

**Public Perceptions of Natural and
Modified Landscapes of the
Coromandel Peninsula, New Zealand**

**John R Fairweather
and
Simon R Swaffield**

October 1999

Research Report No. 241

**Agribusiness and Economics Research Unit
PO Box 84
Lincoln University
Canterbury
New Zealand**

**Ph: (64)(3) 325-2811
Fax: (64)(3) 325-3847**

**ISSN 1170-7682
ISBN 0-909042-19-5**



Research to improve decisions and outcomes in agribusiness, resource, environmental, and social issues.

The Agribusiness and Economics Research Unit (AERU) operates from Lincoln University providing research expertise for a wide range of organisations. AERU research focuses on agribusiness, resource, environment, and social issues.

The AERU conducts research contracts for clients. University research can be supported by AERU through supervision of postgraduate research. Research clients include Government Departments, both within New Zealand and from other countries, international agencies, New Zealand companies and organisations, individuals and farmers. Research results are presented through private client reports, where this is required, and through the publication system operated by the AERU. Two publication series are supported: Research Reports and Discussion Papers, with ISBN and ISSN numbers respectively. The list of AERU publications below illustrates recent research projects completed.

The AERU operates as a research coordinating body for staff in the University. It can call upon the expertise of staff in all six divisions of the University and has close links with Commerce (45 academic

staff), Applied Management and Computing, Environment Management and Design, and Human Sciences Divisions.

The major research areas supported by the AERU include: natural resources, environment and public policy; agricultural economics; rural sociology; and marketing (both institutional and consumer. In addition to the research activities, the AERU supports conferences and seminars on topical issues and AERU staff are involved in a wide range of professional and University related activities.

Founded as the Agricultural Economics Research Unit in 1962 from an annual grant provided by the Department of Scientific and Industrial Research (DSIR), the AERU has evolved to become an independent, major source of business and economic research expertise. DSIR funding was discontinued in 1986 and in 1987 the name of the organisation was changed to the Agribusiness and Economics Research Unit. In 1999 the AERU became part of the Commerce Division but continues to provide research on agribusiness, resource, environment and social issues.

AERU STAFF 1999

Director

Ross Cullen, BCom(Hons) PhD Dip VFM.

Senior Research Officer

J R Fairweather, BAgSc BA MA PhD

Research Officer

G Greer, BAgSc(Hons)

Research Assistants

Geoffrey Fairburn, BRS MappSci

Eriko Kamikubo-Gould BA MA

Secretary

A Christie

Contents

LIST OF TABLES		i
LIST OF FIGURES		iii
PREFACE		v
ACKNOWLEDGEMENTS		vii
SUMMARY		ix
CHAPTER 1	INTRODUCTION: BACKGROUND AND RESEARCH OBJECTIVES	1
CHAPTER 2	Q METHOD USING PHOTOGRAPHS	3
	2.1 Introduction	3
	2.2 An Overview of Q Method	3
	2.2.1 Q Sorting	4
	2.2.2 Q and Subjectivity	5
	2.2.3 Statement and Subject Selection	5
	2.3 Q Method and Landscape Research	6
	2.4 The Use of Photographs as Surrogates for Landscape Experience	6
	2.5 Representing Natural Character: Selection of Images	7
	2.6 Sampling and Interview Procedure	12
	2.7 Q sorting Procedure	14
	2.8 Q method and Collective Q sorting	15
	2.9 Conclusion	15
CHAPTER 3	RESULTS: TWO MAIN VIEWPOINTS ON NATURAL CHARACTER	17
	3.1 Introduction	17
	3.2 Full Range Factors	17
	3.2.1 Overall comparison of Factors	17
	3.2.2 Subjects' Views on the Full Range Photographs	23
	3.3 Focus Range Factors	30
	3.3.1 Overall Comparison of Factors	30
	3.3.2 Subjects' Views on the Focus Range Photographs	37
CHAPTER 4	CONCLUSION	
	4.1 Introduction	45
	4.2 Summary of Results and Discussion	45
	4.3 Implications	47
REFERENCES		49
APPENDIX 1	DATA RECORDING SHEETS	51

List of Tables

1.	Classification of Photographs by Landform Categories and Key Features	11
2.	Characteristics of the Sample	12
3.	List of Consensus Photographs, Full Range	18
4.	List of Distinguishing Photographs, Full Range	19
5.	List of Key Features of Photographs for Each Factor, Full Range	20
6.	List of Consensus Photographs, Focus Range	31
7.	List of Distinguishing Photographs, Focus Range	32
8.	List of Key Features of Photographs for Each Factor, Focus Range	34

List of Figures

1.	The Coromandel Peninsula	2
2.	Subjects by Traits Data Matrix	4
3.	Factor 1 Array, Full Range	21
4.	Factor 2 Array, Full Range	22
5.	Factor 1 Array, Focus Range	35
6.	Factor 2 Array, Focus Range	36

Preface

Land use is often a contentious topic especially when there is heightened concern to protect, preserve or enhance the environment, or concerns to manage land for production in responsible ways. With these concerns there is often a need to identify the natural and modified elements of the environment. Lincoln University researchers have collaborated with Forest Research in a programme of research, one part of which specifically addresses the issue of public perception of natural and modified environments. This report documents how the public, including a wide range of interest groups, defines both natural and modified landscapes. In so doing it continues a theme of research in the AERU on perceptions of land based on responses to photographic images. This report will be of interest to planners, policymakers and others concerned with land and definitions of its natural character.

Ross Cullen
DIRECTOR

Acknowledgements

Funding for this research was provided by the Foundation for Research, Science and Technology, as a component of programme CO4816, Socioeconomic Adaptation to Emerging Market Environments.

We acknowledge the assistance of people in, and visitors to, Coromandel, including planners, consultants, Maori, forestry, mining and conservation personnel.

We also thank Sue Dick for her enthusiastic field work assistance.

Summary

The primary objective of this study was to document public perception of natural character in the biophysical environment using the Coromandel Peninsula as a case study of landscape settings. This research will then be used to compare public perceptions with legal definitions. The design of the research used photographs of landscape and Q method, an approach that has been developed and tested in previous studies by the authors. The selection of photographs for Q sorting was based on a sampling frame based on six key features of five landforms. The photographs were edited to show a cloudless blue sky as a backdrop. Subjects were presented 25 images as a 'full' range showing extremes of natural and unnatural character, and 26 images as a 'focus' range showing more subtle gradations of changes from natural to unnatural character.

A total of 88 locals and visitors was selected in a diverse, non-random sample of the main interest groups. Each subject sorted the photographs into nine piles ranging from most natural to least natural and all Q sorts were factor analysed. Interpretation of the results was based on the factor arrays of photographs and on the comments made by the subjects. For both Q sorts there were two factors or distinctive sets of values expressed. The differences between the two factors were more accentuated for the focus range Q sort. That is, people tended to be more differentiated in their perceptual values when dealing with partially modified environments. Both factors placed relatively unmodified coastal, estuarine and upland settings at the most natural end of the scale, and there was a general similarity between the two factors in their evaluation of the most natural types of landscape.

The key distinguishing feature between the two factors was in evaluation of modified settings, and particularly in the relative evaluation of plantation forestry. Photographs which showed young plantations, clear cut, or visibly managed plantations were evaluated as the least natural setting by Factor 2, whereas Factor 1 evaluated the same settings as largely neutral and buildings and urban environments as least natural. In Factor 2, urban settings were still regarded as unnatural as were settings with distant views of mature pine plantations across less modified environments such as mangrove, unlike Factor 1. Factor 1 evaluated treeless pasture as largely neutral, whereas Factor 2 evaluated it as one of the least natural settings in the focus range. Factor 2 included a relatively modern, but sympathetically designed house at the natural end of the range, whereas Factor 1 evaluated all buildings as unnatural.

Results are discussed and a number of implications identified.

CHAPTER ONE

INTRODUCTION: BACKGROUND AND RESEARCH OBJECTIVES

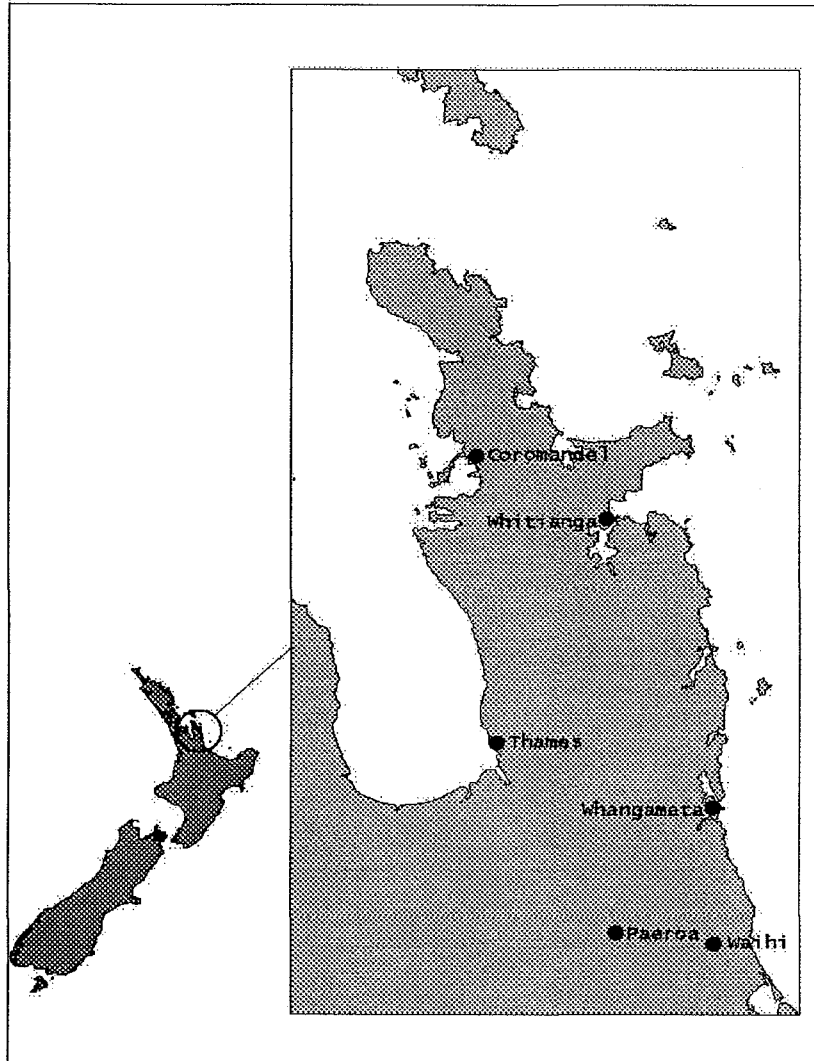
The research presented in this report was initially conceived as a project focused upon investigation of perceptions of natural and modified landscape, in response to needs expressed by different district and regional councils. The project comprised a case study in Coromandel, with other related work. It was subsequently incorporated into a broad programme of research aimed at facilitating economic development in the Gisborne/East Coast region of New Zealand. The programme seeks to examine the interrelationships between market dynamics, investor motivation and constraints, and community well-being and adaptability to change. The natural character component of the research has three components: the examination of juridical and procedural definition of natural character (legal definition), the development of a biophysical typology of landscape naturalness (objective definition) and a survey of public perceptions of natural character (public definition). The three approaches to natural character will be compared in order to assess the level of fit between the requirements of the Resource Management Act (RMA) (1991) and the actual practice of environmental planning with a view to improving the management of effects of land use change.

The primary objective of the research presented in this report was to document public perception of natural character in the biophysical environment using the Coromandel Peninsula as a source of landscape settings. The public included people from all main interest groups (e.g., planners, environmentalists) and included both local residents and visitors. The Coromandel Peninsula was chosen as a study site because it has diverse topography and land uses located in a compact area, is a popular holiday location receiving many visitors, and is currently undergoing land use change involving both coastal subdivision and forestry, for which perceived 'natural character' is an important consideration. Landscape settings in one part of Coromandel were selected, but members of the public interviewed from many locations within the Peninsula, and visitors from other parts of New Zealand, contributed to the survey. Figure 1 shows the location of the Coromandel Peninsula within New Zealand, the main towns, and a rectangle representing the study area in which photographs were taken for use in the research.

Given the context of the research presented here, that is, the need to compare public definitions of natural character with legal definitions, we did not have specific expectations in mind for this research other than the idea that public definitions may be variable and quite diverse. The task we had was to describe patterns of public perceptions in depth but not to attempt to describe or account for their incidence in the population as a whole. The research is qualitative in its focus, and exploratory and interpretive in its scope.

This report is organised as follows: in the next chapter we describe the method of research. Chapter 3 reports the results and Chapter 4 provides a conclusion that discusses and interprets the results.

Figure 1
The Coromandel Peninsula



CHAPTER TWO

Q METHOD USING PHOTOGRAPHS

2.1 Introduction

While the Q method is formally documented, the availability of this documentation and general awareness of this method is limited, so this chapter begins with an overview of the method. The chapter reviews its use in landscape research generally before describing the selection of photographs, the sample, and the Q sorting procedure used in this study.

2.2 An Overview of Q Method

The two main references for Q method are Brown (1980) and McKeown and Thomas (1988) and the following paragraphs draw from these references to give an overview of Q method. The Q method had its origins in statistical and factor analysis developments during the 1930s. In July 1935 the British factorist Sir Godfrey Thompson advanced the idea of computing correlations between subjects rather than between test scores, which had been the conventional approach. He described the approach as Q analysis in order to distinguish it from Pearson's R and R analysis. Coincidentally, in August 1935, in a letter to Nature, William Stephenson described a new technique of factor analysis in which the scores of subjects were factored.

The Q method as used today involves respondents placing a selection of objects in a significant order. Typically, statements of opinion are rank-ordered according to a condition of instruction, such as 'most agree' to 'most disagree'. The array of statements is a Q sort. The Q sorts from several people are correlated and factor analysed to yield groups of people who have ordered the statements in a similar way. The order of statements of all the people who have a similar array is used to produce an array of statements typical of those subjects. This array is referred to as a factor, and the focus of attention is on the factor and its qualities, so that each factor and its corresponding array of statements is interpreted, by the researchers, for the attitudes and meanings they reveal. It is customary in Q method to personify each factor and treat it as if it had human qualities.

The Q method emphasises the concept of 'operant subjectivity'. This concept entails the assumption that all subjective phenomena (i.e., what people value or feel about something) are manifest and reducible to factor structure and that there is no right or wrong way to sort the statements. The Q sort is an individual's picture of reality and reflects his/her viewpoint, indicating what is important to him/her. The act of Q sorting reveals the respondents' subjectivity, making it measurable. Typically, scientific measurement involves comparing an item to be measured with a known standard. When measurement is applied to people, the researcher establishes criteria (e.g., low income is less than x dollars), takes a measurement (income level) and interprets the results (description of income data). When undertaking this kind of measurement no attention is paid to what the subject thinks or feels about his or her particular income level. In contrast, with Q method, attention is focused on the respondent, and the Q sort provides a way for individuals to express their thoughts and feelings about an issue.

The Q method is thus different from the typical quantitative approach. The contrast between the two approaches is important and the fundamentals of the differences are contained in Figure 2.

Figure 2
Subjects by Traits Data Matrix

Subjects	Traits				
	T ₁	T ₂	T ₃	...	T _n
S ₁	S ₁ T ₁	S ₁ T ₂	S ₁ T ₃	...	S ₁ T _n
S ₂	S ₂ T ₁	S ₂ T ₂	S ₂ T ₃	...	
S ₃	S ₃ T ₁	S ₃ T ₂	S ₃ T ₃	...	
.					
.					
S _n	S _n T ₁	S _n T ₂	S _n T ₃	...	S _n T _n

Source : Brown, (1980) p. 12.

Figure 2 shows the scores, S_xT_x, for respondents (S) and traits (T) that can be produced from a research study. For a Q sort, the T_s represent statements and the row of scores, S₁ T₁ to S₁ T_n, is the Q sort for S₁. In the more typical R analysis each trait (or variable) is correlated with each other or used to produce factors linking selected traits to each other. The analysis is based on differences among all respondents for each trait, and there is no interaction between respondents. R analysis typically would examine each trait or variable and use these data to describe the respondents or sub-groups in terms of selected traits or variables. In contrast, in Q analysis respondents are correlated with each other to produce factors which link together individuals who have similar Q sorts. The analysis is based on differences between individuals for each trait, and there are interactions between traits, that is a Q sort puts particular traits together, by virtue of the subjectivity of the respondent.

2.2.1 Q Sorting

Respondents can rank order statements or objects, such as photographs, according to what they like/dislike or agree/disagree with. Typically, statements are placed in a number of piles to which a score is given, ranging from negative to positive. Each pile has a different frequency of statements so that those at the extreme, with a high positive or negative score, have few statements and those in the middle, with a low score, have many statements. In this way the Q sort takes the form of a normal curve. The normal curve is used only for convenience because generally there are many statements about which most people have no strong opinion. There is no technical reason for using the normal curve and the shape of the curve has been found to have little bearing on the results (Brown, 1980).

The statements placed in the middle of the distribution receive a score of zero. Each Q sort is similar in that a number of statements have a zero score and are seen by the respondents as insignificant or irrelevant. Statements at the extremes are then measured by their positive or negative score and are important because they have meaning compared to the middle or neutral statements. Thus, all Q sorts have a common base of a neutral score for neutral statements.

2.2.2 Q and Subjectivity

The structure of a Q sort is a product of the respondent alone. The meaning of statements derives not only from their individual character but from their relationships to each other. Precise meanings and nuances of statements derive from the position of the statement in the array.

There are many ways that statements can be sorted. For example, if there are sixty statements in a Q sort array of nine piles, with a minimum number of three and a maximum number of ten statements per pile, there are 2.28×10^{75} ways of sorting (Brown, 1980). In practice, the factor analysis identifies a limited number of common ways of sorting. Usually there are between three and seven factors. Each factor is an 'average' Q sort for the people who load on it, that is, have a high and statistically significant correlation between their individual Q sorts and the array of statements in the factor.

The interpretation of each factor requires the development of an explanation which must fit the known facts inherent in the factor. In particular, attention is given to the relationships between statements, and the interpretation proceeds by continuously putting up possible explanations for the factor array until the best explanation is developed. In this way Q method integrates both deductive logic, in the selection of statements, and inductive logic, in the formulation of plausible explanations. More specifically it requires the use of an abductive research strategy (Blaikie, 1993) which involves constructing a theory or explanation of everyday activities, in this case the activity of Q sorting and its product the Q sort. Most importantly, in developing plausible explanations the researcher is bringing to light the values of the respondents under study. Subjectivity, made operant by the Q sort, is the quality that is the focus of Q method research.

2.2.3 Statement and Subject Selection

Because subjectivity is made operant or measurable by Q sorting and factor analysis, the research task is one of understanding and interpreting human experiences, not one of generalising results to a population. Q method takes care to select statements for sorting by insuring that they cover the realm of possibilities in ways that are similar to random sampling of subjects in R methods. Typically, the key dimensions of the study topic are identified and statements are then selected to ensure that the dimensions are represented. This approach means that the subjects are exposed to the full range of dimensions of the topic under study. In contrast, selection of subjects is not random but typically based on principles of theoretical sampling in which subjects who might be expected to have a distinctive viewpoint are included in the study. The full range of relevant human experience is needed to work with or respond to the stimuli of the Q sort statements, but while the stimuli may appear identical the responses are not because they reflect varieties subjectively. The result of this strategy is the maximum possible variation in subjectivity in response to a wide range of dimensions under study. Factor analysis 'simplifies' the results by identifying common patterns to the Q sorting. The research thus explores, identifies and interprets experience of a phenomenon and can generalise only to the extent that other people who may be found to be characterised by a particular factor would have a corresponding particular view about the phenomenon.

2.3 Q Method and Landscape Research

The potential role of Q method in landscape research was recognised early, but has received only modest subsequent attention. Zube et al., (1974, 1975) used Q method with photographs as a technique to assess scenic values, and subsequent studies have extended the investigation of scenic values (Palmer, 1983; 1997), assessed residents' classifications of landscape character (Palmer, 1983; Amadeo et al., 1989) and made cross cultural comparisons of perceptions of scenic and heritage landscapes (Zube and Pitt, 1981). In one of the few longitudinal studies of landscape perceptions, Palmer (1997) compared the results of Q sorts in 1976 and 1997, and found significant stability in the landscape perceptions of local residents of a small coastal community in the eastern USA.

These applications of Q method have been evaluated as having a range of advantages, including the ability to encompass a wide variety of landscape settings, and the focus on respondents (Amadeo et al., 1989), in ways that allow sensitivity to individual responses and give richness of data (Pitt and Zube, 1979; Palmer, 1997). Pitt and Zube (1979) reported that Q method provided a comparative degree of reliability to psychophysical methods, such as the Scenic Beauty Estimate Method (Daniel and Boster 1977). One potential limitation of Q method in landscape research is the very richness of data it provides, which can create difficulties in analysis of large data sets. Two strategies have been used to resolve this problem. The most typical is to limit responses to the selection of photographs, and to utilise large samples of respondents to gain statistical generalisability for the results. Brown (1984) provides a New Zealand example of this strategy in the Auckland Regional Landscape Study. This psychometric strategy has frequently been combined with some form of semantic differential technique to gain insight into the way respondents characterise the choices they have made. However, whilst this strategy enables some degree of prediction of population preferences (and thus addresses the goals of researchers in the psycho-physical paradigm) it under utilises the qualitative potential of the technique. The alternative strategy is to use Q sort in an interpretative and explorative way, by focusing on smaller samples of respondents, and complementing the sorting with in-depth interviews, in order to draw out the underlying attitudes and values behind the selected array of photos. This is the strategy used in this study.

2.4 The Use of Photographs as Surrogates for Landscape Experience

Despite a range of attempts to develop alternative ways of representing landscape experience to respondents, photography remains the most widely used technique in landscape perception research. The advantages derive from their economy of production and ease of administration. A series of comparative evaluations have confirmed the general viability of photographs as surrogates for landscape experience (Shafer and Brush, 1977; Shuttleworth, 1980; Sheppard, 1982; Coeterier, 1983; Zube and Pitt, 1981). The evidence suggests that respondents correctly interpret photographs presented to them as indicators of the 'real' landscape, and make their evaluation on that basis. As visual surrogates, they are able to convey much of the richness of a landscape setting. What they cannot do, of course, is convey the total landscape experience: of smell, sound, and other tactile and sensory qualities. Nevertheless comparisons between results gained from photographs, and from experience 'in the field', suggests that in visual evaluation such use of surrogates is valid.

There are, however, a range of ways in which photographs can be selected, framed and presented. Two broad approaches can be identified. In studies based upon psycho-physical and cognitive paradigms (Zube, Sell and Taylor, 1982) the quasi-experimental methods used require standardisation of presentation of stimuli, and in the case of areal landscape evaluations, frequently use random selections of photo locations. The rationale for the standardisation of presentation is twofold: first, to ensure that respondents are not distracted by unintended bias or variability in the way landscapes are presented (e.g., variation in weather, foreground detail, spatial character, etc.), and second, to enable analysis to discriminate accurately between the variables which are designed into the experiment (e.g., percentage of clear cut forest). The spatial composition of a particular scene, for example, has been shown to significantly affect evaluations of scenic beauty. For the same scene, photographs are typically taken with standard lens, film colour, etc. However, such standardisation also introduces its own limitations. Specifically, attempts to ensure similarity of view, composition, perspective and so on across a wide range of landscape settings, arguably present a detached sense of the landscape experience (Wood, 1988). In the real world, some landscapes are intimate, others are expansive, some are inherently well structured, others are less so. There is a case to argue that a visitor's experience of an overall landscape setting (e.g. Coromandel) comprise a whole range of types of landscape experience, which all need to be represented and cannot be incorporated in a standardised photograph format.

The key issue lies in the way photographs are used. In the landscape studies cited above, most used photographs as psychometric tools, in order to construct predictive models of preference or perception. Here standardisation of image is desirable. In the interpretative and qualitative approach (used in this study), the goals are quite different, being focused upon exploration and interpretation. The methodological aim is to present surrogates for the widest possible range of landscape experience, and to investigate the subjective evaluations of the respondents in response to this range.

However, the practical administration of Q method means that it is not possible to present an unlimited number of photos. Some selection of focus is inevitable. In this study, the criterion for photo selection was to represent a wide range of settings as they would be experienced (e.g., close up views of town centre, expansive views of coastline from beach). However, an attempt was made to standardise weather and lighting conditions (see next chapter for details), to retain the desired focus of response on the landscape setting.

2.5 Representing Natural Character: Selection of Images

Selection of a set of images to represent a range of natural and modified landscape settings requires a sampling framework based on theoretical and empirical considerations within which the selections can be made. There is a large body of empirical evidence that has accumulated overseas much of it as part of the systematic research effort directed at scenic and visual management of federal lands in the USA. Whilst there are clearly contextual limitations in the validity of translating such research to New Zealand, the extent of the evidence, and the cultural parallels that do exist, suggest that overseas findings may be of some relevance. Notably, they also appear to parallel the limited evidence that is available within New Zealand.

Several relevant themes can be drawn from the overseas work. First, a limited number of key factors consistently emerge as visual indicators of 'naturalness': relief, water, vegetation, and the

absence of obvious signs of human modification (Shafer and Bush, 1977; Ulrich, 1983; Kaplan and Kaplan, 1989; Lamb and Purcell, 1990). There are strong parallels between these findings and the results of Mosley's (1989) investigation into New Zealand perceptions of wild and scenic rivers.

Second, a label or name that suggests human influence can shift perceptions of naturalness, as Hodgson and Thayer (1980) demonstrated, in a classic study in which the same image of a lake was labelled as a reservoir for a sub-sample of respondents, who judged the view less natural as a consequence. However, human influence is seldom clearly labelled in the real world. Although Nassauer (1995a) argues that 'cues for care' such as mown grass strips are importance devices in helping people accept ecological revegetation, Balling and Falk (1982) noted that not all 'managed' settings are regarded equally. Lamb and Purcell (1990) found that tall and dense vegetation was judged more natural than low, open vegetation. People could identify managed change in vegetation structure, but became less discriminating as the height of vegetation increased.

Third, spatial structure (e.g., degree of enclosure, geometry of space) is also an important component of perceptions of naturalness (Nassauer, 1995b). However, Schauman (1988) emphasised that responses to different types of settings varied by locality - reinforcing Kaplan's (1989) conclusion that familiarity significantly affects perception of naturalness. Kaplan noted that while locals revealed lower preferences for particular 'natural' environments than tourists, they nonetheless discriminated more finely, showing greater preference for 'subtle' settings. Lamb and Purcell (1990) concluded that there is less consensus about indicators of naturalness in modified environments, and that perceptions of naturalness relate to, but do not correspond to, 'ecological' measures of naturalness.

Whilst much of this evidence is drawn from the USA, similar themes emerge in studies within other Western cultures. Coeterier (1996) for example identified similar indicators of 'naturalness' in the Dutch landscape: evidence of organic growth, lack of geometric patterns, presence of 'natural' materials, and vegetation type.

There have been a number of attempts to develop theoretical explanations for the empirical findings on perceptions of naturalness. In particular, there is now a large body of literature which adopts a 'socio-biological' explanation, arguing that perceptual responses are significantly prestructured by evolutionary history. Ulrich (1983) for example argued that responses to basic environmental categories such as water and vegetation are precognitive, that is, 'wired in' to our perceptual responses, and a number of authors (notably Kaplan and Kaplan 1989) have followed Appleton's (1975) lead in developing models of perception which are based on spatial qualities and archetypes. These have also been linked to different biological genotypes, e.g., savannah (Balling and Falk, 1982), which exhibit characteristic spatial structures. The basic argument is that we respond to different types of environment based on an innate predisposition towards the type of natural settings in which humans are believed to have evolved. Perception of 'naturalness' is thus, to some degree at least, predetermined.

Nassauer, however, has highlighted the differences between contemporary perceptions of 'naturalness' and ecological measures (1995b). This highlights the point that whether the 'evolutionary' model is accepted or not, there is, at the very least, a significant cultural transformation of these underlying perceptual dispositions. As Altman and Wohlwill noted (1983), perceptual attributes of 'nature' are symbolic, as well as biological and ecological, and

there is now a growing recognition that our contemporary perceptions of nature have been extensively influenced, and perhaps fundamentally structured by the conventions of painting, and more latterly, photography (Crandell, 1993). There are varying interpretations of the origins and subsequent development of the aesthetic tradition variously described as 'scenic' (Leopold, 1949; Gobster, 1995), 'pictorial' (Crandell, 1993), 'landscape' (Daniels and Cosgrove, 1989), or 'environmental' (Koh, 1982), but what all share is an assumption that 'nature' has become symbolised by a set of conventions of representation, in which the 'viewer' sees 'nature' as a detached object which is judged for its 'naturalness' according to a set of ideals.

The representation of nature as variously sublime, beautiful or picturesque was central to aesthetic debates in Europe, North America and other European colonies throughout the 18th and 19th centuries, and as Bowring (1997) has demonstrated, continues to underpin much contemporary professional discourse in landscape architecture in New Zealand. The crucial significance of 'pictorialised' nature for perceptions of natural character is that it introduces a set of spatial conventions and expectations that may bear little resemblance to the ecological patterns and processes of a particular location. Cultural theorists thus offer an alternative interpretation of the empirical findings of authors such as Lamb and Purcell (1980), arguing that the reason perceptual preferences do not equate to ecological measures is not because of local variations from a socio-biological norm, but because the fundamental basis for expressed preferences comes from an entirely cultural set of conventions, based, in simplistic terms, on the ideal of nature created by renaissance artists.

These alternative theoretical interpretations compete as a version of the wider 'nature vs nurture' debate. However, the empirical findings underpin both. Taken together, the theoretical and empirical evidence confirm the significance of landform, and the key features of landscape including: the presence or absence of water, the character of vegetation cover, the presence or absence of human artefacts, and their age, and the visibility or otherwise of signs of human management (either in terms of overall landscape pattern, or in the presence of particular 'cues for care'). A sampling frame was therefore developed using these variables, with different types of landform along one axis, and key features or attributes along the other (Table 1).

The second step was to identify locations within the study area in which the different categories were well expressed. A transect approach was adopted, selecting a band of country from the main ranges to the sea between Whangamata and Tairua, which contained the full set of possible settings. A landform and vegetation core analysis identified the broad areas within which detailed locations could be sought.

For each cell in the matrix, a site was identified from which a photograph could be taken which presented the key attributes desired, for example, the foothills with tall indigenous vegetation, or a coastal headland with new houses (artefacts). Given that the aim was to represent different landscape settings, direction of view and focal length were selected to ensure the image featured the regional character (rather than using standardised focal lengths, or random views as utilised in psychophysical research). It was as important to exclude adjacent vegetation or land use which did not match the required attributes as it was to include key attributes.

The complete matrix comprised 100 settings; furthermore, there were some in which detailed variation was also needed, for example, the maturity of exotic forest is known to be an important variable. This resulted in over 100 potential images in total.

Previous experience indicates that Q sort with photographs works best with around 30 images. Two strategies to reduce the total sample were adopted. First, some redundancy was implicit within the matrix, for example, 'organic' patterns would equate with unmodified indigenous vegetation. This allowed an initial reduction of the sample, as not all cells needed to be represented.

Second, a decision was made to present two sets of images to each subject. A review of professional and judicial practice in New Zealand (FR Project Record 6299) highlighted the greater consistency in perception and approach at the extremes of a natural or unmodified spectrum, than in the middle. There is little debate, either professional or theoretical, over which of indigenous forest or an urban street are more or less natural. There is, however, considerable ambiguity in assessments of partially modified settings, for example, forestry, agriculture or human artefacts in 'natural' materials. This was the area of most research interest. Two sets of images were therefore developed: a 'full' range, which was selected from the entire spectrum of attributes in the sampling matrix, and a 'focus' range, which concentrated upon the combinations of attributes within the middle, partially modified context. Six images were selected for inclusion in both sets, to provide a basis for comparison.

In total, 46 different images were selected, 26 in the 'full' range, 26 in the 'focus' range, with six in common to both. Table 1 shows the complete selection and their location in the matrix. Two identifying numbers are given. The first is a unique description for each image, based on the initial field work. The second number is the number given to the image within the 'full' or 'focus' set. Image 46, therefore, was photograph no. 10 in the full range, and no. 4 in the focus range, and comprised a view of the foothills with a predominantly random appearance made up of pasture and scattered bush remnants.

The selection of images was also cross referenced with the ecological survey, and five sites included which were used as sample sites for ecological measures of naturalness. Hence sites in regenerating kauri forest (image 147), in mature pine (image 136), in pasture (image 140), in dunes (126) and in amenity grassland within an urban strip (17) were all included in the sample.

Although the images were not standardised for view, as explained above, it was considered important to remove variations due to weather etc., which could otherwise distract subjects. All images were therefore digitally edited (Photoshop) to achieve a cloudless blue sky as a backdrop.

Table 1
Classification of Photographs by Landform Categories and Key Features

Key Feature		Landform Categories									
		Ranges		Foothills		Estuarine		Beach		Headlands	
		Full	Focus	Full	Focus	Full	Focus	Full	Focus	Full	Focus
Water		143/23		95/17		58/11		126*/2 2		2/1	
Indigenous Vegetation		96/18		147*/2 4							
Exotic Vegetation	Forest	81/15		83/16	83/12 109/15 136*/22 116/18	103/19	73/11	17*/5 18/6	18/2	5/2	
	Pasture				140*/23 141/24	59/12	59/10			7/3	7/1
Patterns	Random			46/10 61/13	46/4				127/20	11/4	
	Formal				89/13	27/8		23/7			
	Organic										120/19
Artefacts	Old	152/25	152/26		48/5	115/21	56/8		111/16		113/17
	New				49/6		51/7 57/9 134/21	36/9		112/20	
Cues for care		151/24			92/14		51/7		37/3		

Notes: 1. Shading indicates photographs used in both the full and focus Q sorts, and the asterisks identify sites selected for the ecological survey of naturalness.

In summary, the selection of images aimed to present as wide a range of expressions of natural and modified landscape as possible, within a single study area. Key variables were derived from the theoretical literature and empirical research findings. The images were presented to subjects in two sets, one encompassing the widest range of possible conditions and the other focused more narrowly upon variation in the middle range of partially modified settings.

2.6 Sampling and Interview Procedure

The main aim of the sampling was to obtain a diverse, non-random sample of the public. Initially, we sought to include people from the following groups: land use planners, tourist operators, service providers, landowners or managers, local iwi, women and conservation groups. Upon gaining familiarity with the study area we added forestry, mining and tourism people to the list. Another minor group were those involved in the history of the area in some way. A total of 88 people were interviewed and Table 2 shows the composition of the non-random sample. The total of 88 includes seven people who provided a pre-test of the photographs.

Table 2
Characteristics of the Sample

General Category	No.	%
Planning	6	7
Conservation	6	7
Forestry	2	2
Mining	4	5
Farming	4	5
Tourism	7	8
Local	26	29
Visitor - New Zealand	17	19
- Overseas	6	7
Maori	10	11
Total	88	100

We endeavoured to interview men and women in equal proportion but we sampled 62 (70 per cent) and 26 (30 per cent) respectively. This was due to the preponderance of men among the categories.

In July 1998, a total of seven people from Thames were asked to pre-test the initial selection of photographs. They did three Q sorts each and then were asked to comment on the method. These interviews went very well, lasting for about one hour, and there were no adverse comments about the method or approach. Some commented positively about the method saying that it was both enjoyable and interesting.

After the pre-tests were completed we reviewed the photographs to ensure that the relevant ones were included and removed one from the focus range. It showed housing adjacent to a beach that duplicated the essential attributes of another image, and was therefore redundant. The pre-

test Q sorts showed that this photograph was in the middle of the range (natural to not natural; like to don't like) and therefore did not have a significant bearing on their Q sort. The pre-test Q sorts were adjusted by removing the rejected photograph. This entailed making an arbitrary repositioning of a few photographs, but this movement was from one column to an adjacent column, changing the score by a value of only one. This change had little effect on the relative position of each photograph in the Q sort so the remaining 25 photographs comprised a Q sort comparable to one done without the photograph in the first place. Hence, all seven pre-test Q sorts were included in the analyses.

All interviews were conducted in the study area. Initially, people at the Department of Conservation and at the planners' office in Thames were approached and asked to contribute to the study of public perception of natural character. These knowledgeable locals provided names of other people who might have a strong or distinctive viewpoint of natural character. A list of people who had attended a meeting between other researchers in the programme and stakeholders with an interest in planning and the environment was used to identify suitable people. In addition, people associated with the different occupations were approached and asked to contribute. Using this approach many names were obtained and those that were willing and available were interviewed. Most of the interviews occurred in December 1998 and January 1999 (the latter month included to ensure that visitors were included.)

Our general strategy was to use theoretical sampling techniques to ensure that we included all major groups thought to have a particular viewpoint on natural character. However, we also wanted to include many visitors to Coromandel since this group is large and important in environmental planning, but might be omitted if we chose locals only. Our initial plan was to interview visitors by asking them to complete the Q sort only and not provide an account of what they thought in order to gain a reasonable number of this sub group. We found this approach did not work because the visitors did talk about their Q sort and so the average time for interviewing was still about one hour. Hence the visitor component of the sample (23 or 26 per cent) is smaller than we anticipated but is still a significant proportion (over one quarter) of the total.

Interviews occurred in Thames which is the largest town on the Coromandel Peninsula, and the base for the District Council, the planners and many businesses. Many interviews also took place in Whangamata because it was a good location for locals and visitors. During the January component of the field work we visited Waihi, Paeroa, Thames, Coromandel, Whitianga and some other places in between in order to fill our normal quota of at least five people in each group.

Maori are an important stakeholder group in the Coromandel. In order to include their viewpoints we approached the Hauraki Maori Trust Board to seek their advice on how best to record the views of the many different iwi. In addition, two Maori were approached independently and they agreed to participate. We were advised by the Board to contact each of the 12 Trust Board members, each one representing an iwi. In some cases the contact person delegated the task to another representative, usually someone living on the Coromandel.

The Coromandel Maori, like many other, have many commitments and in some cases could not be contacted, or a suitable time could not be arranged. A total of ten Maori did the Q sort.

2.7 Q sorting Procedure

Each person participating in this research was told that the purpose of the study was to learn about their perception of 'natural' in the physical environment. We explained that the RMA specified that planning must take account of natural character and we were interested in how people defined natural character, expecting that there might be variable interpretations. Three Q sorts were performed: the full range of photographs ($n = 25$) and the focus range of photographs ($n = 26$) were each sorted under the condition of instruction: 'from most natural to least natural or unnatural'. Then the full range photographs were sorted under the condition of instruction: 'from most liked to least liked (or disliked)'.

The Q sort distribution consisted of nine piles of photographs with the number in each pile running in the following sequence, which approximated a normal distribution.

Number in pile:	1	2	3	4	5	4	3	2	1
Score:	-4	-3	-2	-1	0	1	2	3	4

Each pile was assigned a score ranging from -4 to +4, and the score was assigned to each photograph in the pile. The focus range Q sort had 26 photographs so the middle pile had six photographs.

On completing the first Q sort each person was asked to explain what in the photographs that was natural or unnatural. These explanations were recorded on the record sheet (see appendix 1). In most cases an explanation was recorded for every photograph. In addition, most people were asked about what aspects of natural character should be protected in planning decisions.

On completion of the full range Q sort, the subject began the second Q sort using the focus range of photographs. A procedure similar to the first Q sort was followed. Then the full range of photographs was used for the last Q sort examining what the subjects liked in the photographs. Finally, the interviewer collected some brief background information.

Occasionally, the subjects asked questions of clarification. A common initial one was: "Well, what do you mean by natural?" Our reply emphasised that it was their view that was important, not ours. Other questions related to the detail in the photographs. For example, there were questions about the type of tree, the location and the status of a forest park. Our policy was to clarify this identification of a tree species where this was obvious to us (and confirmed by experts) but to be non committal on other, more esoteric matters (e.g., the headland in Photograph 19, focus range, was a Maori pa site) since we found that this information affected the position to the photograph.

The interviews took about one hour on average to complete. Some lasted two hours. Generally, subjects found the Q sorting an enjoyable task, nearly all having no difficulty in completing the Q sort despite some having initial hesitations about the process.

2.8 Q method and Collective Q sorting

Q sort methodology is a typical Western research method involving a one-to-one interaction between researcher and subject. It is not well suited to collective responses, for example, if a group of people discussed the positioning of the photographs for a Q sort and agreed on the final distribution together. Agreement by a group would be unlikely, especially if, as would most probably be the case, there were diverse viewpoints among the group being considered. In such cases, individual interviews would be appropriate and Q methodology would identify the major patterns of shared viewpoints. However, in some cases collective decision making is important to subjects. Collective decision making is important in Maori culture and during the interviewing in this study we had an opportunity to meet with three Maori (one Kaumatua and two tribal representatives) and try out the possibility of a collective Q sort.

The Q sorts were performed and there was agreement about the location of photographs. One person, the youngest, took the initiative in leading the Q sort and in giving explanations, while the other two checked the location of photographs and made some minor adjustments, but did so in a way that did not appear to express the same level of direct involvement. Therefore it is possible that their own Q sort might have been different. At a general level though, they did not disagree with the initial ordering and supported the final set.

The above observations are not surprising in the light of the results of analysing all the Q sorts. As we will show, there were not many variations in perceptions of natural character, in fact there were only two factors and they were quite similar. Therefore it is likely that Maori in the group Q sort had a common view at both individual and collective levels

Discussion with Maori suggests that even in a marae setting with a larger group it is likely that a few will lead the discussion and would therefore dominate the Q sorting. To this extent then the collective Q sort would 'represent' group decision making.

2.9 Conclusion

This chapter has described the Q sort method as it was used to identify public perceptions of natural character in the Coromandel. It gives a general background to the methodology and shows that Q method has been widely used in landscape research but typically in a quantitative manner. We argue that photographs are useful surrogates for landscape experiences and in this study the selection of photographs was based on a matrix that combined key landscape and landform categories with six key features. The selection of subjects covered a wide range of interest groups. The Q sort procedure was described and shows that the method appeared to work well providing the potential for a detailed interpretation of the public perceptions of natural character.

CHAPTER THREE

RESULTS: TWO MAIN VIEWPOINTS ON NATURAL CHARACTER

3.1 Introduction

The results are presented in two main parts: those for the full range Q sort and those for the focus range Q sort. In each case attention is given first to the general character of the results before presenting specific results, including subject's views on the photographs.

3.2 Full Range Factors

The 88 full range Q sorts were correlated and rotated using the varimax option of the PQ Method computer programme (version 2.06) suitable for personal computers. Four factors were extracted. The first two accounted for 74 per cent of the variance of the rotated correlation matrix while the second two accounted for six per cent. For 25 photographs in a Q sort the standard error of a factor loading is $1/\sqrt{n} = 0.20$, and at the 0.01 probability level a loading has to be at least $0.20 \times 2.58 = 0.52$. Only loadings that were 'pure', that is, for which there was a significant loading on only one factor, were used in the specification of the factors. Also, the loading had to be more than half of the common variance across factors.

Using these criteria meant that there was a total 65 subjects (74 per cent) whose Q sorts were used to define Factors 1 and 2. Two subjects loaded on to Factor 3 and one subject loaded on to Factor 4 and since the numbers were so low, these factors were excluded from the analyses. The remaining 20 subjects either loaded on more than one factor (12 cases) or on none (eight cases).

3.2.1 Overall Comparison of Factors

The results show a narrow range of viewpoints among subjects. The two selected factors were quite similar, with their array of photographs having a correlation coefficient of 0.82. This is confirmed by the presence of 10 consensus photographs, that is, photographs that do not distinguish between the two factors because they are in similar position in each factor. Table 3 shows the list of ten consensus photographs selected as non-significant at $p = 0.05$. This list was prepared by having PQ Method consider only two factors, consequently the list of distinguishing photographs was larger than if all four factors were considered.

Table 3
List of Consensus Photographs, Full Range

No.	Photograph	Factor 1 Score	Factor 2 Score
23	Stream in bush	4	4
1	Headland with trees	3	3
18	Bush country	3	3
22	Grass on dune, beach and sea	2	2
11	Estuary, and trees to water	2	2
5	Dune vegetation and sea	1	1
3	Farmland, coast panorama	0	1
10	Farmland and bush	0	1
17	Farmland and stream	0	0
8	Large new house and waterway	-3	-2

The table shows that settings of unmodified bush, headland, dune and estuary are seen as natural by both factors, with native bush in inland or coastal locations receiving the highest score. At the bottom (least natural) end of the list however there is agreement over only one photograph and that is of the large, new house on a waterway. This photograph receives a moderately low score in both factors. In the middle of the list is a group of four photographs which were judged as more or less neutral in terms of natural character. One photograph is of dune vegetation and the other three are of farmland settings. Of those three farmland settings, Factor 1 has them all as with a score of 0, while Factor 2 gives two of them a score of +1.

Despite similarities between the two factors, there are some moderately contrasting features and these are shown in Table 4 by the list of distinguishing photographs, presented in order of most difference (positive) through least difference, to most difference (negative). In this table the Z score is included because it gives a finer gradation in the scores. Thus it is possible to have a different Z score but an identical raw score.

Table 4
List of Distinguishing Photographs, Full Range

No.	Photograph	Factor 1 Score	Factor 2 Score	Z Score Difference
16	Young pines on hill	0	-3	1.445
15	Semi-mature pines on fill	0	-3	1.306
2	Mature pines, headland and sea	1	-1	1.263
19	Mangroves, pine on hill	1	-1	0.653
14	Town	-4	-4	-0.366
21	Bridge, pine and river	-1	0	-0.389
12	Beach with log, and baches	-2	-1	-0.515
25	Relic in bush	1	2	-0.531
4	Houses on headland	-2	-1	-0.545
6	Beach, baches and trees	-1	0	-0.580
20	Prominent house on hill	-1	0	-0.618
7	Beach, baches and steep tree covered hill	-1	0	-0.618

Clearly, the photographs with pines received significantly different scores from the two factors. The two photographs showing immature pine tree plantations (Photographs 16 and 15) received a 0 score in Factor 1 but a -3 score in Factor 2, and the two photographs showing mature pine plantations (Photographs 2 and 19) received a +1 score in Factor 1 and a -1 score in Factor 2. These data illustrate the essential difference between Factors 1 and 2: compared to Factor 1, Factor 2 moves young plantations to the negative end, representing the highest degree of unnaturalness, and moves mature plantations which were judged in Factor 1 to have some degree of natural character (score of +1) to a position which emphasises some degree of unnatural character (score of -1). In taking this view, Factor 2 is forced to move up the scale the photographs that Factor 1 found unnatural, particularly those involving buildings, hence the general ordering of photographs is similar in both factors once the anti pine sentiment is expressed.

Finally, we can examine the complete factor arrays which displays all the photographs from most (+4) to least natural (-4). Table 5 shows the arrays for both Factor 1 and Factor 2 and next to them are inserted the key elements which can be seen in the photograph label. This shows the overall character of the array for each factor. Figures 3 and 4 show all the photographs arrayed from most to least natural for Factor 1 and Factor 2 respectively. The array is in the shape of the actual Q sort distribution. As noted above, the main difference between the factors is in the location of the photographs showing pines.

Table 5
List of Key Features of Photographs for Each Factor, Full Range
Factor 1

No.	Statement	Feature	
23	Stream in bush	Bush	
1	Headland with trees	Coast	
18	Bush country		
24	Regen bush on hill		
22	Grass on dune, beach and sea	Dune	
11	Estuary, and trees to water		
5	Dune vegetation and sea		
25	Relic in bush		
2	Mature pines, headland and sea	Mature pine	
3	Farmland, coast panorama	Farmland	
10	Farmland and bush		
19	Mangroves, pines on hill		
17	Farmland and stream		
15	Semi-mature pines on hill	Young pine	
16	Young pines on hill		
6	Beach, baches and trees	Baches	
21	Bridges, pine and river		
7	Beach, baches and steep tree-covered hill		
20	Prominent house on cliff	Houses	
12	Beach with log, and baches		
4	Houses on headland		
13	Houses and hill covered in pines		
9	Sandy beach, houses and hill		
8	Large new house and waterway		
14	Town	Town	

Factor 2

No.	Statement	Feature	
23	Stream in bush	Bush	
18	Bush country		
1	Headland with trees	Coast	
11	Estuary, and trees to water		
22	Grass on dune, beach and sea	Dune	
24	Regen bush on hill		
25	Relic in bush		
5	Dune vegetation and sea		
10	Farmland and bush	Farmland	
3	Farmland, coast panorama		
6	Beach, baches and trees	Baches	
7	Beach, baches and steep tree-covered hill		
17	Farmland and stream		
21	Bridges, pine and river	Pine	
*19	Mangroves, pines on hill		
12	Beach with log, and baches		
20	Prominent house on cliff	Houses	
*2	Mature pines, headland and sea	Mature pine	
4	Houses on headland		
13	Houses and hill covered in pines		
9	Sandy beach, houses and hill		
8	Large new house and waterway		
*15	Semi-mature pines on hill	Young pine	
*16	Young pines on hill		
14	Town	Town	
*	Significant negative shifts		

Figure 3
Factor 1, Full Range

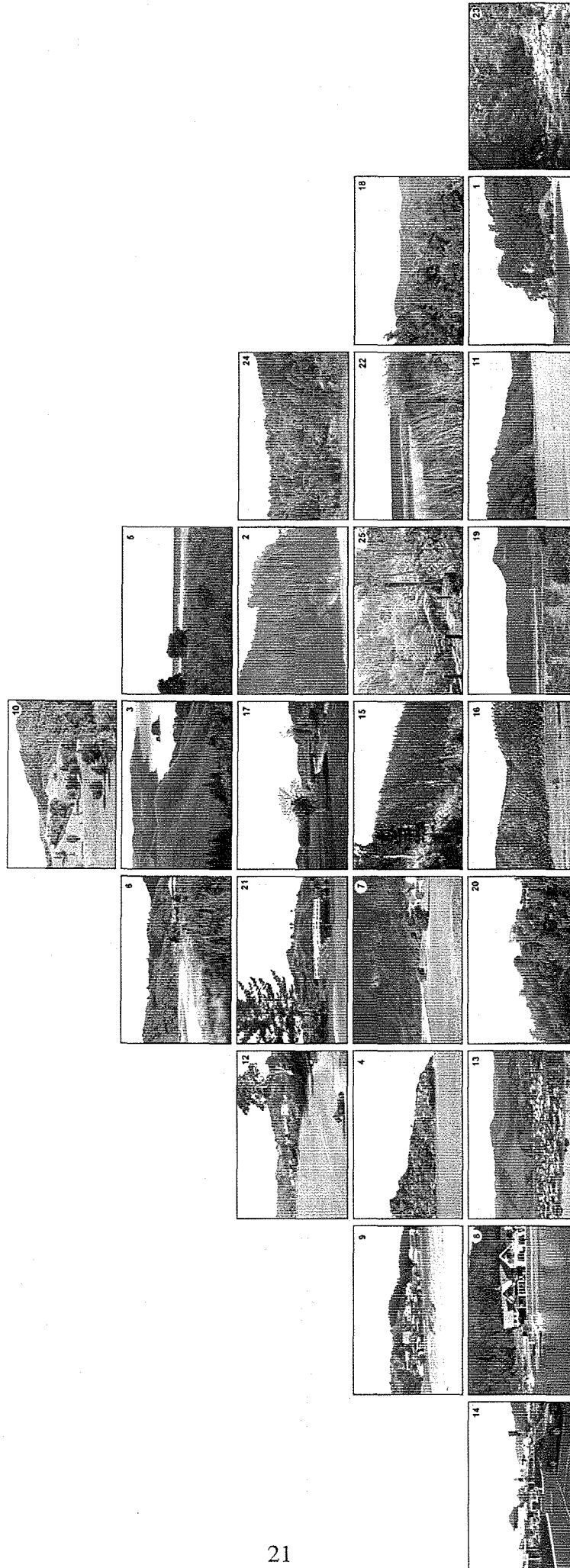
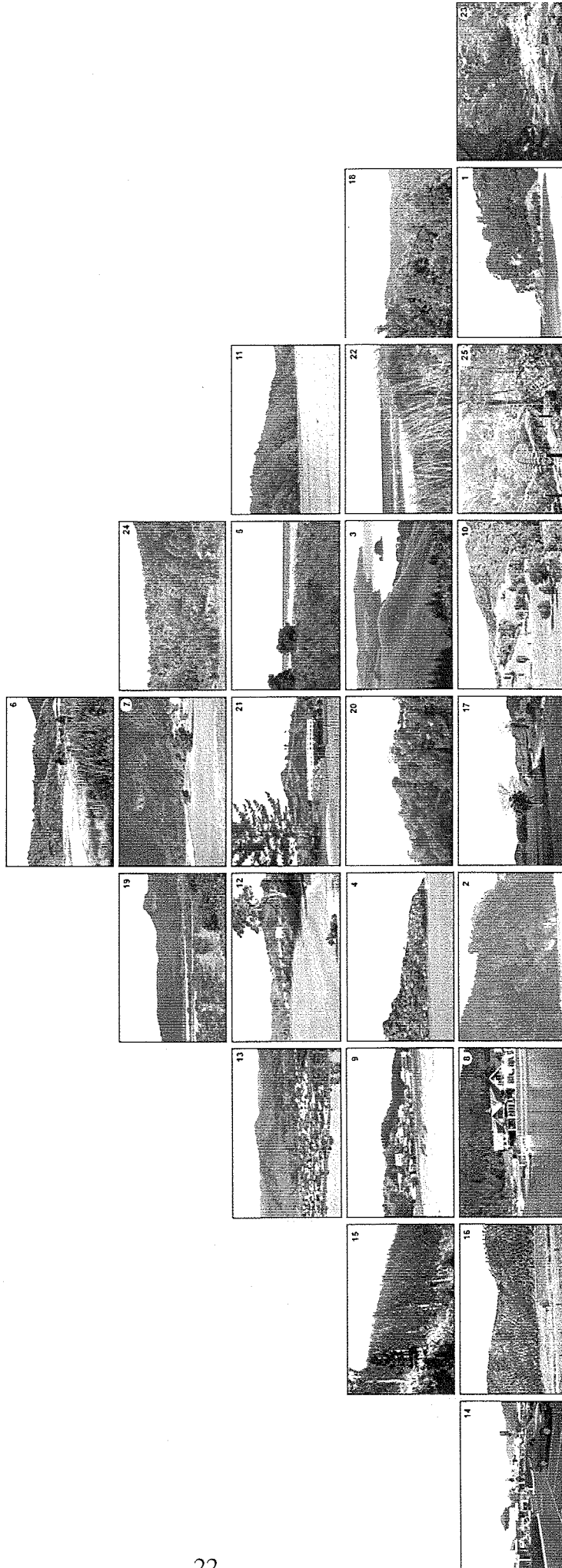


Figure 4
Factor 2, Full Range



3.2.2 Subjects' Views on the Full Range Photographs

The above analysis has taken a more 'objective' viewpoint of the meaning and content of the photographs. It is important to balance this with an appreciation of what the subjects said about the photographs. To do this the subjects who loaded with 0.83 or more on Factor 1 and with more than 0.75 on Factor 2 were selected. These loadings were arbitrary levels that gave 11 and 12 subjects respectively, that is, a modest number that made collating of comments manageable.

The comments were examined to identify the key criteria that the subject used to order the photographs from most natural to least natural. This usually involved a description of what is natural (or not) and why. In some interviews this was done with the help of the subject present and in some cases it was done in response to inspection of the interview data. For each selected subject the 'what is natural (or unnatural) and why' is listed in that order using their words and noting the number of the photographs referred to. Occasionally all that can be reported is the main feature of the photograph.

Factor 1

Subject 10:
(Male. Forestry)

Native bush, untouched (1,18,23).

Mature forests are more natural (2,19).

There's not much bush amongst these houses(9,12).

Natural is untouched - this is the exact opposite (14).

Subject 13:
(Male. Conservation)

(This is) what is typical for Coromandel (1,11,23), belt of (Male. pohutukawas in reasonably natural estuarine system. Diversity of habitat

Remnant dune (5) or forest(25), modified bush (24), past disturbance (25), pine (19).

Houses fitting in better (4,13)

Imposing scale of buildings and sharp gradation (20). Colour of bridge and large pine (21), pohutukawas help but grass is unnatural (7). Little left of remnant dune (9), -little natural gradation, opposing scale of buildings (8), mish mash of design with hard edges (9, 14).

Subject 21:
(Male. Maori)

The river - it is the wairoa of our people. These are areas for harvesting food (forests, estuaries), or areas for pa (headland). this was natural housing that worked in with natural outcrops (18, 23, 24).

Buildings, houses: planning is not compatible with development in modern housing. Development of canals has robbed away from

birds and fish. Potential for pollution is high. pines in background. So many man-made materials and synthetic processes (8,9,14).

Subject 27:
(Male. Maori)

Indigenous vegetation, goes up to ridge and pleasant sky behind (24). River plus natural bush that feeds it and connects to sea (23). Hills to the sea: our people say "From the sky to the sea" all this makes up the natural environment. No people or degradation. Need to keep this for future generations.

The concrete brings it back (in score) (25), some attempt at disguise (4,13), amount of human development (8) from skyline to sea, including forestry and farming (4,19).

Subject 31:
(Male. Maori)

This is basically untouched stream and bush, undeveloped and both have sea (1,22).

Estuary with pohutukawa, natives plus introduced flora (11), absence of man-made structures with regenerating bush that man has been through (18).

Man-made forest (2,19), pastoral edge (14) and man's presence via concrete (25).

Development - houses structures, development just started.

Development underway taking away natural features (4,13,12). Unnatural features and man-made structures associated with orderly settlement (8,9). Not a blade of grass or bush no matter where you look (14).

Subject 36:
(Male. Local)

Untouched by civilisation (1,2,11).
More and more influence of people (7,14,20)

Subject 51:
(Male. Tourist)

Uncorrupted virgin bush (1).

Elements of corruption (exotics)(11,18), no kauri in 18 - Kauri are indigenous.

Regenerating bush (not pristine), beaches and some exotics (22,23,24). Beachscapes look natural but may have introduced species.

Man's interference - pines, pasture. Utilities plus beach settlements

Intensification of dwellings and build up of towns (13,14).
Totally artificial waterways, jetties, pines (8).

Subject 58:
(Male. Visitor-overseas)

Wild bush reminding us of how it was 100 years ago.
Trees and bush plants are 80 per cent endemic. Coast, rivers and bush combined (1,18,23).

Unbushed areas (10), with new trees (15,16,19), beaches looking more natural (22) agricultural uses.

Looks older, bach like (6,12). Rich, wealthy, urban (4,7,9).

Filled up with houses and bridges etc., not wild any more (4,8). The sky is the only natural thing (14).

Subject 67:
(Male. Visitor)

Least interference by man. Most natural bush, not exotics, nothing man made, doesn't appear to have been cleared (1,18,23). Can see sign of man's impact.

Can see when man has had impact - farmland, pines mining.

Obvious interference but still natural - bridges, pines power poles, fences and stock.

Habitation entering this group.

Right on waterfront, clustered too close (8,9,20).

Obvious subdivision - unnatural (4,13,14). Increasing influence by man.

Subject 72:
(Male. Local)

No man made influence (11,23,24).

Beginning to show man's influence with forestry, building, farming, still with natural elements.

Gradual increase of man's buildings, structures and population density (9,13,14), less dense in 6,7 20 and 21.

Subject 83:
(Female. Visitor)

People haven't harmed it; it will be that way if people weren't here, also more remote and wild and less visited by people (18,23,24).

Farmland - unnatural - with grazing for money making, clear trees to make pasture, house, pines, with no other natural plants (natives) (15,16).

Greater density of houses, roads, bridges - more human things, man made (4,13), town and traffic lights, man made, nothing natural (14).

There is a clear pattern among the subjects loading highly on Factor 1 and that is a specification of natural as untouched, diverse, indigenous, uncorrupted and wild bush while the least natural is touched by man, has buildings, man-made structures, development and subdivision. Between these extremes are modified bush or dune, forest and farm land.

Factor 2

Subject 2:
(Male. Conservation)

Least modified of all sites but probably affected by possums and goats (18). Regenerating bush (11,23), but some introduced elements.

Slightly more modified (22).

Human influence (houses) but relatively unmodified, houses blend in (6). Crass house (20). Heavy modification by uncontrolled urban sprawl (13), better is low impact housing (12,9).

Mature pine forest has significant ecological value (2,19), therefore ahead of 15,16.

Pasture and young pine forest has little nature value (15,16), note:, forest is large scale therefore less natural compared to houses, plus they are destroyed every 25 years.

Completely human dominated, nothing natural except hill in background (14).

Subject 4:
(Male. Planner)

Stream is unmodified and regeneration from past influences (23), regeneration from past influences (11,18).

Being left (1) younger regeneration , say let for 20 years (24). 25 is unusual, some privet - needs clearing out - wild but weedy.

Some regeneration plus weeds, cleared 20 years ago, houses don't dominate (20). Not natural but wild (5, 22). Pohutukawa regenerating plus grass and pines, house not natural; I like merging of pohutukawa and pine - no sharp edges (97).

Farmland (3,10,21), 10 has soft edges not straight. Only bush is what people have planted (4).

Pines (15) and surf softens pines right up to margins (92). funny mixture, all modified but softer feel (6).

Modified with coastal settlement and forest (913). Pine and pasture (16).

Development is completely man made plus pine (98,9). Hard to regard as natural - completely built over by humans (14).

Subject 7:
(Female. Conservation)

Stream bed is unmodified, vegetation unmodified. Was cutover but regenerating and no weeds 923). Coastal pohutukawa , was originally there; been allowed to grow into cracks 91). Looks reasonable although possum damage 918).

Some modification - dunes (22), secondary growth modifying itself nicely (25), unobtrusive houses and beach looks good. bush behind and fine crop of weeds (6).

Not sure what it is in there (i.e., is it native of not) (5,7,11). Mixture of natural and modified for farming (10).

Heavily modified for farming and asking for trouble (17). I cannot stand ostentatious houses (20). Pines (9,19).

Housing and pines is very very artificial (8), town plus estuary backdrop is a mixture (13). Looks like pine (2).

Collection of buildings, man-made look, planting looks like an after thought, crowded beach suburb (14). Pine plantation is probably best use of land (15,16).

Subject 12:
(Male. Planner)

Unspoilt, untouched, indigenous bush (18), natural headland (1) and bush (23).

Natural coastline plus grass 911). I think the grass has been planted (22).

Grass planted (5), man-introduced changes, probably.

Gorse (6), second rate bush (20); nice photo but grass (17).

Grass (7) pines and buildings (2,19).

Buildings (9)and pines (15,16,9) and township (14).

Subject 17:
(Female. Local)

Natives, young natives (18,22,23)

Farming.

Modified dune and pines.

Inappropriate housing.

Tree farming (15,16).

Subject 26:
(Female. Mining)

Very familiar bush scene to water, stones are natural (23), typical of bush scene. Secondary growth, few introduced species (18) rocks, no evidence of industrial/residential baches (1).

Concrete is old and blends in though industrial in past (152). Marram plus sea and beach – no humans (22,5).

Pines, helps with erosion but looks unsightly and will be stripped later on (15). Residences close to water (13), never liked development there – I remember it without housing (4).

Houses close to water leaving little foreshore for public use. Worst development I have ever seen: will get erosion from wind and sea, plus pines (9). Buildings blend in nicely but lots of pines, little natives, many motor boats (8), can see a lot of human intervention, trees stripped of hills, few trees by stream (16).

Subject 30:
(Male. Maori)

Sea, beach and foreshore was the environment our people worked in - resources from the sea (5) seems to be unspoiled and untouched by humans, trees to water's edge, not yet developed (11). Reminds of lookout point our people would have used in their natural environment, the highest point overlooking a bay or settlement (1).

Native bush as food source.

Rocks that look like buildings (23). Our people had access to a beach - this reminds me of what I used to see (22). Natives – as a hunter and bushman I've used the bush for food all my life (pigs), not developed plus native birds – no Tegel chicken in the early days (24).

Town (14) is development and my people never had it like that. Better is the lone house (8). All these are development 99,14).

Many things unnatural here. Township on low lying land with waste going into the sea, big problem from Maori point of view; Maori had settlements further back (13). Pines - with mangrove it's not natural for the mangrove to get sediment from pines when harvested; Maori mangrove is the health of the bay, by supporting fish etc. (19). Changed by buildings (20)

Unnatural because of forestry, pines - in lines (16. Older trees (15,2).

Subject 47:
(Male. Visitor-overseas)

Pristine and untouched, combination of coast and hinterland (1,18,23).

Native vegetation, no human habitation or structures (11,22,24).

Introduced weeds, development historical or cultural, clearing on hills and gullies is unnatural (3).

Development - housing on hills and coast, farming.

Forestry, pine plantations covering hinterland and coastal.

Mix of old-style baches and new houses, fairly well ordered, with sensitivity to native vegetation (8,9,13).

I hate forestry - over clearing of bush, sad (15,16). Total urbanisation, no natural intention, no flora to harmonise; especially tourists look for attractive townscapes (14).

Subject 53:
(Male. Visitor-local)

Least modification, secondary growth is most natural, old pohutukawas look unmodified, despite intrusion of mining remains, looks natural (11,223,25).

Greater modification, farmland, bush, dunes, moderate pines.

Development starting - intrusion of houses, less effect than pine plantation.

Pine plantation more unnatural than beach development settings into bush (15,16).

Streetscape - not even a pine tree (14)!

Subject 56:
(Male. Visitor)

Native look – beach (1,22,23) native plants even if secondary regrowth - undisturbed land (25).

Cleared farmland but trees kept as buffer, cleared foreshore, townscape, some greenery, signs of possums in regenerating bush

Canal and house stands out (8), same as 13 but has pohutukawas. Erosion, cleared farmland (17).

Town has trees but pine backdrop creates unnatural look because native cleared (14). Forest has ruined land to plant trees, rather see native bush (15,16).

Subject 59:
(Male. Visitor)

Least man influence, natural processes (23), some modification (18,25). Amount of native species I can recognise.

Introduced species, monoculture, cutover bush.

Predominantly modified by buildings with cutover bush.

80% modified by man - pine forest is total manufactured (2,15,16).

Predominance of buildings and culture, environment greatly changed (8,14). Dunes removed (9).

Subject 85:
(Female. Local)

Native trees viewed as key to 'native' index. Natural native bush (pohutukawas, rewa-rewas, pungas, ti-tree), predominance of natives (18,23,25).

More pastoral, not natural features (10,17).

Coastal natives plus pastoral, not enough pohutukawas (7), left only one pohutukawa 912), pohutukawas coming back (4).

Mature pines out of place (2,21) and unnatural (8), they will be chopped (19).

Just a town (14), pines out of place (2,21). Just horrible pines - skyline wrecked, shoreline barren, stripped (9,15,16).

For Factor 2 the specification of natural and unnatural is similar to Factor 1. Natural is described as: least modified, unspoilt, nature, bush, sea shore, pristine, untouched, least man influenced while the least natural is human dominated, developed, buildings, man made, tree farming, houses close to water, pines forestry and streets. Between these extremes are farmland and pines. However, pines now also feature at the unnatural end, with comments highlighting an anticipation of clearfelling in the future, and also some reaction to their linearity in the landscape.

3.3 Focus Range Factors

The 88 Focus range Q sorts were analysed in the same way as the Full range Q sorts. Three factors were extracted. The first two accounted for 67 per cent of the variance of the rotated correlation material, while the third accounted for four per cent. Using identical criteria to the full range Q sort there was a total of 67 subjects (76 per cent) whose Q sorts were used to define Factors 1 and Factors 2. Only two subjects loaded on Factor 3 and this Factor was excluded from analysis. The remaining 19 subjects either loaded on more than one factor (four) or on none (15)

3.3.1 Overall Comparison of Factors

The two selected Factors have a correlation coefficient of 0.46 compared to 0.82 for the broad range Q sort, so these two factors are not so similar. There were only four consensus photographs and these are listed in Table 6.

Table 6
List of Consensus Photographs, Focus Range

No.	Photograph	Factor 1 Score	Factor 2 Score
25	Forest park	2	2
1	Farmland, coast and panorama	1	1
5	Old hay shed and barn	0	-1
6	New hay shed and barn	-1	-1

The table shows that the bush settings of the forest park, including the sign, is seen as moderately natural for both Factors, and to a lesser degree so is the farmland setting. The hay sheds of photographs 5 and 6 show a farmland setting which is rated as slightly unnatural, presumably because of the buildings.

There are few similarities between Factors 1 and 2 and therefore more dissimilarities. Table 7 lists all the distinguishing photographs in order of most difference (positive) through least difference to most difference (negative). This table shows high Z scores compared to the same table for the Full range photographs. There are five photographs with a Z score difference greater than +1.0, and six photographs with a Z score of greater then -1.0.

Table 7
List of Distinguishing Photographs, Focus Range

No.	Photograph	Factor 1 Score	Factor 2 Score	Z Score Difference
18	Logged hill site	0	-4	1.899
12	Young pines on hill	0	-3	1.620
23	Stark farmland scene	0	-2	1.589
13	Managed pines behind farmland	0	-3	1.465
22	Distant hill, pines and eucalyptus	1	0	1.109
14	Road, sign and nature pines	0	-2	0.739
15	Eucalyptus	2	1	0.697
20	Beach (no water) and trees (pines)	3	2	0.636
24	Cows, trees and river	1	0	0.616
11	Trees (some pines) down to water	4	3	0.548
4	Farmland and bush	1	2	-0.402
8	Rock jetty	-1	0	-0.627
3	Beach with sigh	-1	0	-0.710
16	Yellow bach	-2	-2	-0.764
26	Relic in bush	3	4	-0.877
2	Beach, baches and trees	-1	1	-1.040
7	Blue waterway, houses and pines	-3	-1	-1.078
10	Beach with log and baches	-2	0	-1.082
21	Mangrove, toi toi, and houses	-4	-1	-1.380
9	Wharf	-3	-1	-1.411
17	Concealed house	-2	1	-1.628

Five of the first six photographs in the table show a similar pattern: while Factor 1 gives them a neutral score Factor 2 gives them a negative score, indicating that they are not natural. Four of the photographs show pines, in many phases (immature, mature and recently logged). One photograph (23) shows a farmland setting of hillside pasture without any trees or bush which Factor 2 possibly associates with forestry seeing it as likely to be planted in pines. Photograph 22 (distant hill, pines and eucalypts) follows the same pattern, but not strongly, of being slightly natural for Factor 1 and neutral for Factor 2 (perhaps because it is a mix of species). Turning to the bottom part of the table we can see that Factor 1 rates as unnatural the concealed house (Photograph 17) and the beach with baches (Photographs 10 and 2) while Factor 2 rates these as neutral or slightly natural. Also, the houses with mangroves (Photograph 21), the wharf (Photograph 9) and the waterway (Photograph 7) are very unnatural for Factor 1 while Factor 2 rates them as slightly unnatural. Clearly, Factor 1 is identifying a range of built structures as unnatural and in contrast to Factor 2, Factor 1 rates the photographs with pines as neutral.

Finally, we can examine the complete factor arrays for each factor which displays all the photographs from most (+4) to least natural (-4). Table 8 shows the arrays and next to them are inserted the key elements which can be seen in the photograph label. This shows the overall character of the array for each factor. Figures 5 and 6 show all the photographs arrayed from most to least natural for Factor 1 and Factor 2 respectively.

As noted above, the main difference between factors is in the location of the photographs showing pines. However, there are also other subtle shifts which increase the contrast between Factor 1 and Factor 2 in this focus range. Two photographs (15 and 22) showing eucalyptus plantations shift from natural to less natural, which is consistent with the evaluation of pines. There is also a notable shift in the evaluation of pasture (photographs 23 and 24). The view of open pasture without trees in particular moves significantly into the 'unnatural' category.

Several photographs also shift further towards the 'natural' category than would be expected solely from displacement by pines. Photograph 17, of a wooden home in pohutukawas, shifts from unnatural in Factor 1 to natural in Factor 2. Photograph 21 showing houses behind mangrove and toi toi shifts from most unnatural in Factor 1 to slightly unnatural in Factor 2. The wharf (photograph 9) moves from unnatural to slightly unnatural. And at the 'most natural' end, the old artefact in bush (26) and headland (19) both become more natural for Factor 2.

These shifts suggest that the distinction between Factors 1 and 2 in the focus range are more than just a different attitude towards pine forest. A wider contrast is apparent. The cause will become clearer from subjects' comments.

Figure 5
Factor 1, Focus Range



Figure 6
Factor 2, Focus Range



3.3.2 Subjects' Views on the Focus Range Photographs

Subjects who loaded with more than 0.85 on Factor 1 and with more than 0.75 on Factor 2 were selected to yield ten and twelve respectively. Compared to the full range Q sort, there is a greater number of higher loading subjects in the focus range data, with four who have a correlation of greater than 0.90 with Factor 1.

Factor 1

Subject 9:
(Male. Forestry)

Coastal; very little man-made influence, relatively unmodified, few pines, untouched, coastal, exposed: it will never get to be anything, hard environment (2). Native, plus old gold mining – concrete does not put me off – good to see its not going, it will disappear (26). Riparian management i.e., buffer zone with native regeneration 911).

Aesthetically OK, clean green (14). Natives but sign horrible, weeds (pampas) (25). Protected site, food for houses but nothing will ever happen to it, pa site (19).

Difficult to split (differentiate) these mid-range photos. Mixture of covering up and scarring at harvest.

Influx of people will affect beach, sign shows this (3), houses too close beach (10). Invasion of houses plus pampas (21), development of big, flash house on coast (7).

Subject 25:
(Male. Mining)

Least changed (20,25,26).

Most changed (9,16,21)

Subject 31:
(Male. Maori)

Mix of natives and introduced (species) (11), similar but pines and no man-made structures (20). Not aware that these are eucalypts (15).

Man-made structures here (25,26) and 13 is a forest.

Pastoral land, signs of forestry and no permanent structures.

Natural forest gone, touched by man but not so evident, 8 and 5 show evidence.

Dwellings, roads - strong evidence of man, increasing proportion of man-made structures.

Pines in background plus wharf shows strong commercial Influence (9). Man made (10,16).

Subject 35:
(Female. Tourism)

All you can see is bush, rocks and sea, planted yet still very natural (11). You can see a little fencing, otherwise untouched (19). Looks like it's the start of a walking track – natural (15).

Natural sand dunes with planted pine forest (20) farmland and yet natural contours and bush (4), views to sea and island, farmland contours left and houses in background (4).

Some native bush planted out for forestry (20), stripped of most trees, burnt off for farming (23), farmland with natural stream planted (240), looks very natural apart from signs (25).

Farmland, shed put there by man, forestry, clearing, man-made road, steel and concrete.

Foreground natural, houses on shoreline (10), that's my sister's house – build up, planting natural plants to keep dune intact (3). All stuck there, farm fencing around house (16). Some naturalness balanced with homes (7,21). Very ugly man-made structure, the wharf (9).

Subject 42:
(Female. Visitor-overseas)

Nothing made by people - sea, coast, trees are natural (11).
Forest, trees, sand, water are all natural (20,22).

View along coast, sun setting gives natural feel (1), natural water, cows belong to people yet natural scene (24). Coast, rock shapes are very natural for me (19).

Farm made by people (23), mountains and forests are natural (4). Bare grass cut by people (18), unnatural sign but helps preserve (26), plantation looks artificial (12), people cut down forest and made road, not natural (14).

Natural scenes but include houses, barns, fences etc.

More houses make it unnatural – still have mountains, still pretty (10,16,17).

Greater number of houses, cut down mountains or forests (7,21), unnatural wharf, ships etc., unnatural shape (9).

Subject 49:
(Female. Visitor-overseas)

No human influence, natural equals green (11,20,22).
Small amount of human influence with concrete (26), house on cliff unnatural rest is natural (1), sign is unnatural - it doesn't grow, rest is green and growing (25). Planted trees, fence posts, sheep and cows.

House, garden fence unnatural (16), build up, posts unnatural (6), people on shore and houses unnatural (2).

Houses and gardens unnatural (7,17,21), industrial look (harbour) (9).

Subject 62:
(Male. Maori)

Natural bush (26), good stating it's a natural bush area, (perhaps relocate sign) (25), pa site, terracing, grazing can change contours (19).

Farmland quite natural overall, appealing coastline still in bush (46), archeological sites (1), natural and beautiful regrowth (11).

Mixed aged eucalyptus better than pines.
Horrendous to cut down bush to plant pines. Pines represent colonialism - being planted up quickly before our claim comes up

Residential, some natural aspects.

Semi-disguised development, natural bush, trees, wharf not a huge structure, OK (9,16,17). More bach-like housing (7,10), more moneyed houses (21).

Subject 72:
(Male. Local)

Water, coastline, rocks (?) untouched bush (11). Heaps of greenery, historical modification (26). Lots of green via man's influence in forestry and farming - I like lots of green (22,23). All natural, happy to have sign (25).

Beach, with pines, is still natural as is rock wall (8,20). Some natural bush, farming and clearing of land (1,4).

Clearing of land, farmland, pines and plantations buildings appearing, wider spaces, less dense subdivisions.

More dense development, housing, man-made structures (9,10,16,17). Architecture and settings not natural (7,25).

Subject 83:
(Female. Visitor)

Doesn't look like it's been changed (11,20), eucalyptus fit in, not cut down for milling (15).

Only thing unnatural is the grass (19,22,25).

More farmland, rivers, cattle/sheep, man-made concrete pines, houses quite well fitting in. Unnatural with trees cleared, bare, erosion, grass. Farm scenes with sheds and concrete wall are man-made

Houses, wharf and boats disrupting fish (7,9,10,17,21), more natural if trees are there (17). Farm, road and yellow (house) does not look natural (16).

Subject 88:
(Female. Visitor-overseas)

Totally natural beach with native grasses and looks like native forest cover (20). Mix of native vegetation (11). Good sign indicates its protected.(25).

Looks natural, rank area, fence (15), looks grazed – groomed and harvested on hills (23,1).

Human impact, looks cut and the grassed; mined (pipeline) sheep grazing. Looks grazed and monoculture, human structures. Protection sign is a human structure.

Clearcut and planted, wall, road, houses structures built on landscape increasingly (2,8,12,14). Houses (7,10,21). Mowed and colour of house (16). Associate wharf with pollution, industry, gasoline getting into water (9).

Factor 1 comprises subjects who specify nature as: coastal, unmodified, least changed, bush/rocks/sea, nothing man made by people, no apparent human influence, water/coastline, not changed and natural beach. Taller and older exotic trees, and pasture with trees, are also seen as generally 'natural'.

Factor 2

Subject 3:
(Female. Conservation)

If it's regenerating it's more natural. Mixture of historical plus bush, damage has been done (26), sign indicates it's being looked after (25), regenerating forest (11).

Pa site, therefore needs protection for historical value; grazing prevents roots from damaging terraces, - don't want regeneration. Maori history is natural, Maori was more a way of life (19). Exotic trees (eucalyptus) but there for a long time, big tall trees so significant (15). Grazing, land regenerating, some pines (2).

Natural appearance but not sure what the farmer is going to do (4), (rock wall) is a natural structure (8).

Pine forests, but trees will be cut. Green hills of New Zealand. Wilding pines better. Not sure if it's reverting.

Cattle and denuded stream, coliforms (3), heaps of houses close together - afraid of being alone (7), pines and grazing (13).

Cleared forestry - (I) hate the most. (18), Grazing and forestry as commercial exploitation. (12), not natural, not aesthetically pleasing, lot of boats, fuel etc. (9).

Subject 4:
(Male. Planner)

Degree of modification plus visual amenity are the key themes. Has most regeneration, being allowed to happen, although it will take time (26). Pa site, leave in grazing, valuable (19). Regeneration merging with grassland gives a soft edge (4).

Mix of species gives a softer look more natural to some degree (22). Weeds, but will regenerate (11). Coastal ring has nice natural effect but pasture is softened by hills (1). Eucalypts, I like them, 915), settlement plus wetland (21). Forest and farmland is soft (24).

Inoffensive bach (16), low key development, merged with sand dunes (3). Ragged edge near beach is innocuous (20). Weeds but allowed to go back (25). Water, hills reasonably natural and wharf OK (9). Making most of landscape (17).

More natural because development is low key, buildings lower, nestling in (10).

Barns are quite modified. Rock wall not greatly unnatural.

Not natural: scruffy pines and development (7), young pine is unnatural with hard edges (12), like 12 three years earlier (23). Totally modified landscapes (14), not natural appearance (18).

Subject 7:
(Female. Conservation)

Pines (wildings) but mostly secondary regeneration down to water's edge, no harbour, no houses, no wilding pines (11). Beach, bush at back, houses not obtrusive, weeds in foreground, left beach alone (2), left a natural environment and put houses among it – blend in well (17).

Where mans been once, good regrowth (26), left pohutukawas (19), bush in gullies - should be fenced off (4).

Have to have wharves, nice photo (9), tidy shed plus farmland and bush (6,21), not a good farm (25), houses but mangrove and nice muddy estuary (21).

Farmland, partially modified, pohutukawas left (1).

Pines don't like the look of lines of planting. Many weeds (24), cleared for farming leaving no bush, asking for erosion, so stupid (23). Big house plus pines, the nicest part is the estuary (7), attractive but man made completely. (14).

Pines (13), scruffy land. Pines best land use but aesthetically revolting (12). Been logged and left (18).

Subject 14
(Female. Planner)

Most indigenous vegetation, old and historic (26), dune with no structure although vegetation are exotics (20), vegetation to water with natural systems at work but could be improved (are those buoys?) (11).

DoC sign implies its on the border of a park with much indigenous vegetation (25). Extensive background of indigenous vegetation helps whole scene (4), dune system but houses not dominant. – plus its being enhanced by the sign (3).

Heaps of unmodified coast (1).

Modified by lots of houses near water, the odd tree but nothing indigenous, highly modified (7), human made (14).

Totally exotic-planted, engineered, human intervention (12,13), farmed to point of erosion and overuse of land - all pasture (23). It is just exploitation 'in your face'. Land being exploited, therefore no character to it (18).

Subject 18:
(Male. Local)

Natural foreshore with dune plus general vegetation, no houses (20). Vegetation to shore (11), good example of secondary growth, even though mining in past and they can become interesting (26).

Hills and vegetation in foreground is a pleasant vista - not covered in houses (14), Interesting headland, perhaps modified by Maori occupation, therefore interesting (19), pleasant stand of bush – been changed, not sure of species, some not native (15).

Windy road but still pines (14.) Cluster of houses plus exotic trees although nice shoreline (7). Dedicated to pines and knocked around, logging has scratched the land, therefore future trouble (18). Commercial plantations - not attractive. Completely modified by pines (12, 13).

Subject 26:
(Female. Mining)

Contours of pa showing plus rocks and pohutukawa (19), farm development is sympathetic to vegetation, plants along stream, well managed farm (4). I like history and the concrete is blending in well (26).

Holiday home with much planting, some natives (2). Lots of development but coast has pohutukawas, I would like to see more trees (7), I like native plantings; sympathetic to surroundings (17).

Poorly farmed, blackberry, erosion on hill (5), spraying gorse on hills, erosion, so bare (23). Stripped vegetation for farming, erosion, and now pines: soil not fertile afterwards, no vegetation near stream (12), I know pines are valuable (13). Garish colour in natural surroundings - I don't like it (16).

Subject 53:
(Male. Visitor)

Apart from concrete intrusion the total volume of the scene is mostly natural (26), modifications (wall, planted regrowth) are not an intrusion and overall its natural (8,11).

Modified farmland (1), houses (3) and pa site with trees cut down (3) but overall vista not too modified. Wharf and baches blend in (9,17).

Greater modification and farmland, crud at back.

Increasing modification where pine degradation is worse than beach development.

Ugly without trees, totally denuded - bare earth policy (23).

Subject 69:
(Male. Visitor)

Sign indicates protected heritage area probably has a ranger (25), rustic bush, growing back well, touch of humanness (26), expanse of trees, clearing is balanced (4).

Cleared land but view up coast is natural (1), dunes but not pines are natural (20) Eucalypts are large and been there a while (15).

Natural headland (19), sign indicates natural processes (3), trees, water, mixed planting (11). Trees are rural setting: semi natural (24).

Mix of buildings, structures, beach scenes with human beings natural and interacting.

Forestry is less natural than human beings living their life with baches, piers and walls, spoilt by farming and sheds.

Showing worst side of forestry especially on large scale. using high impact machinery with runoff and floods (12,18).

Subject 78:
(Male. Local)

Impact in past, bush allowed to regenerate with no further modification (26), pines (weeds) in bush being left alone (11), pockets of bush in valleys, farming flatter areas (4).

Attempt at regeneration although serious weed problem (25), people have to live somewhere (17), pohutukawas on cliff still, farmland detracts (19).

Good preservation of dunes although pines used (2,20), wetland forming again is good, some silting from pines (21).

Man managed therefore not natural, erosion problems, cattle going into water (24), not so steep for trees – its better (14), better than pines - not a weed problem (15).

Marginal steep farmland pohutukawa nice (1), cleared for farming and unproductive (48), man-managed landscapes, totally modified; use for pines or farming is questionable (12,18,23).

Subject 82:
(Female. Visitor)

Most natural with New Zealand trees although not original (26), regenerating native, looks man made, a bit scruffy (25), trees look an exotic/native mix, balance is farmland and trees are good (4).

Bush and foreshore are native (2), mix of both (types of) trees returning to native on its own process (11), man made (dune) to look natural.

Balance between farmland and pohutukawas i.e., balance between man and nature. Good mix of housing and trees. Good use of site for wharf. Mix (of natural and man made).

All very unnatural because lack of trees, grass and structures. It is past bringing natives back in.

Pine forests are most unnatural and once they are up they come down. Any life form there was wiped out especially birds. Some exotics OK as forest (12,13,14,15,18,23).

Subject 85:
(Female. Local)

Bush, trees, ferns and historic stamper (26), house plus pohutukawas and flax (17), pohutukawas plus stony coast with paddocks not especially right (19), natural foreshore, despite pines (1). Gums are not such a disaster as pines (15). Nice mixtures of ti-tree, puriri, flax, and sign – concept of forest park is nice (25).

Stones are a good choice for a wall. Cute bach - bright and cheerful. Bush in gullies, secondary growth returning. Old wharf is natural. Pines are yuk but kept tidy. Only one pohutukawa, hate bare paddocks.

Too much pine (11), lines of trees look like a dog's dinner (22), bare at back – erosion (5,23).

Trees in line: pines – terrible (12,13), taken everything off - draining and erosion problems (18).

Subject 86:
(Female. Maori)

Coastlines are cleared which they shouldn't be (11,19).

Forestry has been a disaster to me, they are non-management and logging is disaster for nature, their clearing practices are criminal (3,12,13,14,18).

Factor 2 comprises subjects who specify nature as less modified, not built, natural, foreshore. However, some types of modification are not an intrusion, for example signs indicating protected heritage, with recognition of past impact but now regenerating, NZ trees and bush/trees/ferns.

What one can see in these comments is a greater acceptance of human involvement by Factor 1 compared to Factor 1, provided that the involvement is appropriate. Appropriate is defined as encouraging nature and accepting human integration into the environment provided that it is principled and not obtrusive.

CHAPTER FOUR

CONCLUSION

4.1 Introduction

This study aimed to describe and interpret patterns of public perceptions of natural character, based upon a case study investigation in the Coromandel. The method adopted was Q sort using photographs. The photographs were presented in two sets: a 'full' range which was intended to represent a wide range of types and degrees of natural character, from unmodified environments to highly modified settings; and a 'focus' range which provided more variety and detail in the middle part of the range, that is, in landscapes that were partially modified. Selection of photographs in both ranges was based upon a matrix of potential conditions, with five landform types (ranges, foothills, estuarine, beach, headlands), and a set of attributes known from other work to be salient in perceptions of naturalness (vegetation cover, landscape pattern, artefacts and cues for care). Two sets of photographs were presented to 88 subjects, selected non randomly to include both Maori and non Maori, locals and visitors, and key informants from a range of sectors and interest groups.

The Q Sort comprised ordering of photographs from most to least natural, and was complemented by an interview which sought explanation for subjects' choices. The Q sort results were factor analysed, and the resulting factors interpreted by reference to the content of photographs, and the comments of subjects on each photograph. Two distinctive factors were identified. The factor results are summarised and discussed in detail.

4.2 Summary of Results and Discussion

The two factors identified represent the views of 65 of the 88 subjects interviewed, and were generally consistent across both full and focus ranges of photographs. However the differences between the two factors were more accentuated for the focus range Q sort, indicating that evaluation of finer points of detail highlighted differences in perception. In the focus range Q sort both factors placed relatively unmodified coastal, estuarine and upland settings at the most natural end of the scale, and there was a general similarity between the two factors in their evaluation of most natural. However there was a notable difference between the factors in their evaluation of what is least natural.

The key distinguishing feature between the two factors is the evaluation of plantation forestry. Photographs which showed young plantations, clear cut, or visibly managed plantations were evaluated as the least natural setting in Factor 2, whereas Factor 1 evaluated the same settings as largely neutral. Instead, photographs that showed buildings and urban environments were categorised as least natural. In Factor 2, urban settings were still regarded as unnatural, but with the exception of main street Whangamata in the full range, were displaced from the end of the range by the plantation images. Factor 2 also evaluated settings with distant views of mature pine plantations across less modified environments such as mangrove as "unnatural", whereas Factor 1 included them on the more natural side of the range. The only exception was a photograph of a beach and dunes with wind shaped pine plantation beyond, which was evaluated as relatively natural by both Factor 1 and 2.

Two other notable differences between the factors emerged in the analysis of the focus range. First, Factor 1 evaluated treeless pasture as largely neutral, whereas Factor 2 evaluated it as one of the least natural settings. Second, Factor 2 included a relatively modern, but sympathetically designed house at the natural end of the range, whereas Factor 1 evaluated all buildings as unnatural.

Analysis of subjects' comments provided insight into the basis for these distinctions. Factor 1 regards evidence of human construction or artefacts as the essential test of what is unnatural. This applies whether the artefact is a modern house, older bach, wharf, or farm shed. Anything that is green and growing, on the other hand, whether exotic or indigenous, is more natural than a non-living artefact. This perspective parallels the juridical determination that 'natural' indicates a product of nature, rather than a man-made structure, and that this can include pines trees and grass. Factor 1 therefore displays a perspective that seeks to discriminate natural character on the basis of biological function and processes. However, it relies significantly upon appearance as a basis for evaluation and as a result downplays human involvement in biological as opposed to construction processes.

Factor 2 exhibits four traits which modify this position. First, the visible effects of large-scale commercial plantation management are evaluated as highly unnatural - particularly the linearity of new plantings, and the impact of clear felling. The prospect of clear felling as part of the management cycle influences evaluation even when there is no current evidence of its effects: the full range images did not include any photographs of recent clear cut, yet it was cited as a major reason for evaluating plantations as unnatural (e.g., subjects 26, 30 and 45). Second, the evaluation of plantation forestry as unnatural was influenced by a belief that it leads to adverse physical effects, such as erosion, even though these were not illustrated in any way in the photographs (e.g., subjects 1, 7, 14, 26, 69, 78 and 85). Third, and in contrast, Factor 2 subjects were willing to accept 'appropriate' development within more natural settings, provided it was 'blended', in 'balance', and 'sympathetic' (e.g., subjects 7, 26 and 29). This was illustrated by the evaluation of the modern but subtly designed wooden houses behind pohutukawa on Tairua Head as relatively natural. Similarly, subject 3 described the rock wall as a natural structure. Similar values appear in comments that evaluated naturalness by age and colour. Fourth, other notable traits are the way that Factor 2 included a photograph of pasture with no trees visible at the highly unnatural end of the range, and the way that evidence of regeneration of a formerly modified setting can lead to an interpretation of significant naturalness.

The distinguishing features of Factor 2 are therefore an evaluation of plantation forestry as highly unnatural, a more general picturesque sensibility in evaluating natural character, and a willingness to ascribe naturalness to settings that have evidence of indigenous regeneration. These three aspects reinforce one another in regard to plantation forestry, as some but not all of the unnaturalness of forestry appears to be based upon evaluations of its managed and geometric appearance, whilst there is also an association of plantations with earlier bush clearance. The evaluation of the open pasture as unnatural probably reflects these three aspects, in that it looks superficially similar to clear cut forestry, in the absence of any relieving interest or contrast, lacks picturesque qualities, and also results from bush clearance.

Whilst the two factors are clearly distinguished in their evaluation of less natural settings, there are few clear patterns in the characteristics of subjects expressing each factor. Rather it is notable how diverse each group of subjects are, and how most interest groups have members who fall into each factor. Thus overseas tourists, NZ visitors and locals load onto both factors. Similarly, Maori load onto both, although more load onto Factor 1. Gender is not a discriminating factor either. Unsurprisingly, foresters do not load onto Factor 2 (the

'anti forestry' factor), but conservationists load onto both, as do miners. Planners tend towards Factor 2, which could have policy implementation implications.

It is important to remember however that the distinction between factors lies at the 'unnatural' end of the range. What is equally clear, and potentially more significant in policy terms, is that there is a strong and almost unanimous agreement about what constitutes 'natural' character. Furthermore, the findings here are entirely consistent with empirical findings overseas. That is, natural character, or naturalness, is indicated by relief, water, tall and apparently unmanaged vegetation, organic (as opposed to geometric or random) patterns, and the absence of man-made structures. There are two qualifications to the latter point. Both factors included a relic artefact set in regenerating bush as a highly natural setting, and both similarly included a setting which contained a reserve sign. Thus regeneration and cues for conservation care can strengthen a sense of naturalness in otherwise modified settings.

It is also notable that a distinction between exotic and indigenous species, whilst clearly a significant contributor towards natural character in both factors, was not a reliable indicator, in that exotic species appeared in a number of the highly 'natural' photographs in both factors. This included wind shaped pines, tall eucalyptus, adventive weeds such as gorse, exotic grasses, and pasture when it is associated with other 'natural' qualities such as a rocky headland or organic patterns of bush remnants. Thus, whilst mature or regenerating indigenous vegetation contributes to natural character, so also can exotic species in some contexts.

4.3 Implications

There are some interesting research and policy implications from these findings. In this section only those directly related to this study are discussed. Implications for and with other parts of the overall programme will be dealt with in a separate report.

First, the results have supported the general empirical findings on perceptions of naturalness in the international Anglo-American literature on landscape perception. All the key variables reviewed in Chapter 2 have emerged as significant variables in the two factors identified here. Hence although there is a lack of previous New Zealand based work, it appears that the broad patterns of perceptions are similar to those identified in North America and Europe. Whether this expresses sociobiological or cultural influences is less easy to determine.

Second, the Q sort method with photographs has proved to be an effective and fruitful approach and this research both extends its range of application and further confirms its utility. Furthermore, the adoption of both a full and a focus range of photographs has been an effective tactic.

Third, the consistency of response in both factors about what constitutes natural character provides clear guidance for policy makers aiming to address sections 6(a) and 6(b) of the Resource Management Act 1991. These results confirm that the key variables that have been typically used by professional landscape planners to delineate natural character correspond to the attributes recognised by the wider public. There can be little basis for claiming uncertainty on the part of the public about the qualities that the RMA91 seeks to protect under this section.

Fourth, the differentiation in perception of what constitutes the least natural, indicates that there are two sets of values that need to be acknowledged in situations where urban

development is proposed in environments with significant natural character (e.g., coastal subdivision). Factor 1 subjects are likely to be particularly sensitive to any evidence of built structures or urban forms, irrespective of how they are designed. Factor 2 subjects may be more willing to accept discreet and well designed structures, provided the overall setting retains 'picturesque' qualities. Evidence of regenerative processes will also make development more acceptable.

Fifth, the characterisation of plantation forestry as highly unnatural by Factor 2 subjects suggests that there is likely to be significant opposition to plantation forestry wherever natural character is perceived to be compromised. Similarly, the sensitivity to the effects of logging and replanting revealed in the results means that these concerns could become more marked as the forest estate reaches maturity in many areas. However, although the nature of concern has been shown clearly in this survey, we have been unable to identify why some subjects load onto the factor that sees forestry as highly unnatural, whilst others do not. There is a need for further in-depth qualitative investigation focusing on the underlying motivations and attitudes of both Factor 1 and Factor 2 subjects in regard to forestry.

Sixth, the acceptance of the contribution of exotic species to natural character in some contexts means that presence or absence of indigenous species alone will not be a sufficient indicator of perceived natural character. Significant proportions of exotic species can be present in settings regarded as highly natural, depending upon the overall landscape pattern.

Finally, the approach we have adopted has been successful in identifying in considerable depth the perceived attributes of natural character within the case study area. However, it does not attempt to make systematic connections between the characteristics of the subjects and the expressed values. The diversity of subjects loading on the two factors is an important result and raises the question of whether it is possible to identify any population-wide patterns in the underlying values and motivations behind subjects' evaluation of natural character.

References

- Altman, I.; Wohlwill, J. (1983) *Behaviour and the natural environment*. NY: Plenum Press.
- Amadeo, D., Pitt, D.G., and Zube, E.M. (1989) Landscape feature classification as a determinant of perceived scenic value. *Landscape Journal* 8(1):36-50.
- Appleton, J. (1975) *The experience of landscape*. London, Wiley.
- Balling, J.D. Falk J.H. (1982) Development of visual preferences for natural environments. *Environment and Behaviour* 14:5-28.
- Blaikie, N. (1993) *Approaches to social enquiry*. Polity Press: Cambridge.
- Bowring, J. (1997) *Institutionalising the picturesque*. PhD thesis. Lincoln University.
- Brown, S.R. (1980) *Political subjectivity. Applications of Q method in political science*. Yale University Press: New Haven.
- Coeterier, J.F. (1996) Dominant attributes in the perception and evaluation of the Dutch landscape. *Landscape and Urban Planning* 34(1):27-44.
- Crandell, G. (1983) *Nature pictorialized*. Baltimore: Johns Hopkins University Press.
- Daniel, T., and Boster R. (1997) *Measuring scenic aesthetics: the scenic beauty estimation method*. RM167: US Department of Agriculture.
- Daniels, S.; Cosgrove, D. (ed.) 1988 *The iconography of landscape*. Cambridge, CUP.
- Gobster, P.H. (1995) Aldo Leopold's ecological aesthetic: integrating aesthetic and biodiversity values. *Journal of Forestry* 93(2): 6pp.
- Hodgson, R.W.; Thayer, R.L. (1980) Implied human influence reduces scenic beauty. *Landscape Planning* 7:171-179.
- Kaplan, R; Kaplan, S. (1989) *The experience of nature*. Cambridge: CUP.
- Koh, J. (1982) Ecological design: a post modern design paradigm of holistic philosophy and evolutionary ethic. *Landscape Journal* 1(2):76-84.
- Lamb, R.J.; Purcell, A.T. (1990) Perceptions of naturalness in landscape and its relationship to vegetation structure. *Landscape and Urban Planning* 19:333-352.
- Leopold, A. (1949) *A sand country almanac*. New York: Oxford University Press.
- McKeown, B., and Thomas, D. (1988) *Q method*. Sage: Newbury Park.
- Mosley, M.P. (1989) Perceptions of NZ river scenery. *NZ Geographer* 45(1):2-17.
- Nassauer, J.I. (1995a) Culture and changing landscape structure. *Landscape Ecology* 10(4):229-237.

- Nassauer, J.I. (1995b) Messy ecosystems, orderly frames. *Landscape Journal* 14(2):161-170.
- Palmer, J.F. (1983) Assessment of coastal wetlands in Dennis, Massachusetts. In Smardon, R.C., (Ed.) *The future of wetlands, assessing visual-cultural values*. Totowa NJ: Allanheld Osmun.
- Palmer, J.F. (1997) Stability of landscape preferences in the face of change. *Landscape and Urban Planning* 37: 109-113.
- Schauman. S. (1988) Scenic value of countryside landscapes to local residents: a Whatcom County, Washington case study. *Landscape Journal* 7(1):40-51.
- Shafer, E.; Brush, R. (1977) How to measure preferences for photography of natural landscapes. *Landscape Planning* 4:237-256.
- Sheppard, S.R. (1982) Predictive landscape portrayals: a selective research review. *Landscape Journal* 1(1):9-14.
- Shuttleworth, S. (1980) The use of photographs as an environmental presentation medium in landscape studies. *Journal of Environmental Management* 11: 61-76.
- Thayer, R. (1989) The experience of sustainable landscapes. *Landscape Journal* 9(2):101-108.
- Ulrich, R. (1983) Aesthetic and affective response to natural environment. Chapter 3 in Altman and Wohlwill (op.cit.).
- Wood, D. (1988) Unnatural illusions: some words about visual research management. *Landscape Journal* 7(2): 192-205.
- Zube, E.H., Sell, J., and Taylor, J. (1982) Landscape perception: research, application, theory. *Landscape Planning* 9: 1-33.
- Zube, E.H., Pitt, D.G., and Anderson, T.W. (1974) Perception and measurement of the scenic resources in the Southern Connecticut River Valley. Amherst: Institute for Man and His Environment. University of Massachusetts.
- Zube, E.H., Pitt, D.G., and Anderson, T.W. (1975) Perception and prediction of scenic reserve values of the North East. In Zube, E.H., Brush, R.O., and Falos J.G. (Eds.) *Landscape Assessment, Values, Perceptions and Resources*. Stroudsburg PA: Dowden, Hutchinson and Ross.
- Zube, E.H., and Pitt, D.G. (1981) Cross cultural perceptions of scenic and heritage landscapes. *Landscape Planning* 8: 69-37.

Appendix 1
Data Recording sheets

Perception of Natural and Modified Landscapes: Coromandel

Subject No.: _____ Date: _____ Location: _____

Order in terms of natural character, i.e., from least to most natural. Full Range

What is it about the landscape that is natural or unnatural?

For images with natural character, which should be protected in planning decisions?

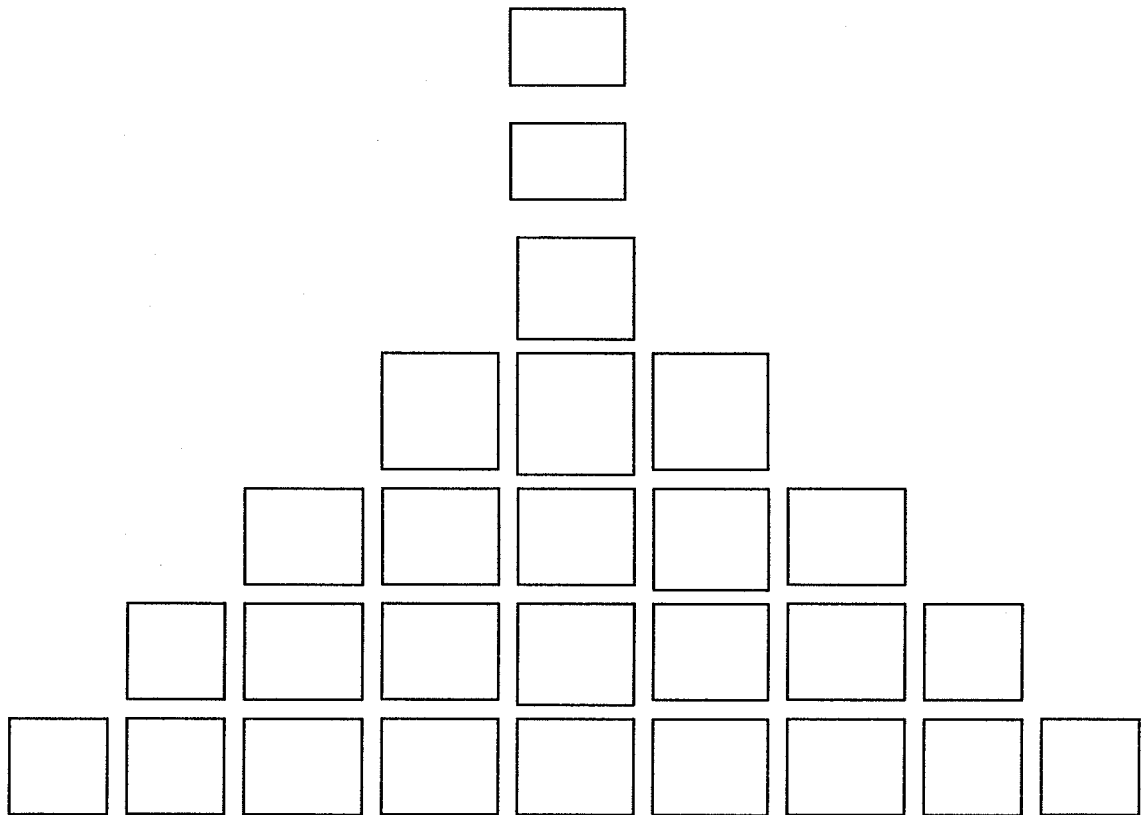
Unnatural

Natural

Order in terms of natural character, i.e., from least to most natural. Focus Range

What is it about the landscape that is natural or unnatural?

For images with natural character, which should be protected in planning decisions?

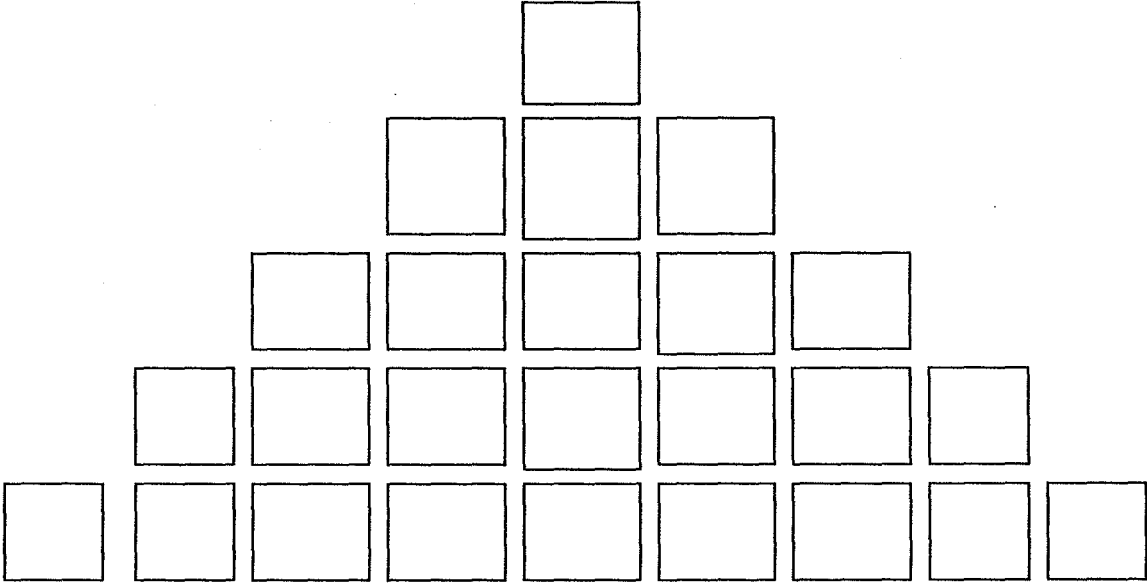


Unnatural

Natural

Order in terms of what you like, i.e., from least to most like. Full Range

What is it about the landscape that you like or dislike?



Dislike

Like

Background Information

Occupation: _____ Gender: _____ Age: _____

Do you Live in Coromandel? Yes _____ No _____

If yes, for how many years? _____, and what location? _____

If not a resident, how often do you visit Coromandel?

One off visit _____

Regularly _____

If regularly, then how often?

Weekly _____

Monthly _____

Yearly _____

Other _____

Where are you staying i.e., what location? _____

Where do you usually live? _____

All Respondents.

What main activities do you pursue in Coromandel? _____

To what groups or organisations do you belong? That is, with respect to land use or natural issues generally?

Other information:

RESEARCH REPORTS

- 227 **An Expert System for Drenching Sheep. Expert systems in feed management - 3.** Bishop-Hurley, G J & Nuthall, P L 1994
- 228 **An Expert System for Surplus Feed Allocation. Expert systems in feed management - 4.** Bishop-Hurley, G J & Nuthall, P L 1994
- 229 **The Application of Expert System Methodology to Feed Management - 5.** Nuthall, P L & Bishop-Hurley, G J 1994
- 230 **New Zealand Agricultural Policy Reform and Impacts on the Farm Sector.** Gouin, Daniel-M; Jean, N & Fairweather, J 1994
- 231 **New Zealand's International Trade Performance: Pre and Post Deregulation: 1970-1985 and 1985-1993.** Lattimore, R & McKeown, P 1995
- 232 **Understanding Why Farmers Change Their Farming Practices: The Role of Orienting Principles in Technology Transfer.** Morris, C; Loveridge, A & Fairweather J R 1995
- 233 **The Decision Making of Organic and Conventional Agricultural Producers.** Fairweather, John R & Hugh Campbell 1996
- 234 **Family Farming without State Intervention.** Rudolf Helbling 1996
- 235 **Regional Income & Employment Impacts of Farming & Forestry in the Mackenzie/Waitaki Basin.** G V Butcher 1997
- 236 **Investigating Community: Imperatives for but Constraints Against Land Use Change in the Mackenzie/Waitaki Basin.** Morris, Carolyn, John R Fairweather & Simon R Swaffield, 1997
- 237 **A Comparison of the Structure and Practice of Dairy Farming in New Zealand and Japan.** Kazuaki Araki, 1998
- 238 **The Development of Organic Horticultural Exports in New Zealand.** Campbell, Hugh & Fairweather, John 1998
- 239 **A New Zealand Trade Share Database, 1966-96.** Cagatay, S & Lattimore, R 1998
- 240 **A Review of Economic Reforms in Bangladesh and New Zealand, and Their Impact on Agriculture.** Jahangir Alam, 1999
- 241 **Public Perceptions of Natural and Modified Landscapes of the Coromandel Peninsula, New Zealand.** Fairweather, John R & Swaffield, Simon R 1999
- 242 **Instruments for Internalising the Environmental Externalities in Commercial Fisheries.** Hughey, K F D., Cullen, R., Kerr, G N and Memon P A 2000
- 243 **New Zealand Farmer and Grower Intentions to Use Genetic Engineering Technology and Organic Production Methods.** Cook, Andrew J., Fairweather, John R & Campbell, Hugh R 2000
- 244 **Success Factors in New Land-based Industries.** Mayell, Peter J & Fairweather, John R 2000
- 245 **Smallholders in Canterbury: Characteristics, Motivations, Land Use and Intentions to Move.** Fairweather, John R & Robertson, Nicola J 2000
- 246 **A Comparison of the Employment Generated by Forestry and Agriculture in New Zealand.** Fairweather, John R., Mayell, Peter J and Swaffield, Simon R 2000
- 247 **Forestry and Agriculture on the New Zealand East Coast: Socio-economic Characteristics Associated with Land Use Change.** Fairweather John R., Mayell, Peter J and Swaffield, Simon R 2000

DISCUSSION PAPERS

- 139 **Classifying NZ's Export Markets: A Behavioural Approach.** Thomson, G & Lattimore, R 1994
- 140 **Dumping Protectionism & Free Trade.** Sheppard, R L & Atkins, C 1994
- 141 **Papers Presented at the 1st Annual Conference of the NZ Agricultural Economics Society. Blenheim 1994**
- 142 **Papers Presented at the 2nd Annual Conference of the NZ Agricultural Economics Society. Blenheim 1995**
- 143 **The Implications of Government Reform in New Zealand for the Canadian Agri-Food Sector.** Storey, Gary G 1996
- 144 **Papers Presented at the 3rd Annual Conference of the NZ Agricultural Economics Society. Blenheim 1996**
- 145 **Papers Presented at the 4th Annual Conference of the NZ Agricultural Economics Society. Blenheim 1997**
- 146 **Papers Presented at the 5th Annual Conference of the NZ Agricultural Economics Society. Blenheim 1998.**