

Conservation, Cost, and Income: New Zealand Farmers' Values in Forest Management

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Abstract

A postal survey of 1435 farm owners with 50 ha or more of indigenous forest was conducted in June-August 2002. Thirty-eight percent of farmers responded. Collectively they owned approximately 92,000 ha of forest. By far the most important uses of their forests were non-consumptive; that is, as a home for bird life, forest protection for the benefit of future generations, aesthetic qualities, and erosion control. Environmental benefits ranked first in terms of farmers' forest management goals, followed by economic, social and cultural benefits. Farmers believed that environmental values and benefits should be the highest priority for the management of indigenous forest on private land in New Zealand. Asked to indicate how they would respond to a theoretical commercial proposal for sustainable harvesting, only a third said they would go with the proposal, while almost half chose continued reservation of their forests. Only 28% received any income from their indigenous forests, while 42% reported direct outlay associated with forests. Eighteen percent had some long-term protection arrangements for their forests, and 93% had conducted pest animal control. The results of this survey compared with a more localised survey 10 years earlier suggest a shift in farmers' values for forests away from the utilitarian and toward a more naturalistic appreciation.

Keywords: farmers' attitudes, indigenous forest, native forest, farm survey, conservation, sustainable forest management, forest values, forest uses, New Zealand.

Introduction

A postal questionnaire survey of 1435 farm owners was conducted in June-August 2002. Owners of all the farms recorded in Agriquality New Zealand's "Agribase" as having 50 ha or more of indigenous forest were contacted. We chose a threshold value of 50 ha of forest because above that size, the full range of commercial timber management options becomes feasible. This survey was part of a larger survey of New Zealand forest owners including those whose forests do not occur on farms. These are largely Maori landowners. The larger survey will be used to compare values, uses, and forest management between the two classes of owners. This report describes only the responses of the forest-owning farmers.

We sought the data to inform public policy. Indigenous forest management is established in law under the Forests Act 1949 and its amendments. Further amendment of the Forests Act is pending. We wanted to learn how owners perceived the uses and values of their forests to understand how the future law might most effectively influence behaviour of both classes of owners to achieve sustainability.

Ten years ago, Wilson (1992) surveyed farmers in the extreme southeast of New Zealand, the Catlins District. He reported utilitarian attitudes toward on-farm forests similar to those reported from other countries around that period (e.g., McDowell and Sparks 1989). “Utilitarian” indicates “a primary concern for the practical and material value of animals and the natural environment” as opposed to a “naturalistic” attitude, indicating interest and affection for animals and the outdoors in and of themselves (Kellert 1984). Wilson’s survey 1988-1992 predated the Forests Act (1949) amendments (1993) that stipulate sustainable management practices for privately held indigenous forests. He concluded that for the majority of farms in his sample, indigenous forest had persisted only where the area was perceived as unsuitable for farming.

Social change, dictated by changing attitudes, both influences and is influenced by legal change. New Zealand’s resource management legislation has changed markedly over the last 10-15 years. The Resource Management Act (1991) and restructuring of central, regional, and local government were introduced during Wilson’s survey. This survey updates our knowledge of farmers’ attitudes toward forest parcels on farms.

Methodology

Of the 1435 farmers who received the postal survey, 41% (593) responded, yielding 486 useable responses (an effective response rate of 34%). The 107 unusable responses included those who returned the questionnaire blank, who said they did not qualify, who gave their total area of native forest as less than 50 ha, or whose responses (three cases) related to Department of Conservation (DOC) estates. The questionnaire covered details of the respondent, farm property and business, native forest on the property, management and use of this forest, and attitudes to the forest. Questions related to uses and values of forests were asked in several ways. This redundancy was to assess consistency in respondents’ choices.

The questionnaire produced ordinal data (such as scores on a five-point scale) as well as interval data (such as forest area or respondent’s age). Given the types of data, the Spearman Rank Order Correlation test was used to measure the correlation between variables. In this non-parametric test, the values of each of the variables are ranked from smallest to largest, and the correlation coefficient (ranging from -1 to $+1$) is computed on pairs of ranks. Since the statistical significance (or p value) of the correlation is related to the number of cases, a conservative approach has been taken to reporting correlations. Only Spearman Rank Order correlation coefficients (Rho) with a significance of .001 or better are given, unless otherwise stated.

Respondents and properties

Responses came from throughout the country, with all regions and 59 of New Zealand’s 74 local council districts and cities represented. The largest representations were from the Tasman (7.6% of responses), Ruapehu (7.2%), Far North (6.0%), Waitomo (5.5%), Thames-Coromandel (4.9%), Southland (4.3%), and Whangarei, Gisborne, and Clutha Districts (each 4.1%).

Respondents were 90% male and 10% female. They were on average older than the primary sector workers recorded in the 2001 census as employers or self-employed, the segment of the

workforce including our categories of “farmer”, “farm owner”, and “farm manager”. Our sample under-represented those below age 40 and over-represented those above 50.

Of the 461 who answered the question on ethnic affiliation, 95.2% classified themselves as “NZ European or pakeha”, 2.2 % as Maori, and 2.6% as “other”, typically “New Zealander”. Based upon the 2001 Census of Population data for self-employed and employer agricultural and fisheries workers, Maori were underrepresented in the survey (3.8% in the census c.f. 2.2% in the survey). We were surprised that so few Maori occurred in a nationwide sample of farmers.

Respondents were involved in beef (79%) and sheep (68%) production, plantation forestry (40%), dairying (16%), and tourism or accommodation (10%). Of the 473 who answered the question, the majority (76%) were owner-operators without a farm manager, while 9% were owner-operators with farm managers, 7% were farm managers with a share or stake in the property, 6% were managers without a stake holding, and 3% were owners not working on the property. In all, 444 (94% of those who answered) were full or part owners in their properties.

Length of ownership of the particular properties ranged from 1 to 75 years and was correlated with respondents’ age (Rho 0.49). Fifty percent of the 447 respondents who answered had purchased their farms from an unrelated previous owner, 31% had bought from a parent’s family, 10% had inherited from a parent’s family, and 9% acquired their property through other means.

Forest area

Four-hundred and sixty-one respondents gave information on the native forest on the property. The maximum forest area was 3,700 ha, with an average of 199 ha per property. Ninety percent of the properties had 400 ha or less of native forest, and 50% had 108 ha or less. The total area of forest on these properties was just under 92,000 ha. Properties averaged 107 ha of virgin forest and 128 ha of regenerating forest – totalling 40,934 ha of virgin forest and 49,246 ha of regenerating forest in the total sample. The main forest types on the properties were podocarp or mixed podocarp-hardwood (51%), regenerating hardwood shrubland (19%), and beech (17%). Other types were indicated for 11% of properties.

In 37% of cases, the forest on the property was in one block and in 63% it was divided among several blocks – on average six blocks. Taking all properties into account, including those with only one block, the average size of the largest block was 134 ha; 95% of properties had a block of at least 20 ha.

Seventy-nine percent of the properties for which data were provided were bordered by native forest. This was most commonly a large Crown or publicly owned native forest (47% of all properties) followed by a large area of privately owned native forest (27%). Five percent of properties bordered both public and privately owned forests.

Reported uses and values of forests

Using a five-point scale (ranging from 1 being ‘not important at all’ to 5 being ‘essential’), respondents were asked to rate the importance of various forest *uses* to them. Twenty uses were listed (Table 1).

Table 1. Ratings of importance of various forest uses

	# responses	mean rating
as a home for birds/wildlife	439	4.20
protecting it for future generations	434	4.08
aesthetic /visual	420	4.07
erosion prevention / catchment protection	416	3.26
streamside protection	400	3.02
water retention	397	2.86
walking/hiking	414	2.86
relaxing	407	2.80
bird or animal watching	399	2.52
hunting	424	2.43
shelter for stock	415	2.34
botanical interests	393	2.28
picnicking	399	2.03
honey production	394	1.87
firewood	413	1.78
collecting plants or seeds for planting	390	1.77
grazing	405	1.57
timber & fence posts	378	1.41
collecting medicinal plants	375	1.26
moss collecting	375	1.16
other	21	4.33

The highest ratings were given to items referring to conservation-aesthetic uses, followed by environmental and recreational ones. Economic uses were generally considered less important overall.

Later in the questionnaire, a related ranking was requested from respondents using eight “values” statements (Table 2).

Table 2. Forest values statements

	# respondents	mean score
Maintaining the environment (soils, plants and animals etc) in natural state	459	4.0
Having a nice place to visit and recreate	459	3.9
Having a resource for your future generations	453	3.7
As a place to hunt or get wild foods	446	2.3
Maintaining the owners’ cultural identity	425	2.3
Having a place to get timbers, plants etc for cultural uses	434	1.9
Getting a good financial return	431	1.8
Creating jobs for the owners/ shareholders	418	1.5
Other things	30	4.5

The environmental/conservation items here also received the highest importance ratings, with 71% rating “maintenance of the environment” as important (4 or 5 on the scale), followed by “having a nice place to visit” (67%), and “having a resource for future generations to use” (64%). These results are fairly consistent with those for the uses in Table 1.

When uses and values were combined in a single cluster analysis, seven groupings of values emerged. From this analysis, ratings of importance for each of the groupings of forest values were calculated as an average of each of the component scores for each respondent, giving seven composite scores (Table 3).

Table 3. Composite value scores

	# respondents	mean score
conservation importance	479	3.97
catchment protection importance	425	3.06
recreation importance	427	2.42
hunting importance	459	2.38
stock shelter importance	415	2.34
cultural identity importance	425	2.32
economic importance	468	1.68

No clear correlations were evident between the composite scores and respondent or property characteristics, although the economic (Rho 0.42), culture (0.20), and stock shelter importance (0.27) scores correlated with the proportion of income received from the forest (see below). Hunting importance was correlated with total area of native forest on the property (0.26).

Benefits and costs of forest ownership

Respondents were asked whether any *income* was currently generated from the forest uses in Table 3. At least one of the forest uses generated income for 28% of respondents; the remainder reported no forest-derived income. The most important income-generating uses were shelter for stock (15% of respondents), grazing (14%), firewood (9%), timber and fence posts (7%), honey production (7%), hunting (6%), and walking-hiking (6%).

Forest use contributed little to respondent’s annual incomes. Four percent of respondents reported that they had received concession fees or rental payments from their native forest in the preceding 12 months. For the 313 who answered, 17 % of the respondents got 5% or less of their annual income from the forest, 5% got 10% or less, and 6% got more than 10%. Four respondents reported that they received all or nearly all of their income from their native forests through harvesting under a sustainable management plan. The forest’s overall contribution to annual income was correlated with some of the use scores (Table 1), especially with the use of the forest as a source of timber and posts (Rho 0.42).

Forty-two percent (202 respondents) reported that in the preceding 12 months they had incurred some direct *financial outlay* related to their forests (Table 4).

Table 4. Financial outlay related to forest ownership

Expense	# respondents	percent (n=202)
Fencing & fence maintenance	102	50.5
Animal pest control (especially possums)	82	40.6
Weed control	29	14.3
Rates	26	12.9
Tracks, walkways etc	19	9.4
Fires and other protection (incl. insurance)	11	5.4
Tree planting	9	4.4
Sustainable management plan costs	8	4.0
Resource consents, covenant etc costs	8	4.0
Other	11	5.4

Animal control had been carried out on 93% of properties in the previous five years. In many cases, this work was done without direct outlay by the farmer, by the Animal Health Board or the regional council (as part of bovine tuberculosis control) using levy payments or rates, or by the Department of Conservation as part of the protection for their own estate. The main target animals were possums (73%), wild goats (16%), wild pigs (10%), and mustelids (8%).

Financial outlay was weakly correlated with involvement in forest decision-making (Rho 0.19) and with the respondents' recreational (0.14) and conservation value scores (0.16). Weed control was correlated with having spent money for forest management (Rho 0.25) and with the proportion of the respondent's income received from the forest (-0.20).

Over a third (36%) of respondents had no management plan, 48% had an informal management plan, 7% had a written plan, and 9% (46 respondents) had a registered sustainable management plan or permit (SMP). Seventeen percent (80 respondents) further indicated they had investigated or begun the process of getting a sustainable management plan. Having a written management plan was statistically correlated with the respondent's recreation (Rho 0.21) and conservation value scores (0.20). Possessing a SMP was weakly correlated with percentage income from the forest (Rho 0.16, $p < .005$).

Of the 454 who answered, 61% considered that the advantages of having native forest on their property outweighed the disadvantages, 24% thought they were about even, and 15% felt the disadvantages were greater. The perception of relative advantage in having native forest was positively correlated with having a written management plan (Rho 0.16), and with the recreation (0.38), catchment (0.27) and conservation value scores (0.43), and negatively correlated with having had financial assistance with forest protection (-0.16).

Congruence of stated uses and values with management choices

Eighteen percent of respondents reported that the long-term rights to all or some of their forest had been leased, sold or granted to Crown, or had been covenanted to another body for the purposes of protecting the forest. Of these:

- 46 (9.5% overall) had Queen Elizabeth II National Trust covenants,

- 10 had reserve or lease arrangements with the regional or district council, 4 had some private arrangement,
- 9 had covenants with the Department of Conservation,
- 2 had Nga Whenua Rahui covenants,
- 7 had some unspecified covenant, and
- 3 had Crown lease land (the terms of which prohibit forest clearing).
- 4 respondents felt that their forest was protected under district or regional planning schemes or by legislation.

Ten respondents noted that they were in the process of either selling forest land to the Crown or covenanting it, while one person reported that the harvesting rights to some of his forest area had been sold.

Nineteen percent (91 respondents) reported that at some time they had received financial assistance for native forest protection or conservation. The main providers of assistance were the QE II National Trust (36 respondents), regional councils (26), DOC (24), and district councils (9). Help was mainly provided for fencing, pest control, or as council rates relief.

Having a long-term protection arrangement was correlated with having a written management plan (Rho 0.26) and the number of perceived barriers to forest use (0.22). A protection arrangement was weakly correlated with having a SMP (0.17) and the respondent's catchment (0.17) and conservation value scores (0.19). The relationship between a long-term protection arrangement and the economic value score was weak (-0.17).

Personal management priorities

Respondents were asked to indicate their overall goals for the management of the native forest on their own properties by ranking (1=high, 4=low) against each other the importance of economic, cultural, social, and environmental enhancement or benefits (Table 5).

Table 5. Prioritisation of respondents' forest management goals

Goals	# responses	mean rank
environmental enhancement or benefit	399	1.36
economic enhancement or benefit	302	2.38
social enhancement or benefits	276	2.45
cultural enhancement or benefits	232	3.41

The closeness of the rankings of the economic and social goals was due to the relatively high proportion of second and third rankings given to the social goal, and the polarisation of views about the economic goal (with 29% ranking it lowest, compared with 8% for the social goal). Non-response to this goal-ranking exercise was high, with many respondents only indicating the most important or two most important goals. The number of responses for each goal is proportional to the importance ranking (Table 5). If we consider only the percentage of respondents ranking each goal as the most important (ranked 1), environmental enhancement clearly led with 72% of respondents, followed by economic enhancement (32%), social enhancement (7%), and cultural enhancement (less than 1%).

The priority given to each goal was related to the respondent's scores for the composite forest values (Table 3):

- The priority given to economic enhancement was correlated with the economic value score (Rho 0.32) and with having received financial assistance for forest protection (0.20), and was negatively related to the catchment (- 0.24), recreation (-0.30) and conservation (-0.32) scores, as well as to a perception of net benefit from having native forest (-0.34).
- The priority given to cultural enhancement was positively related to the cultural (0.40) and conservation scores (0.22), and with perception of net benefit of having native forest (0.23).
- The priority given to social enhancement was negatively correlated with the respondent's economic value score (0.27).
- The priority given to environmental enhancement was positively correlated with the recreation (0.18), catchment (0.23), and conservation value (0.29) scores, the perception of net benefit of having native forest (0.22), and negatively correlated with the economic value score (-0.27) and having financial assistance for forest protection (0.19).

Normative management priorities

The respondents were asked to indicate from the four forest management goals (Table 5) what they believed should be the highest priority for native forest management on farms and private land in New Zealand generally (normative priority), as opposed to the goals for their own land. Two thirds of the 371 who answered felt that environmental enhancement and benefits should be the main normative goal, followed by economic (24%), and much less important, social (3%) and cultural goals (0.6%). Four percent of respondents felt that environmental and economic goals should be considered together, and 1% felt that this should be a matter for individual landowners themselves.

The goal that the respondent ranked as the highest priority on his or her forest was compared with what s/he thought should be the highest normative priority goal (Table 6).

Table 6. Comparison of personal and normative priority goals for native forest management

Highest priority for own forest	Highest priority for native forest on private land			
	% economic	% cultural	% social	% environmental
Economic (n=80)	69	1	3	20
Cultural (n=13)	23	8	-	62
Social (n=16)	13	-	38	38
Environmental (n=242)	11	<1	2	80

Sixteen people whose personal priority was economic felt that environmental goals should be paramount for private forest generally. The reverse contrast also occurred; 26 people whose personal priority was environmental felt that the national priority should be economic. However, those whose personal priority was environmental were the most consistent between personal and normative goals (80%) of the total sample, while those few whose personal priority was cultural were the least consistent (8%).

Management Priorities and Harvesting

The matter of values and priorities was further tested by asking the respondents to consider the following scenario:

“A reputable local sawmill has contacted you with a proposal to log your native forest. This involves going through the process of getting a registered sustainable management plan or permit. With such a plan or permit, you could maintain the forest and continue harvesting it periodically in small amounts in the future. This would bring in a profit of \$100-\$200/ha each year, depending on the composition and condition of your forest”.

Respondents were asked to choose among three options – keeping it as a reserve, proceeding with the proposal, or doing something else (Table 7). Willingness to consider harvesting the farm’s native forest was correlated with economic value score (Rho: 0.18). On the other hand, willingness to harvest was negatively correlated with having a long-term forest protection arrangement (-0.19), perception of a net benefit of having native forest on the property (-0.32), and the recreation (-0.28), catchment (-0.22), and conservation (-0.33) value scores.

Of those who indicated what else they would do, 60% would do some kind of harvesting, 21% would not undertake harvesting, and 19% would consider the proposal in more depth. Taking the “do something else” choices into account, approximately 47% would entertain some cutting of their forest if the conditions were right, and 53% would most likely retain their native forest as is. This we describe as their *basic position on harvesting* (Table 7)

Table 7. Respondents’ personal forest management priority, decision on the forest harvesting scenario, and basic position on harvesting are contrasted.

Personal priority	Decision on logging proposal			Basic position on harvesting	
	% keep as reserve	% accept proposal	% do otherwise	% unwilling to harvest	% willing to harvest
All cases (n=456)	47	34	19	53	47
Cases stating a priority (n=405)	49	31	20	54	46
Economic (n=92)	15	63	22	18	82
Cultural (n=15)	60	13	27	67	33
Social (n=19)	63	11	26	72	28
Environmental (n=279)	59	23	18	64	36

Respondents’ personal priority for management of their own native forest, their decisions on the logging proposal and their basic position on harvesting are generally consistent. Departures from what might be expected as consistency include those whose personal priority was economic but who declined the harvesting proposal and whose basic position was “not willing to harvest”. Also interesting was the number of respondents whose priority was environmental but who accepted the harvesting proposal and who were willing to harvest. Evidently, these respondents felt that the harvesting proposal was consistent with their environmental goal. A higher proportion of those whose goals were cultural or social rejected any harvesting.

Conclusion: farmers as conservationists

Farmers evidenced considerable awareness of the environmental values of native forest on farms. In general, owners or managers of farms with native forest who responded to the survey tended to be focused on the environmental, conservation and aesthetic values of their forests, rather than on economic or utility values. This contrasts markedly with the results of an earlier survey limited to the Catlins (Wilson 1992), in which farmers' views were more utilitarian. For example, in Wilson's (1992) sample, 39% of farmers regarded native forest as important to catchments, while in this survey, 49.5% of respondents rated catchment protection "very important" or "essential". In Wilson's (1992) survey, 74% of landholders said that native forests were important stock shelter, while in this survey only 23% of respondents felt that this was the case.

One aspect that may have contributed to this change is the relative economic value of the forest as perceived by farmers. Our data show that farmers generally capture very little revenue from native forests. Prior to and during Wilson's (1992) survey, farm forest remnants were sold for woodchip, an important cash value, including as loan collateral for some in the Catlins. This value was eliminated with the passage of the Forests Amendment Act (1993). Timber sales from Catlins farms were negligible apart from chipwood. Wilson (1992:120) said, "The individual landholder and his/her decision-making environment are the major forces shaping the native forest landscape on farmland". The present legal nexus restricts landholder decision-making more than was the case prior to the introduction of the Resource Management Act (1991) and the Forests Amendment Act (1993).

Direct comparison between the surveys is impossible because different formats were used, but the two sets of results suggest that the big change was not in the economic value, but in the perceived environmental and recreational values. In this survey, when farmers were presented with a hypothetical income opportunity from their forests, fewer than half said they would elect to harvest. Even among those who said that economic aspects were their highest priority for forest management, 15% still chose reservation of the forest. Forest management in New Zealand has become more ecologically based since 1993. About a quarter of the respondents evidenced a perception that harvesting is not necessarily inconsistent with their environmental or conservation values. A shift in farmers' values attached to indigenous forest has occurred.

References

- Kellert, Stephen R. 1984. Urban American perceptions of animals and the natural environment. Urban Ecology 8: 209-228.
- MacDowell, C. and R. Sparks. 1989. The multivariate modelling and prediction of farmers' conservation behaviour towards natural ecosystems. Journal of Environmental Management 28: 185-210.
- Wilson, Geoff A. 1992. A survey on attitudes of landholders to native forest on farmland. Journal of Environmental Management 34: 117-136.