office going. Logging would be done according to a Code of Forest Practice that helps minimise damage and ensures the forest grows back.

What happens to the town if forest is conserved as National Park?

In this case, logging will not proceed, and many people have predicted the decline of the town.

What are the costs of logging?

The tall old forests would be replaced by a young forest, which would be left to reach about 120 years of age before it was cut down again. The logging would harm the plants and animals and many would die. Although the trees would grow back after the logging, some species could not live in the young forest – for example, some need tree hollows that are only present in older forest. It is unlikely that any species would become extinct because of the logging. Building new logging roads will allow introduction of weeds and feral animals.

What are the options?

The government is considering four possible options for future management of the forest. To help them make a decision, they want to see which of the options people prefer.

Appendix 2 Wetlands and Irrigation - How should water be managed?
(sections added for the third scenario about endangered bird species are shown in bold)

What is the issue?

A region in your State features a major group of wetlands. The area is home to many native water birds [including two endangered species]. Over recent years the number of birds and fish has declined. Scientists have shown that this is due to the amount of water being taken away from the wetlands and used to irrigate crops. Irrigated crops now provide the main source of income and employment for the region. Some people have argued that the wetland should be conserved as a National Park. The irrigators and many other businesses oppose the Park, because it will reduce the amount of water they can use, and have a bad effect on the region's economy.

What is the wetland like?

The wetland is made up of *three* large areas of reeds, grasses, ponds and waterways. Under natural conditions, they usually flood during winter and spring. The flooding attracts many types of water birds and fish that come to the wetland to breed.[**The two endangered water birds breed in all three of the areas.**] With irrigation, the natural flooding no longer occurs, as water is stored in a dam upstream, and released during the summer and autumn for use by irrigators.

What are the benefits of irrigation?

Irrigation water is used to grow crops like rice, for orchards & other agriculture. Irrigated agriculture provides a range of jobs for the community. It also supports other businesses such as the petrol station, supermarket & restaurants. This has helped the town to keep the school, bank & post office going. If the wetland is conserved as National Park, then agricultural production will be substantially reduced. People say that some towns in the region will decline.

What are the costs of irrigation?

Unless irrigation is stopped or reduced, the quality of the wetlands will continue to decline. The ability of some native species to survive in the area will be substantially reduced. Some plants & animals will die out from the area [& the two endangered species will be threatened]. There will be fewer waterbirds & native fish. The vegetation will change with the drier conditions - some wetland plants will be limited to small areas, & other plants & weeds will take over.

What are the options?

The government is considering four possible options for future management of the wetlands. To help them make a decision, they want to see which of the options people prefer.

Option 3. All park, no logging, no tourism
The forest is given maximum protection and is declared a National Park. The forest survives as a pristine area. Logging and tourist development are not allowed and the only access into the Park is on foot. The mill has to close down and people lose their jobs. The businesses and services that support the timber industry may eventually close as well.
Option 2. All park, no logging, some tourism
The forest is declared a National Park. A small area at the Park boundary is set aside for a tourist development that will created some business opportunities. There are some minor impacts on the forest from tourist activities, but basically the forest remains intact. No logging is allowed which means the mill has to close.
Option 1. Some park, some logging, some tourism
A park is created but it is only half the size originally proposed. A small area at the Park boundary is set aside for a tourist development that will create some business opportunities. There is now some timber available for the mill to stay open for the next few years, but its long-term future is not certain. There are significant impacts on the forest from logging, and the smaller park also has impacts from tourism.
Option 0. No park, all logging, tourism unlikely
The Park does not go ahead and the mill is able to access the stands of timber it needs. The town remains unchanged. It is unlikely that the area would attract many tourists. The old forest is replaced with young regeneration and some animals and plants are reduced in numbers.
Not Sure

Figure 1 Park Preference (PP) Options - forest scenario

4. I think that the environment is worth preserving at any cost, so I would make whatever sacrifices are needed to see the Park created;
3. I would not sacrifice everything, but I think that the benefits from having the new Park are worth more to me than even a *significant reduction in income* or having to *move* or *change jobs*;
2. I would put up with a *significant reduction in income*, but not with having to change my job or move elsewhere;
1. I would put up with a *small reduction in income*, but not with having to change my job or move elsewhere;
0. If I had to reduce my income, move or change jobs, I would not support having the Park; Not sure.

Figure 2 Willingness To Sacrifice Options (for forest and wetland scenarios)

Intrinsic value items
The value of nature exists only in the human mind. Without people nature has no value.*
The only value that a natural place has, is what humans can make from it.*
Places like swamps have no value and should be cleaned up.*
Ugliness in nature indicates that an area has no value.*
The value of an ecosystem only depends on what it does for humans.*
Only humans have intrinsic value – that is, value for their own sake.*
Non-use value items
Natural areas are valuable to keep for future generations of humans.
I need to know that untouched, natural places exist.
I'm seeing natural areas the next generation of children may not see, and that concerns me.
We have to protect the environment for humans in the future, even if it means reducing our standard of living today.
Even if I don't go to natural areas, I can enjoy them by looking at books or seeing films.
There are plenty of natural places that are not very nice to visit but I'm glad they exist.
Use (non-recreation) value items
Forests are valuable because they produce wood products, jobs and income for people.
To say that natural areas have value just for themselves is a nice idea but we just cannot afford to think that way: the welfare of people has to come first.
All plant's and animal's lives are precious and worth preserving but human needs are more important than all other beings.
Our children will be better off if we spend money on industry rather than on the natural environment.
It is better to test new drugs on animals than on humans.
I don't like industries such as mining destroying parts of nature, but it is necessary for human survival.
Recreation value items
Natural areas are important to me because I use them for recreation.
Natural areas must be protected because I might want to use them for recreation in the future.

Figure 3. The Natural Area Value Scale

Source: Winter and Lockwood 2004. * indicates a reverse coded item

Table 1 Relative value scores for the combined sample clusters (negative values are shaded)

Cluster names	n	%	Intrinsic value	Non-use value	Use value	Recreation value
1. Traditional	314	13.1	very high negative	high positive	low positive	moderate positive
2. Pro-use	375	15.7	low negative	very high negative	high positive	high negative
3. Recreationist	424	17.7	very low negative	very high negative	moderate negative	high positive
4. Green Moderate	531	22.2	moderate positive	moderate positive	moderate positive	moderate positive
5. Pro-intrinsic	747	31.2	moderate positive	moderate positive	moderate negative	moderate negative
Total	2391	100				

Table 2 Distribution of samples in the clusters

	General Public		Environmentalists		Farmers		
Cluster names	**n**	**%**	**en**	**%**	**n**	**%**	**Total**
1. Traditional	226	18	45	6	43	12	**314**
2. Pro-use	205	16	35	5	135	38	**375**
3. Recreationist	285	22	77	10	62	18	**424**
4. Green Moderate	260	20	208	27	63	18	**531**
5. Pro-intrinsic	306	24	393	52	48	14	**747**
Total	**1282**	**100**	**758**	**100**	**351**	**100**	**2391**

Source: Winter, Lockwood and Morrison 2003

Table 3 Frequencies (%) for Park Preference (PP)

Sample	0. No park, All logging/ irrigation (%)	1. Some park, Mostly logging/ irrigation (%)	2. Mostly park, Some logging/ irrigation (%)	3. All park, No logging/ irrigation (%)	Total (%)
Environmentalists	0.4	12.7	72.4	14.5	100
General public	2.7	48.9	42.2	6.2	100
Farmers	13.1	71.0	14.2	1.7	100

Mann-Whitney U between pairs of samples for the PP variable were significantly different ($p<.01$)

Table 4 Clusters: Frequencies (%) for Park Preference (PP)

Cluster label	0.No park, All logging/ irrigation %	1.Some park Mostly logging/ irrigation %	2.Mostly park Some logging/ irrigation %	3.All park , No logging/ irrigation %	Total %
1. Traditional (a)	8.3	44.9	37.3	9.6	100
2. Pro-use	8.3	66.7	23.2	1.9	100
3. Moderate (a)	1.9	50.0	43.9	4.2	100
4. Green Recreationist	2.4	38.8	52.7	6.0	100
5. Pro-intrinsic	0.7	21.8	62.9	14.6	100

Mann-Whitney U tests between pairs of clusters for the PP variable were significantly different ($p<.01$) except for clusters 1 and 3. (a) no significant difference ($p=.61$)

Table 5 Frequencies (%) for Willingness to Sacrifice (WTS)

Sample	0. No sacrifice (%)	1. Small sacrifice (%)	2. Moderate sacrifice (%)	3. Significant sacrifice (%)	4. Any cost (%)	Total (%)
Environmentalist	5.8	8.6	10.2	58.8	16.6	100
General public	20.3	33.4	10.8	27.6	7.9	100
Farmers	35.3	41.0	7.4	14.0	2.3	100

Mann-Whitney U between pairs of samples for the PP variable were significantly different ($p<.01$)

Table 6 Clusters: Frequencies (%) for Willingness to Sacrifice (WTS)

Sample	0. No sacrifice (%)	1. Small sacrifice (%)	2. Moderate sacrifice (%)	3. Significant sacrifice (%)	4. Any cost (%)	Total (%)
1. Traditional (a)	27.1	29.6	8.0	26.4	8.9	100
2. Pro-use	36.8	35.5	8.8	16.0	2.9	100
3. Moderate (a)	19.6	31.8	8.7	31.6	8.3	100
4. Green Rec	10.4	29.0	11.9	40.9	7.9	100
5. Pro-intrinsic	9.0	16.3	11.1	47.5	16.1	100

Mann-Whitney U tests between pairs of clusters for the PP variable were significantly different ($p<.01$) except for clusters 1 and 3. (a) no significant difference ($p=.07$)

Table 7 Comparison of ecosystems by clusters (p values)
(shaded sections show a significant difference between the scenarios)

	Forest & wetland		Forest & endangered species wetland		Wetland & endangered species wetland	
Clusters	**PP**	**WTS**	**PP**	**WTS**	**PP**	**WTS**
1. Traditional	.64	.95	.38	.31	.64	.36
2. Pro-use	.49	.51	.00	.73	.00	.83
3. Recreationist	.17	.09	.73	.16	.40	.95
4. Green Moderate	.09	.16	.00	.00	.14	.02
5. Pro-intrinsic	.87	.00	.00	.00	.00	.00

Appendix 1 Australian Native Forests - How should they be managed?

Appendix 2 Wetlands and Irrigation - How should water be managed?
(sections added for the third scenario about endangered bird species are shown in bold)

Figure 1 Park Preference (PP) Options - forest scenario

Figure 2 Willingness To Sacrifice Options (for forest and wetland scenarios)

Figure 3 The Natural Area Value Scale
Source: Winter and Lockwood 2004. * indicates a reverse coded item

Table 1 Relative value scores for the combined sample clusters
(negative values are shaded)

Table 2 Distribution of samples in the clusters

Table 3 Frequencies (%) for Park Preference (PP)

Table 4 Clusters: Frequencies (%) for Park Preference (PP)

Table 5 Frequencies (%) for Willingness to Sacrifice (WTS)

Table 6 Clusters: Frequencies (%) for Willingness to Sacrifice (WTS)

Table 7 Comparison of ecosystems by clusters (p values)
(shaded sections show a significant difference between the scenarios)