

LOGGING AND LANDSCAPE CHANGE: WHAT DO THE PUBLIC THINK?

Shaun Kilvert
Environmental Researcher
LIRO



Figure 1 - Photomontage of a logging operation seen from the InterIsland ferries, Onepua Bay, Marlborough Sounds

ABSTRACT

A random sample of 400 New Zealand residents, selected on a pro rata basis around the country, were questioned to determine their opinions about logging and landscape change in plantation forests. The survey obtained data on respondents socio-economic status and background, social values, attitudes, and perceptions. This paper summarises the research results regarding attitudes and the demographic composition of the sample.

The study found that the majority of the respondents recognised plantation pine forests as a fast growing renewable crop with a temporary short-term period of adverse visual impacts. One-third of the

sample did not share this view. Most of these people regarded logged areas as too barren and untidy, were concerned about the impact of logging on soil stability, ecosystems and sustainable use of the land, were uncertain as to if and when logged areas would be replanted, and were of the opinion that the adverse visual impacts of logging were long-term or even permanent.

INTRODUCTION

The two main interfaces between the forest industry and the general public are "the view on the road" (logging trucks) and "the view from the road" (forested landscapes in close proximity to major residential, transportation or recreational networks).

Landscape change resulting from forest operations in highly visible areas is of concern the forest industry, as people's perceptions of the environment are primarily visual in origin (Figure 1) and negative perceptions may prompt criticism of forest management practices and policies.

The issue of public critique of forest landscape change has initiated considerable concern for forestry interests in Europe and America since the early 1960s. In the United States, careful attention to forest landscape management has been prompted by increasing public concern about environmental quality, alleged clearcutting indiscretions on the Monogahela National Forest in West Virginia, and statutes such as the *Multiple Use Sustained Yield Act* 1960, *National Environmental Policy Act* 1969, *Forest and Rangeland Renewable Resources Act* 1974, and *National Forest Management Act* 1976 (Arthur 1977; Benson, McCool and Schlieter 1985; McCool, Benson and Ashor 1986; Reid 1983). In Italy, a special law (L.431/1985) classifies all forests - including plantation forests - as "natural portraits", and regulates the introduction of modifying elements. In other European countries (such as Ireland and Spain) a special environmental impact assessment, including reference to visual impacts, is required for all forest operations whose surface area exceeds a certain limit (Spinelli and Kofman 1994).

In New Zealand, the need to recognise the impact of forest operations on visual amenity was stated in the *New Zealand Forest Code of Practice* published in 1990 (Vaughan, Visser and Smith 1993). This requirement has been subsequently reinforced by the introduction of the *Resource Management Act* 1991 (New Zealand Government 1992). This statute stipulates that "every person has a duty to avoid, remedy, or mitigate any adverse

effects on the environment" (p.28), and should have particular regard for the "maintenance and enhancement of amenity values" (p.22). Amenity values are defined as "those natural or physical qualities or characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes" (p.8).

However, the question which needs to be addressed is, how concerned are New Zealanders about the aesthetics of plantation forests and operations therein? It can be argued that there should be little public concern about these forests because they may be regarded as a fast growing, renewable crop of a species which is not indigenous to New Zealand. New Zealand's 1.3 million hectares of plantation forest mainly consists of the fast growing species *Pinus radiata*, introduced from California last century (New Zealand Forest Owners Association 1994). Under New Zealand growing conditions, final stockings of between 250 and 350 stems per hectare are achieved as quickly as possible (usually by age 14) in order to maximise the volume harvested at clearfell (30 years). The consequence of this is final-crop pine trees with an average height of 35 metres and large stem volumes averaging 2-5 m³.

In order to ascertain the general public's impressions of plantation forests and level of concern about forest aesthetics, the Logging Industry Research Organisation has undertaken a national public perception survey. This paper summarises the research findings regarding respondents' demographic characteristics, attitudes and concerns.

PUBLIC PERCEPTION SURVEY

Objectives

A survey of New Zealand residents' perceptions of plantation *Pinus radiata*

forests and inter-rotation landscape change was undertaken in 1995. This survey had six objectives:

- Evaluate New Zealanders' attitudes regarding plantation pine forests, logging and landscape change.
- Determine the levels of concern about negative visual impacts, together with people's reasons for high and low levels of concern.
- Measure the perceived recovery-period for visual amenity after logging.
- Identify significant relationships between social values, attitudes about logging and landscape change, and perceptual judgements regarding visual quality.
- Evaluate the relative importance of area of clearance, shape of clearance, length of visible roading, colour, and texture on visual quality ratings.
- Evaluate the relationship between visual acceptability and visual quality ratings, and evaluate differences in visual impact acceptability thresholds.

This paper documents the survey findings regarding the first *three* objectives; essentially, this paper summarises the findings on New Zealanders' impressions of, and concern about, logging and landscape change.

Methodology

A questionnaire was designed and piloted during 1994 and early 1995. The questionnaire had four components:

1. A series of closed and open questions to determine the demographic

characteristics and socio-economic background of survey participants.

2. A series of closed and open questions to ascertain attitudes about pine forests and landscape change, levels of concern about the visual impacts of logging, and reasons for concern or unconcern.
3. A section in which the observers rated one of two sets of 30 colour photographs which depicted a hillside, seen from State Highway 1 at a distance of 2.5 kilometres, with varying amounts of bare ground, tracking, slash, and regrowth, and subject to different types of logging and replanting. Aldus PhotoStyler 2.0 software was used to produce the digital photomontages rated in the survey. Each of the 30 photographs was rated on the basis of visual quality, while three photos in each of the two photo albums (six photographs in total) were assessed on the basis of visual acceptability.
4. A closed question to ascertain the social value orientations of respondents.

The conceptual framework underlying the construction of the questionnaire is illustrated in Figure 2. People experience the physical environment through the five senses: sight, hearing, smell, touch, and taste; sight is generally regarded as the most important of these senses. The relay of data (percepts) from the sensory organs to the mind is known as perception. The process of adding meaning to the percepts is often referred to as cognition. The result is an interpretation of the outside world (the behavioural environment) upon which the individual can make decisions and act accordingly (Pourteous 1977; Gold 1980; Tuan 1990).

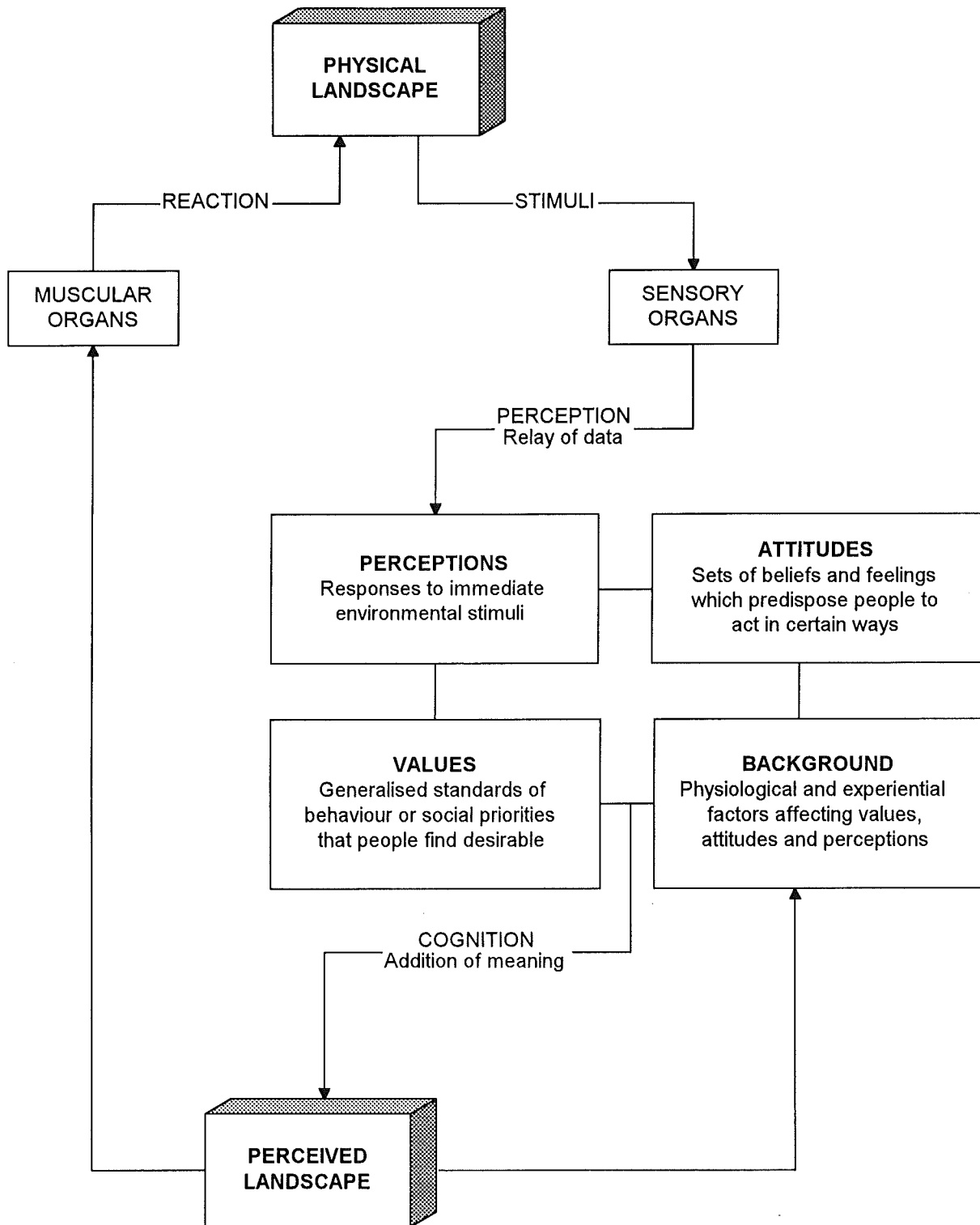


Figure 2 - Environmental cognition: a conceptual framework

Source: Adapted from Pourceous, 1977 p.141

The exact functioning of the cognitive process cannot, unfortunately, be analysed directly. Human-environment interaction has to be evaluated on the basis of the end result - the motor response; this may

involve watching the behaviour of people, or soliciting verbal and/or written answers to questions. Behavioural reactions to environmental stimuli are often categorised according to a three way division:

perceptions (reactions to, or judgements of, immediate environmental stimuli), attitudes (reactions to, or statements of, general beliefs regarding environmental stimuli), and values (generalised standards of behaviour or long-term social priorities that people find desirable). Perceptual judgements may be regarded as somewhat transitory, varying according to the mood and immediate circumstances of the observer, whereas values are essentially stable, changing over years or even decades. All responses, however, are based on experience and upbringing (Pourteous 1977; Gold 1980; Tuan 1990).

The construction of the questionnaire aimed to obtain data on all of the aspects of the cognitive process; data regarding socio-economic and experiential background, social value orientations which may affect the way in which respondents act or respond, statements of attitudes (provided without immediate environmental stimuli), and perceptual judgements regarding actual visual stimuli presented in the form of colour digital photomontages. This paper summarises the findings regarding respondents' attitudes and background.

An early version of the questionnaire was used in a survey of 213 New Zealanders' attitudes about logging and landscape change administered in 1991 (Killerby 1992; Kilvert and Hartsough 1993). A modified version of section one and two of this questionnaire, together with an early version of section four, was employed in a 1994 survey of 153 Kawau Island landowners' perceptions of exotic forest management (Kilvert 1995). The final questionnaire was piloted on a random sample of 15 Napier and Hastings residents in March 1995.

In the public perception survey undertaken in 1995, difficulties were experienced in obtaining a representative sample of the general public. Members of the general

public (selected from electoral rolls) had been invited to meetings, at which they would complete a questionnaire and rate a set of 30 colour slides (Killerby 1992); however, this technique resulted in a very low response rate, with participants being only those who were either very interested in the issue or had nothing better to do.

In order to obtain a representative sample of the general public in the 1995 public perception survey, interviewers called door-to-door with questionnaires and photograph albums. A total of 400 people were required, selected on a *pro rata* basis. Quotas were used to ensure representative geographical distribution (Figure 3), and relevant national urban-rural, male-female, and working-retired ratios.

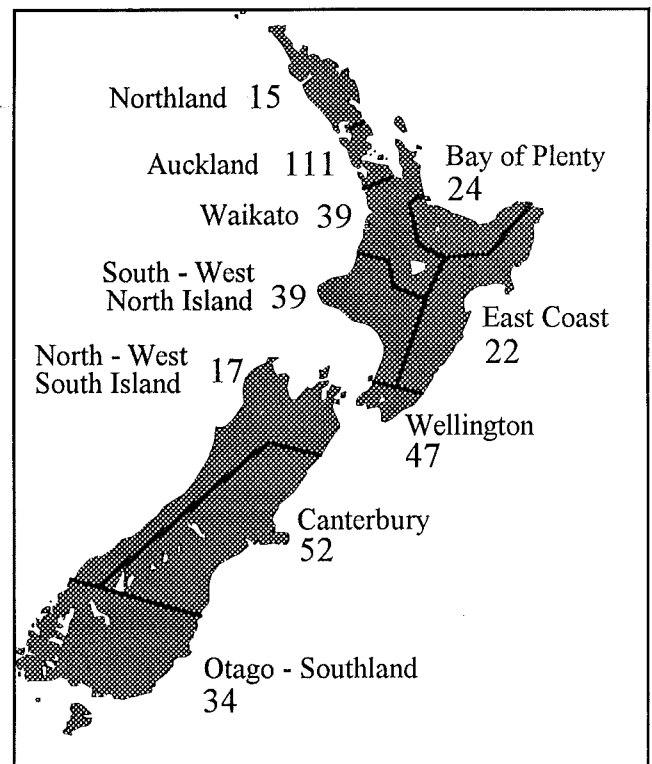


Figure 3 - Geographic distribution of survey respondents

Respondents were selected by going house-to-house in randomly selected urban and rural localities within ten regions: Northland (Dargaville and environs),

Metropolitan Auckland, Waikato (Hamilton and environs, plus households around Whangamata and Whakamaru), Bay of Plenty (Rotorua and environs), East Coast (Napier-Hastings and environs), South-West North Island (Palmerston North and environs), Metropolitan Wellington, North-West North Island (Nelson and environs), Canterbury (Christchurch and environs), and Otago-Southland (Dunedin and environs). Note that while the majority of these sample areas represent one regional territorial authority unit, four represent amalgams. The East Coast region is an amalgamation of the Gisborne and Hawke's Bay populations, South-West North Island is an amalgamation of Taranaki and Manawatu-Wanganui, North-West South Island amalgamates the Nelson, Marlborough, Tasman and West Coast regions, while Otago-Southland is as the name suggests. These amalgams were formed to produce sample sizes of at least $n=15$ for meaningful statistical analysis of

regional differences in values, attitudes and/or perceptual judgements.

In order to obtain a sample of 400 New Zealand residents, a total of 1783 houses were approached between April and June 1995 (Table 1). Out of this number, 66 doors were not knocked due to locked gates or the presence of guard dogs, 786 householders were not home when an interviewer called, and 96 people were at home when an interviewer but did not hear or acknowledge the knock at the door. Of the 1783 approaches, therefore, only a total of 835 people (46.8%) were asked to participate in the survey. Of this number, 399 people refused to take part (mainly due to lack of time or a philosophy of not answering surveys), 13 people did not understand the nature of the enquiry (due to physiological problems or language difficulties), and 22 householders were not required to participate due to quota restrictions.

Table 1 - Response rate by region

Region	Response (n)			Response Rate (%)
	Houses Approached	Doors Answered	Effective Interview	
Northland	45	25	15	33.3
Auckland	610	281	111	18.2
Waikato	140	78	39	27.9
Bay of Plenty	67	33	24	35.8
East Coast	61	39	22	36.1
South-West North Island	250	95	39	15.6
Wellington	186	94	47	25.3
North-West South Island	58	26	17	29.3
Canterbury	267	116	52	19.5
Otago-Southland	99	48	34	34.3
TOTAL	1783	835	400	22.4

As shown in Table 1, the total number of effective interviews represented a national response rate of 22.4%. Regional response rates varied considerably, with the highest proportion of effective interviews being in

the East Coast and Bay of Plenty regions, while the lowest response rates were obtained in Auckland and the South-West North Island (Palmerston North and environs). The latter region was

problematic due to an extremely high proportion of householders being either out when interviewers called (54%), or not required to participate due to quota restrictions (6.8%).

A variety of statistical techniques were used to analyse the attitudinal data obtained in the survey. Responses to closed questions (answered according to prescribed sets of responses) were numerically coded and aggregated; relevant modal, median and mean scores were then calculated. Responses to open questions (answered using the respondent's own words) were coded on the basis of similar expressions or concepts before being aggregated. Chi-square analysis was used to determine the statistical significance ($\alpha = 0.05$) of associations between a number of variables.

RESULTS AND DISCUSSION

Respondent Characteristics

As an individual's socio-economic environment and personal background were assumed to have an important influence on environmental cognition (Figure 2), the first task in evaluating the responses to the survey was an assessment of the demographic character of the sample. This task was also necessary in order to assess the validity of the random sample (that is, how well the sample reflected national demographic data). This section provides an overview of the respondents' characteristics.

Quotas were used to obtain a sample which had a regional distribution of population similar to the New Zealand 1991 Census distribution (Evans 1995 p.117), and to produce a sample in which 85% of respondents lived in urban areas (territorial units with a population of more than 1000 people) while 15% resided in rural areas (Evans 1995 p.115). A quota was also used

to obtain a sample population where 50% of the respondents were male and 50% female, closely approximating the 1991 national ratio of 49.3% and 50.7% respectively (Evans 1995 p.125).

It is important to note, however, that a quota was not used to obtain representative numbers of male and female respondents within urban and rural areas. Unfortunately, as a consequence of this omission, the male-female ratio for the urban sample was 48.5%:51.5%, while the male-female ratio for the rural sample was 58.3%:41.7%. There was a tendency for women in the rural areas to regard the issue of logging and landscape change as a domain of male knowledge and expertise, and thus to get their male partners or friends to complete the questionnaire.

Table 2 identifies the national age distribution for people over the age of 10 years (Evans 1995 p.127), together with the age distribution observed in the sample. Note that only people 10 years of age or older were surveyed, as it was assumed that people under this age would not be able to comprehend many of the words and concepts used in the questionnaire. The number of people surveyed who were aged over 60 years was constrained somewhat by a working-retired quota.

Table 2 - Expected and observed age distribution

Age Group	Expected % (1991 Census)	Observed % (n=400)
10 - 19 years	19.0	11.0
20 - 29 years	19.3	25.0
30 - 39 years	18.2	18.5
40 - 49 years	14.9	18.2
50 - 59 years	10.2	7.8
60 years plus	18.4	19.5

The results indicate that the sample had an under-representation of people aged 10-19 and 50-59 years, and an over-

representation of people aged 20-29 and 40-49 years. The modal age group was 20-29 years, and the median age group 30-39 years, as expected (Table 2).

In terms of cultural affiliation, 83% of respondents classified themselves as Pakeha (European or Caucasian), 10.2% New Zealand Maori, 3.5% Pacific Island, and 3.3% Asian. This compares favourably with the 1991 Census figures: 79.1% Pakeha, 9.7% New Zealand Maori, 3.8% Pacific Island, 2.7% Asian, and 4.7% mixed (Evans 1995 p.129).

Respondents were also asked to state the country in which they were born. The majority (79.3%) stated that they were born in New Zealand. Most of the immigrants came from the British Isles (11%), Australia and the Pacific (3.5%), or Asia (3.3%), with smaller numbers from Europe (1.5%), America (1%) and Africa (0.5%). The highest proportions of immigrant respondents were encountered in the Auckland (36.4%) and Otago-Southland (26.5%) regions, with the smallest proportions in the North-West South Island (5.6%), East Coast (4.6%) and Northland (0%) regions.

With regard to education, a high percentage of the respondents (41.75%) stated that they had a tertiary qualification: 14.3% had a Trade Certificate, while 27.5% had a University Degree or Diploma. Of the rest, 36.7% of the respondents had High School qualifications, 21% had no formal qualifications, and two respondents refused to disclose personal details regarding education.

Of the 400 people surveyed, 17.5% were house-wives/husbands, 15% were retired, 14.3% were students, and 2% were beneficiaries. A total of 205 respondents were engaged in the labour force; they constituted 51.8% of the respondents aged over 15 (n=396). Table 3 shows the observed distribution of occupations in comparison to the 1991 Census figures. Note that there is an over-representation of professionals in the sample population; a large number of teachers (14), nurses (13), and accountants (6) participated in the survey. This over-representation may be due to a number of factors: shift-work, working at home when not required at the school or office, working from home, and/or a predisposition to participate in surveys.

Table 3 - Expected and observed occupational distribution

Labour Force	Expected % (1991 Census)	Observed % (n=205)
Managers/Administrators	13.4	8.3
Professionals	12.0	22.9
Technicians/Associate Professionals	11.4	9.3
Clerical Workers	13.7	10.7
Service and Sales Workers	13.3	14.6
Agricultural/Fishery Workers	10.3	7.8
Trade Workers	9.6	7.8
Machine Assemblers/Operators	9.6	5.9
Labourers	6.7	2.9
Unemployed	9.7	9.8

Questions about personal income and household income were also asked. In terms of personal income, the median income bracket for people aged over 15 years of age was \$15,001 - \$20,000, while the mode was \$15,000 or less. This compares with a median income of \$14,142 in the 1991 Census (Evans 1995 p.330). The median person income for respondents in the labour force was in the \$25,001-\$30,000 bracket, compared to a median of \$20,864 in the 1991 Census (Evans 1995 p.330). With regard to household income, only 328 of the respondents could or would disclose this information; the median income was in the \$30,001-\$35,000 bracket.

In order to obtain some indication of the extent to which the survey participants had direct personal knowledge or experience of the forest industry, respondents were asked to state if they, or members of their immediate family, had ever worked in forestry or logging. A total of 50 respondents (12.5%) stated that they had worked in forestry or logging at some time, experience ranging from truck driving and delimiting, to planting a few trees as holiday work back when they were a student. Of the eight beneficiaries included in the sample, two were incapacitated by logging accidents. A total of 97 respondents (24.3%) stated that a member of their immediate family had worked in forestry or logging at some time.

To obtain an indication of the proportion of the survey participants who were 'active' proponents of environmental protection, respondents were asked to state whether they were, or had been, members of environmental groups. In total, 41 respondents (10.3%) were currently members of environmental groups, the most popular organisations being Greenpeace (28), the Royal Forest and Bird Protection Society (16), and the Worldwide Fund for Nature (2). A further 56

respondents had been members but were no longer. The two main reasons for lapsed membership were (a) Greenpeace had not sent them a subscription renewal form, and (b) there was less money to go around the various charities and organisations vying for people's attention.

The demographic data summarised above indicates that the survey participants represent a fairly good cross-section of the population. However, when considering the attitudinal data that follows, it should be kept in mind that there does exist an over-representation of the opinions of higher income, tertiary-educated professionals.

Impressions of Pine Forests

The first question in the attitude component of the survey asked respondents to select words, from a supplied list of 24 adjectives, which best described their overall impressions of planted pine forests in New Zealand. Respondents could select as many words as they considered relevant.

Figure 4 identifies the modal salient beliefs; that is, words selected by more than 25% of the respondents. The findings reveal that planted pine forests are generally regarded as a profitable and renewable resource with some aesthetic value (beautiful and/or peaceful). Profitable was the only word used by more than 50% of the respondents.

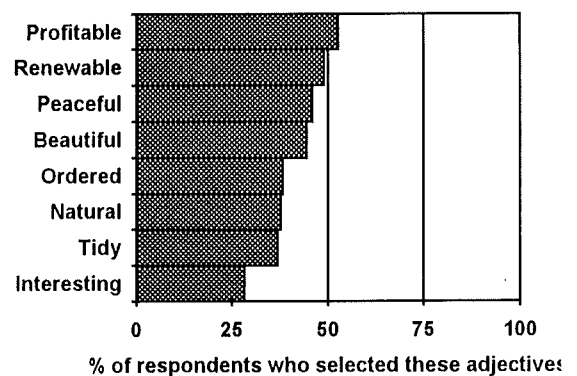


Figure 4 - Adjectives most frequently selected by the respondents (n=400) for describing plantation forests

Table 4 - Selection of bipolar adjectives for describing planted pine forests (n=400)

Attribute	Response (%)		
	Dominant Adjective	Neutral	Subordinate Adjective
Profitability	Profitable 52.8	47.2	Uneconomic 0.0
Renewability	Renewable 49.0	48.5	Nonrenewable 2.5
Naturalness	Natural 37.8	49.5	Unnatural 12.8
Serenity	Peaceful 46.0	51.0	Disruptive 3.0
Beauty	Beautiful 44.5	52.8	Ugly 2.8
Interest	Interesting 28.5	58.5	Boring 13.0
Tidiness	Tidy 37.0	59.8	Untidy 3.3
Orderliness	Ordered 38.3	60.7	Disordered 1.0
Fragility	Robust 7.8	85.3	Fragile 7.0
Change	Dynamic 8.5	86.8	Static 4.8

Ten pairs of bipolar adjectives (words with somewhat opposing meaning) were embedded within the list of 24 words presented to the survey respondents. The selection of words could thus be broken down according to the percentage of people who felt strongly, or were neutral, about the following attributes of plantation forests: profitability, renewability, naturalness, serenity, beauty, interest, tidiness, orderliness, fragility, and change.

Table 4 identifies the range of responses regarding forest attributes. The bipolar adjectives are listed according to increasing level of neutrality (that is, decreasing relevance for describing planted pine forests). Note that while 52.8% of respondents regarded pine forests as profitable, nobody used the term uneconomic. Similarly, very few people selected the terms nonrenewable or ugly.

Boring and unnatural were the only two subordinate adjectives selected by more than 10% of respondents.

The supplied set of 24 words also had embedded within it a range of terms which was used to grade the value of plantation forests to respondents. The scale ranged from sacred, through unique, special, interesting, boring, and unnatural, to weeds (profane). Note that the scale was not constructed using bipolar adjectives, primarily due to the difficulty of using words which the general public could easily comprehend (several respondents still had trouble with the words sacred and interesting). The word common was to have been used as the opposite of unique, however a pilot study revealed that this term was often used in two different ways (numerically common and vulgar).

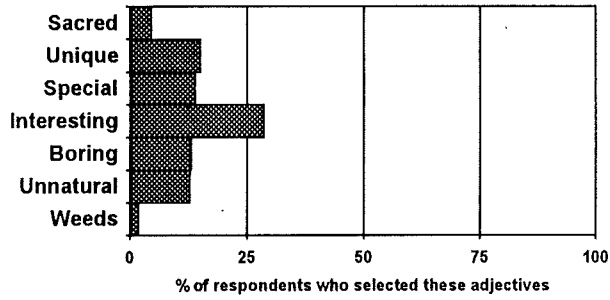


Figure 5 - Range of responses regarding positive/negative images of planted pine forests (n=400)

Figure 5 shows that the modal descriptor was the term interesting (28.5%), with fairly similar numbers of respondents selecting positive (unique 15.0%, special 13.8%) and negative (boring 13.0%, unnatural 12.8%) descriptors. At the either extreme were the 4.5% of respondents who considered all forests to be sacred (regardless of species), and 1.8% of respondents who regarded pine trees as weeds, inappropriate in the New Zealand landscape.

Concern about Landscape Change

Respondents were then asked to state how concerned they were about the visual impact or appearance of logging, using a five-point Likert attitude scale (Figure 6). Almost half of the respondents (48%) stated that they were either concerned or very concerned. One-third (34%) were neutral on the subject. The remainder (28%) were either unconcerned or very unconcerned.

An open-ended query asked the respondents to describe their reasons for the level of concern indicated in the previous question. Responses were subsequently categorised according to common words and concepts. The number

of reasons given by any one respondent ranged from one to three.

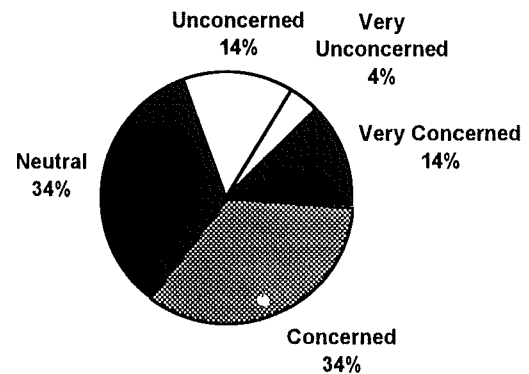


Figure 6 - Level of concern regarding the appearance of logging (n=400)

Table 5 summarises the principal reasons for concern provided by the respondents "off the top of their heads", without any prompts (written, verbal, or pictorial) from the interviewer. The main issues raised were the untidy and barren appearance of logged areas, soil stability and sustainability, the size of logging coupes, the amount of forest being logged, and, of particular concern, uncertainty about future forest management intentions (that is, whether a logged area will be replanted and, if so, when). This list of concerns provides a preliminary indication of the key generic issues which need to be addressed in order to ameliorate or avoid extremely negative impressions of logging.

Table 6 summarises the principal reasons provided for neutrality or low levels of concern. The main reasons were an acknowledgement of the economic utility and dynamic nature of forests. In addition, the landscape change was regarded as being temporary, familiar, and/or not too upsetting.

Table 5 - Main reasons given for concern about landscape change

Reasons for Concern	Response (n=400)	
	n	%
Visual Reasons		
Logging appears unsightly, unattractive, disruptive.	37	9.3
Logging leaves a mess. Prefer to see it cleaned up.	30	7.5
Logged areas look vandalised, raped, bombed.	28	7.0
Logging leaves empty, unnatural, bare brown areas.	20	5.0
Sad to see bare areas that were once forest.	12	3.0
General concern about, or interest in, landscape.	10	2.5
General Reasons		
Concern about impact on soil stability and nutrient status.	22	5.5
Concern about environmental and sustainability issues.	19	4.8
Concern about impact on wildlife and ecosystems.	9	2.3
Issues of Concern		
Unsure whether logged areas will be replanted. Areas must be replanted, preferably as soon as possible after logging.	38	9.5
Amount of forest being logged, size of clearcuts.	21	5.3
Concern about what tourists see.	19	4.8
Forests special, beautiful. Prefer to see them growing.	13	3.3
Need better planning; less disturbance to soil, landscape.	9	2.3

Table 6 - Main reasons given for unconcern about landscape change

Reasons for Unconcern	Response (n=400)	
	n	%
General Reasons		
Logging is necessary for wood, jobs, money, profit.	48	12.0
Pine trees are planted to be logged; visual impacts inevitable.	38	9.5
Pine forests are renewable, dynamic; generally replanted.	36	9.0
Never really thought about this issue.	30	7.5
Visual Reasons		
The visual impact is temporary, short-term. Pines grow quickly.	26	6.5
Don't find visual impacts upsetting; don't take particular notice.	24	6.0
Seldom see pine forests or logged areas.	19	4.8
Forests impressive, logged areas devastated; cancel each other.	8	2.0
Logging can add variety to scenery.	8	2.0

Impressions of Visual Impacts

In order to assess cognitive images of logging, respondents were asked to imagine that they were driving down a road, passing a hillside that has just been cleared of pine

forest. On the basis of this mental image, respondents were asked to select those words, from a supplied list of 20 adjectives, which best described the appearance of the logging scene. Respondents could select as many words as they considered relevant.

Figure 7 identifies the modal salient beliefs; that is, words selected by more than 25% of the respondents. The logged hillside was generally described as a barren, ugly, untidy, devastated site; barren was the only word used by more than half of the people surveyed. Just over one-third of the respondents (35.5%) described the landscape change as necessary, while 25.8% stated that it appeared managed.

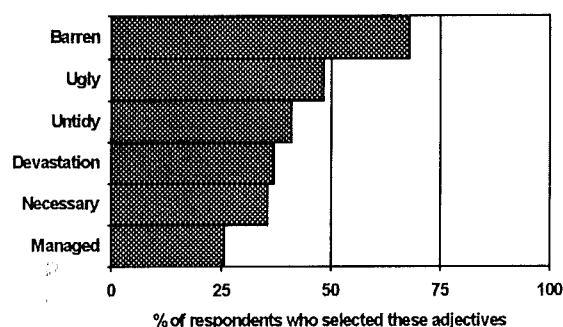


Figure 7 - Adjectives most frequently selected by the respondents (n=400) for describing the appearance of a hillside recently cleared of pine forest

Four pairs of bipolar adjectives were embedded within the list of 20 words presented to the survey respondents. The selection of words could thus be broken down according to the percentage of people who felt strongly, or were neutral, about the following attributes of logged

hillsides: necessity, beauty, tidiness, and management.

Table 7 identifies the range of responses for these attributes. The bipolar adjectives are listed according to increasing level of neutrality (that is, decreasing relevance for describing the appearance of the logged area).

Approximately half of the respondents (48.3%) expressed the opinion that a logged hillside would look particularly ugly; very few people took the opposite stance. Many (41.0%) also indicated that the logged area would look particularly untidy. In contrast, 2.0% stated that the hillside would look clean and tidy; 2.8% thought the area would be tidy (but didn't use the word clean), and 3.0% said the area would be clean (but didn't use the word tidy).

A significant association existed between racial affiliation and the impression of logged areas as clean and/or tidy. Only 5.1% of European and 14.6% of Maori respondents selected these terms, as opposed to 21.4% of Pacific Islanders and 38.5% of Asians.

Table 7 - Selection of bipolar adjectives for describing the landscape change resulting from clearfelling on a hillside near a road (n=400)

Attribute	Response (%)		
	Dominant Adjective	Neutral	Subordinate Adjective
Necessity	Necessary 35.5	49.7	Unnecessary 14.8
Beauty	Ugly 48.3	50.7	Beautiful 1.0
Tidiness	Untidy 41.0	51.8	Clean and/or Tidy 7.8
Management	Irresponsible 14.0	77.2	Responsible 8.8

Just over one-third of the respondents (35.8%) felt that the barren, ugly and untidy appearance of the hillside after logging was necessary (the inevitable result of having plantation forest), while 14.8% held an opposite view (that the adverse appearance was totally unnecessary).

Only 8.8% of the people surveyed thought that the landscape change could be described as responsible, while 14.0% took the opposite stance, describing an imaginary scene which showed irresponsible forest landscape management.

Perceived Duration of Adverse Visual Impacts

Respondents were asked whether they would describe the visual impact of logging as temporary, short-term, long-term or permanent. The frequency with which these words were selected is shown in Figure 8. Of the 400 people surveyed, approximately two-thirds (64.2%) identified the visual impacts of logging to be either temporary or short-term, while one-third (34.3%) used the words long-term or permanent.

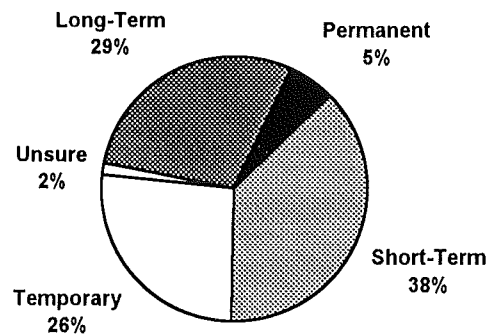


Figure 8 - Terms used to describe the duration of adverse visual impacts (n=400)

In order to obtain a clearer understanding of what people meant when they used the terms temporary, short-term, long-term or permanent, respondents were asked to state how long they thought it would take for scenery to recover after logging. In other words, how long would it take for an area to look decent again after logging and replanting? The results are shown in Table 8. Note that most people specified a range of years, the median perceived time-period for recovery being 5 - 10 years.

Table 8 - Perceived duration of negative visual impacts

Duration	n	Minimum (years)			Maximum (years)			n/a n
		Range	Median	Mean	Range	Median	Mean	
Temporary	103	0 - 30	5.0	5.9	0 - 30	5.0	7.0	2
Short-Term	148	0.25 - 40	5.0	6.3	0.25 - 40	5.0	7.3	4
Permanent ¹	12	0.5 - 30	10.0	13.4	0.5 - 30	12.5	14.8	-
Long-Term	114	2 - 50	15.0	17.1	3 - 60	17.5	20.1	2
Permanent ²	-	Never			Never			9
Unsure	-	-			-			6
Total	377	0 - 50	5.0	9.7	0 - 60	10.0	11.3	23

¹ Used the word permanent but specified a recovery-period

² Used the word permanent and stated that the landscape never recovers

The results in Table 8 indicate that there is very little difference between the recovery-periods defining the terms temporary and short-term. The median time-period for visual recovery would be five years, according to 62.75% of the sample, with the mean recovery period being 5.9 to 7.3 years.

The respondents who described the duration of visual impacts as long-term specified a considerably longer recovery-period (median 15 - 17.5 years, mean 17.1 - 20.1 years), with several respondents thinking that it could take up to 60 years before the reforested landscape would look pleasing to the eye.

Those respondents who used the word permanent to describe the duration of visual impacts (n=21) had two distinct opinions about recovery-period. Most (n=12) described the landscape change resulting from logging as an ongoing effect, considering the duration of adverse visual impacts to be between short-term and long-term (median 10 - 12.5 years, mean 13.4 - 14.8 years). The rest (n=9) were of the opinion that the landscape never recovers from logging activity.

Opinions about Clear-felling Pine Forests

The final question in the attitude component of the questionnaire asked respondents whether they approved or disapproved of the practice of clear-felling pine forests, and asked them to justify their opinion. The intention of this question was to ascertain the general public's preconceptions regarding the term "clear-felling".

Most of the respondents (n=366, 91.5%) were prepared to state an opinion. The amount of approval and disapproval regarding the practice of clear-felling pine forests is shown in Table 9. Overall, 62.25% of the sample approved of clear-felling, while 29.25% disapproved.

Of the respondents that did not state an opinion (n=34), 22 respondents did not approve or disapprove: 15 had no opinion due to lack of information, three did not want to interfere with someone else's livelihood, two questioned the management of the land after logging, and two preferred small-scale logging but stated that this was probably not economically feasible.

Table 9 - Opinions about clear-felling of pine forests

Region	Response			n
	Approve (%)	Disapprove (%)	Uncertain (%)	
North-West South Island	82.4	17.6	-	17
South-West North Island	79.5	20.5	-	39
East Coast	77.3	18.2	4.5	22
Bay of Plenty	70.8	20.8	8.4	24
Wellington	66.0	23.4	10.6	47
Waikato	61.5	25.6	12.9	39
Canterbury	61.5	28.9	9.6	52
Otago-Southland	58.8	38.2	3.0	34
Northland	53.3	33.3	13.4	15
Auckland	49.6	38.7	11.7	111
TOTAL	62.25	29.25	8.5	400

The remaining 12 respondents stated that they both approved and disapproved of clear-felling pine forests, disliking adverse visual impacts and erosion potential but recognising the economic rationale behind the practice.

Note that respondents in the North-West South Island (Nelson and environs), South-West North Island (Palmerston North and environs), East Coast (Napier/Hastings and environs), and the Bay of Plenty (Rotorua and environs) regions had the highest rates of approval. The Metropolitan Auckland sample showed the highest rate of disapproval (38.7%), possibly due to a lack of familiarity with the dynamics of plantation forestry, and high expectations regarding the quality of the non-urban environment.

An open-ended query asked the respondents to state their reasons for

approval or disapproval of clear-felling, and responses were subsequently categorised according to common words and concepts.

Table 10 summarises the principal reasons given for disapproval, provided by the respondents "off the top of their heads", without any prompts (written, verbal, or pictorial) from the interviewer. The main issues raised were essentially the same as the reasons given for being very concerned about logging *per se* (Table 5); that is, concern about the particularly untidy and barren appearance of logged areas, the size of logging coupes, the amount of forest being logged, soil stability and sustainability. A perception of clear-felling causing excessive damage to the environment (especially to soil, wildlife habitat, native undergrowth, and ecosystems) was also evident in the statements given.

Table 10 - Main reasons given for disapproval of clear-felling

Reason for Disapproval	Response (n=400)	
	n	%
Visual Reasons		
Clear-felled areas look ugly, messy, unsightly.	40	10.0
Clear-felled areas look barren, empty.	13	3.3
New Zealand should be clean, green, pristine.	5	1.3
Scenery takes a long time to recover.	5	1.3
Concern about what tourists see.	4	1.0
General Reasons		
Concern about erosion potential.	20	5.0
Clear-felling causes massive environmental damage.	19	4.8
Concern about impact on wildlife and ecosystems.	11	2.8
Clear-felling reduces the productivity of soils.	8	2.0
Issues of Concern		
Prefer smaller areas logged, staggered over time.	23	5.8
Enough trees have been chopped down; planted forests should be permanent.	18	4.5
Forests provide life, air, peace, well-being.	9	2.3
Prefer thinning or removal of alternate rows.	6	1.5
Must replant, preferably as soon as possible after logging.	6	1.5
Prefer an environmentally friendly alternative.	4	1.0

Chi-square analysis revealed a significant association ($\alpha=0.01$) between opinions about clear-felling and the perceived duration of negative visual impacts. The vast majority (73.5%) of the respondents who approved of clear-felling perceived the visual recovery-period to be either temporary or short-term, as opposed to only 45.3% of those who disapproved. Most of the respondents who disapproved of clear-felling pine forests perceived the duration of negative visual amenity to be either long-term (43.9%) or permanent (10.3%).

The results indicate that disapproval of clear-felling, and high levels of concern about logging, may be ameliorated through attention to the key issues identified in Tables 5 and 10, together with public relations/education strategies aimed at reducing the perceived duration of negative visual amenity. This would appear to be especially important in Metropolitan Auckland. Although there are only a few forests in the vicinity of Auckland (Woodhill, Riverhead and Whitford being the main ones), it should be noted that the New Zealand population is highly mobile. Indeed, "New Zealanders regard holidays as part of their lifestyle", and during 1989-90 "spent 41.4 million person nights away" from home (Evans, 1995). Logging activity anywhere around the country (particularly holiday destinations close to Auckland such as Northland and the Coromandel Peninsula) may be seen and interpreted according to Metropolitan Auckland attitudes and values.

CONCLUSIONS

A random sample of 400 New Zealanders, selected on a *pro rata* basis around the country, participated in the LIRO public perception survey. The composition of the sample reflected most national demographic characteristics, although there was (a) a male bias within the rural

component of the sample, and (b) a bias towards professionals.

The survey findings indicate that the survey respondents generally recognised plantation pine forests as a profitable and renewable resource, however there was a fairly high level of concern about post-harvest visual amenity. Almost half of the sample (48%) stated that they were either concerned or very concerned. Important issues of concern were the barren and untidy appearance of logged areas, soil stability, sustainability, size of logging coupes, the amount of forest being logged, and - of particular importance - uncertainty about if, and when, logged areas will be replanted. Just over one-third of the respondents felt that the barren, ugly and untidy appearance of logged areas was a necessary or inevitable part of having plantation forests. In contrast, there were a few who felt that the visual impacts of logging were unnecessary (14.8%) and irresponsible (14%).

Most respondents (64.2%) regarded the negative visual impacts of logging as a temporary or short-term phenomenon, with the landscape looking decent again within (on average) five to seven years after replanting. In contrast, one-third of this random sample of the New Zealand public described the negative visual impacts of logging as being long-term or permanent. These people believed that it could take 10, 15, even 20 years (on average) before the landscape would have recovered from logging, a small percentage being of the opinion that the forest landscape would never look exactly the same.

Most respondents (62.25%) approved of the practice of clear-felling plantation pine forests. However, it should be noted that there was 29.25% disapproval, the main centre of dissent being Metropolitan Auckland. Disapproval was mainly stated to be on the basis that logging coupes are

too large, barren, and untidy, and have an unacceptable impact on soil stability and quality. Statistical analysis also showed a significant association between the perceived duration of negative visual impacts and (dis)approval of clear-felling.

In summary, the findings indicate that the majority of the participants in the survey recognised plantation pine forests as a fast growing renewable crop with a temporary/short-term period of adverse visual impacts. One-third of the sample did not share this view however. Most of these people regarded logged areas as too barren and untidy, were concerned about the impact of logging on soil stability, ecosystems and sustainable use of the land, were uncertain as to if and when logged areas would be replanted, and were of the opinion that the adverse visual impacts of logging were long-term or even permanent.

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