Preferences for Land Use Options in the Mackenzie/Waitaki Basin:

A Q-method Analysis of Stakeholders' Preferences for Visual Images of Six Land Uses on Four Land Forms

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Preface

Land use change is an ongoing issue in New Zealand primary production and resource management. In some regions the issues are intensified as prevailing land uses come into question, and one such region is the Mackenzie/Waitaki Basin. Lincoln University researchers have collaborated with NZ Forest Research Institute Limited to study people's preferences for land uses. This report carefully examines stakeholder preferences in order to develop scenarios that model feasible land uses using a method that relies on visual images. The results will be of interest to all people concerned with future land uses in the Mackenzie/Waitaki Basin.

Ron Sheppard
ASSISTANT DIRECTOR

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Authors' Note

The first two authors prepared this report based on field research undertaken by Lisa Langer and Jacky Bowring. Nick Ledgard provided technical expertise regarding land uses and their effects. Larry Mortlock (Lincoln University) prepared the photographic images.

Summary

This study forms part of a wider research programme aimed at developing improved planning methodologies for resource management. The overall programme focuses upon the estimation of socio-economic effects of land use change in rural environments, using the Mackenzie/Waitaki Basin as a case study. The contribution of this report is to present the results of an investigation into the attitudes of stakeholders, using a preference approach. The results of the preference survey are used to generate several land use scenarios for the study area.

The method used to identify attitudes was a 'Q sort' survey. This involved stakeholders expressing preferences for cards that presented the effects of a range of different land use options. A total of 36 options, covering four land forms, was used. They were selected to represent a range of technically feasible land use options, including forestry, agriculture and conservation. A range of environmental effects for each land use were modelled including the visual image and visual environmental effects such as wilding spread, and the non-visual environmental effects such as local farm income and employment and soil status. Seventy-seven stakeholders were surveyed.

Analysis of the results has identified several clear 'themes', or sets of preferences. These have been designated 'plantations', 'grazing/trees' and 'conservation'. These themes represent particular combinations of options on different land forms that consistently emerged as either strongly preferred or strongly opposed. Each theme is characterised by a distinctive set of land use options, a distinctive combination of effects and each has specific criteria for judging acceptability.

Five composite land use scenarios have been generated. Three of these correspond to the dominant themes emerging from the Q sorts. The other two represent 'compromise' scenarios, comprising land uses that are not unacceptable to the majority of stakeholders.

The research has been undertaken as a joint New Zealand Forest Research Institute/Lincoln University project, funded by the Foundation for Research, Science and Technology under Output 24.

CHAPTER ONE
INTRODUCTION

1.1 Rationale and General Approach

This study forms part of a wider NZFRI research programme aimed at developing improved planning methodologies for resource management (entitled Planning for Rural Environments). The overall programme is exploring ways of providing decision support for policy formation under the Resource Management Act 1991. The RMA has shifted the focus of land use planning by local authorities from a concern for the 'use' of land itself to an emphasis on the effects of land 'use', including the effects on local communities. This change in emphasis creates a need for different analytical techniques, and the overall programme focuses upon the estimation of socio-economic effects of land use change. The particular contribution of this study is to investigate stakeholder attitudes towards the effects of alternative land use options, using a preference approach (Kaplan, 1985).

The NZFRI programme is based on a case study of land use change in the New Zealand South Island high country. Traditional pastoral land use is recognised as being unsustainable over large areas of the high country, extensive areas of which are experiencing land management problems. These problems have been identified as being particularly acute in the Mackenzie/Waitaki Basin. The major problem confronting the rural communities in the Mackenzie/Waitaki Basin has been identified as not being simply rabbits or *Hieracium*, but the ability to sustain families and local communities at current levels (Parliamentary Commissioner for the Environment, 1991).

Forestry is considered by some to be an ameliorative solution (Belton, 1991a, 1991b) and the desirability of commercial forests on a considerable part of the Mackenzie Basin has been expressed by the Minister of Forestry, the Mackenzie and Waitaki District Councils and a number of the existing farmers and land owners. The Minister has set up a Task Force to consider the establishment of forests in the Mackenzie Basin and other parts of the South Island high country, and the District Councils have employed planners to prepare a change to the Transitional District Plans under the Resource Management Act, with the intention of extending the present provisions for forestry.

However, these moves are opposed by a number of interest groups who argue that the wide open landscapes with tussock grasslands formerly characteristic of much of the high country should be protected. The Resource Management Act requires that provision be made for the protection of outstanding natural features and landscapes from inappropriate subdivision, use and development. A landscape study has been undertaken by landscape architects to assess the visual vulnerability of the Mackenzie/Waitaki Basin and to recommend guidelines for forestry (Boffa Miskell Partners Limited, 1992a, 1992b). In addition, as a forerunner to the landscape study, a conflict resolution workshop was held under the auspices of the Regional Council with representatives from conservation, agriculture and forestry. The results of the landscape study and the conflict resolution workshop have been used as a starting point for this study.

Understanding how the inclusion of forest land use could effect the wider community is often overlooked. To date forestry studies have concentrated on forestry potential from the view point of the productive return to the land. Social and institutional monitoring and evaluation from the Rabbit and Land Management Programme (Taylor Baines and Associates, 1990) provides some background to social issues, but options for integrating forestry into agricultural regimes have not been fully examined.

This study combines forestry, agriculture and conservation options, and investigates attitudes towards a range of integrated land use options. The focus is on the use of the Q method to analyse stakeholders' preferences for six land uses on four land forms. Land uses are general categories of activity. Each land use studied has visual effects, that is, what each is predicted to look like, including visual indicators of environmental effects such as wilding spread. In addition there are non-visual (socio-economic and ecological) effects. The study has as its main objective the integration of visual information about the land uses with predictions about selected indicators of socio-economic and ecological effects.

A variety of viewpoints are examined, rather than polling opinion on a random or representative basis. This approach recognises that land use decisions are not decided by consensus or majority viewpoint but are the outcome of contested viewpoints. Thus, our approach assumes that land use effects are not totally objective phenomena but are differentially perceived in ways that reflect the preferences of stakeholders. Describing their preferences provides insights for policy formation. The results of the study will show a number of distinctive sets of preferences and these can then be used to complement economic analyses of land use changes. However, study of the economics of land use change is beyond the scope of this AERU report. The primary role of this attitude survey is to provide input to the selection of feasible and acceptable scenarios for the whole study area. An associated analysis of in-depth interviews undertaken at the same time as the Q sort will be the subject of a separate NZFRI Report.

1.2 Preference as a Basis for Assessing Attitudes Towards Land Use Effects

There are a number of possible strategies that can be adopted to investigate attitudes towards the effects of different land uses. They include methods based upon analysis or ranking of words or statements, visual preference techniques, and contingent valuation. These three methods are reviewed in turn.

Wardle et al. (1993) utilised preference ratings of a range of policy statements, and other forms of semantic scaling have been used extensively overseas to investigate environmental attitudes (Van Lieve and Dunlap, 1981). Swaffield (1991) used qualitative discourse analysis of depth interviews to interpret attitudes towards the management of trees and plantations in the New Zealand high country, and Fairweather (1993) has used Q methodology (see Chapter 3) to investigate attitudes of rural lifestylers. However, semantic investigation relies heavily upon the interpretation of the meaning of words and phrases. This introduces major variability when attempting to assess attitudes towards **future** situations, with which respondents are not familiar, as it requires each respondent to make his/her own predictions and projections of the likely nature of any stated land use option. This makes meaningful

comparison between respondents problematic.

An alternative approach to assessing attitudes that is widely used in landscape perception studies is to seek preference ratings for images of land uses. Kaplan (1985) has summarised the theoretical justification for the use of preference testing as a basis for investigating landscape perception, drawing upon 'functional' concepts of perception. These link preference to respondents' perceptions of the functional role of particular environments. Themes emerging from empirical studies include the importance of 'naturalness' and the spatial structure of environments in determining preference. The particular value of such an approach for this study is that when it is combined with computer technology that allows authentic visual modelling of **future** land use options, it becomes possible to assess respondents' attitudes to the potential effects of land use change, based upon a standard set of stimuli.

1.3 An Integrated Approach to Land Use Preferences

The strategy adopted in this study has been to combine verbal and visual stimuli in semi-formal models (Lyle, 1991) of alternative land use options. Each land use option that was to be presented to respondents was modelled in three ways - visually, economically and ecologically. The visual modelling was based upon analysis of images of existing land uses elsewhere, transposed to the case study locations. The economic modelling used land use economic models developed for the area, whilst the ecological modelling utilised previous studies.

Three sets of indicators were devised: a 2D visual image, a statement of predicted local farm and forestry income and employment, and a statement of predicted soil status. The visual images included cues to land use and ecological status, as well as more conventional 'scenic' qualities. For each land use option, respondents were thus presented with an integrated overview of effects, summarised on a single card.

The field investigation was based upon stakeholders' expressions of relative preference for each composite card. Respondents were thus forced to make trade-offs between visual, economic and ecological effects as part of their preference rating, and to focus upon the overall effects of each land use. The rationale for the composite approach was that forcing stakeholders to make choices between combined effects would reveal attitudes more closely corresponding to 'real world' situations.

The survey approach chosen to present these composite cards to stakeholders was 'Q' methodology. The basis for 'Q' is explained in Chapter 2. The main advantage it offers is that the method focuses upon the subjective views of the respondent, and thus taps directly into their values, beliefs and opinions (Drysek and Berejikian, 1993). This is in contrast to many other methods that use measures prespecified by the researcher.

1.4 Development of Land Use Options

In order to achieve the methodological goals of the overall study it was necessary to develop

a set of feasible land use options. Major biophysical factors influencing future land use in the study area include rainfall, slope, orientation and soil status. Landform and rainfall were selected as the key biophysical variables for this study, and four categories identified: hill slopes between 16° and 35°, lower slopes between 8° and 16° (greater than 800mm annual rainfall), flats, less than 8°, in the higher rainfall area; and flats less than 8° in the lower rainfall area (less than 800 mm annual rainfall).

For each land type, a range of economically feasible land use options was developed. These were formed primarily upon different combinations of grazing, tree planting, and destocking. Grazing was either extensive, or, where considered to be feasible, improved or irrigated. Tree planting was considered as either productive plantation, agroforestry woodlots, or shelterbelts.

Given the long time scale of tree production, two time scenarios were initially modelled : ten years and fifty years. In the final Q sort, only 50 year options were included. Land use change was modelled on either 15 per cent of the available land area, to represent a modest change option, or on 70 per cent of the available land, to represent a major change option. Wilding spread was included in some options, and wilding management to remove spread in others.

1.5 Conclusion

The approach adopted in this study differs from conventional attitude surveys in a number of ways. It presented composite models of the likely effects of potential land uses to stakeholders, and sought responses using a technique that emphasises the autonomy and subjectivity of each individual respondent. However, analysis is based upon well established concepts of preference that are of direct relevance to the process of policy formation in rural communities.

The working proposition is that the study will identify a limited set of distinctive preferences that each express a different combination of values, beliefs and opinions about the acceptability or otherwise of different land use effects. Detailed interpretation of the responses is expected to identify both particular issues of concern or consensus over the acceptability or otherwise of different land use effects, and areas of contention in the prediction of such effects.

CHAPTER TWO
METHOD

2.1 Introduction

This chapter contains an account of the Q method, both in general terms and in its application to visual stimuli. The process by which the landscape images were prepared is described, and the testing and development of the images reviewed. Finally, the selection of stakeholders and field procedures are described, along with a brief description of the technical procedures used. The first section on Q methodology is provided to give a comprehensive background to this technique. Readers less interested in these details can proceed to section 2.3 which describes the preparation of visual images.

2.2 Q methodology

2.2.1 Q and R Methods

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 analyzed to yield groups of people who have ordered the statements in a similar way. The order of statements of all the people emphasising a particular factor is used to produce an array of statements typical of those subjects. Finally, each factor and its corresponding array of statements is interpreted for the attitudes they reveal.

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 1.

		Traits					
		T_1	T_2	T_3		Tn	
	S_1	$S_1 T_1$	$S_1 T_2$	$S_1 T_3$	. . .	S_1 Tn	$\overline{S}_1$
	S_2	$S_2 T_1$	$S_2 T_2$	$S_2 T_3$	. . .		$\overline{S}_2$
Subjects	S_3	$S_3 T_1$	$S_3 T_2$	$S_3 T_3$	. . .		$\overline{S}_3$
	.						
	.						
	.						
	Sn						$\overline{S}n$
		$\overline{T}_1$	$\overline{T}_2$	$\overline{T}_3$		$\overline{T}n$	

Source : Brown, (1980) p.12.

Figure 1
Subjects by Traits Data Matrix

Figure 1 shows the scores, SxTx, for respondents (S) and traits (T) that can be produced from a research study. For a Q sort, the Ts represent statements and the row of scores, S1 T1 to S1 Tn, 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 between 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 Q analysis respondents are correlated with each other to produce factors which link together individuals who have similar scores. The analysis is based on differences within individuals for each trait, and there are interactions between traits by virtue of the subjectivity of the respondent.

2.2.2 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 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.

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 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.

2.2.3 Q and Subjectivity

The structure of a Q sort is a product of the respondent alone. The meaning of statements derives not only from the individual appearance of each statement 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 60 statements in a Q sort array of nine piles, with a minimum number of three and a maximum number of ten piles, 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.

The interpretation of each factor requires the development of an explanation which must fit the known facts. 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. 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 the research.

2.2.4 Advantages of Q Method

Brown (1980) and Drysek and Berejikian (1993) have argued that Q Sort has major advantages over conventional R analysis in socio-political surveys and analysis. In particular, the structure of the analysis emphasises the primacy of respondents' views in the development of analytical categories. It is a 'reconstructive' technique, that allows subjects to 'speak for themselves', and incorporates their subjectivity into the analysis. Furthermore, it seeks patterns of response across individuals, rather than across variables, and thus measures socially assigned meaning directly. Both Brown, and Drysek and Berejikian, argue that this

analytical approach is more 'democratic' and provides a more authentic understanding of socio-political attitudes than the findings of conventional opinion polls or surveys.

2.2.5 Limitations of Q Method

Q method does, however, have some limitations. It does not provide information on the proportion of types in the population as a whole. However, this is not a significant disadvantage in the context of this study, which focuses upon the attitudes of stakeholders actively involved in policy formation. At the technical level, respondents sometimes do not form a distinctive type because their Q sort is idiosyncratic, and individuals sometimes place emphasis on more than one factor because they have non-distinctive Q sorts. The factor analysis also entails a rotation phase which introduces both advantages and disadvantages. Centroid factor solutions followed by hand rotation best fits Stephenson's original use of Q method. However, hand rotation allows the researcher to produce more than one final factor solution, and the different factor solutions yield variations in interpretations. Such indeterminateness is best handled when the researcher has clear theoretical directions to pursue and can therefore justify the selection of a particular rotation. In this study hand rotation is not used.

Drysek and Berejikian (1993) also note that the method inevitably involves inputs from the researchers, in that they select the options presented to respondents. Typically, any bias from this input is minimised by using a cell structure or stratified sample to ensure that a comprehensive range of options is presented. In this study, we sought to provide a full range of feasible options but the number of options available exceeded that which could be responded to easily by stakeholders, and some minor options were not studied. However, it must be emphasised that at issue are the responses that stakeholders make to the cards, and these responses derive from their preferences alone. The cards are an ingredient in this process not a determinant of the preferences. Provided a range of land use options are used then the results will not be seriously limited.

Overall, the Q method is well-suited to an examination of the subjective dimension of preferences for land use options. In particular, it can allow stakeholders to show us how they rate six different land uses on four different land forms. The limitations of the technique outlined above are of relatively minor significance for this particular study.

2.2.6 Item Selection

The Q method can be applied to any phenomenon to which people can attach meaning. Usually, written statements are used, and these are prepared as typewritten entries on small cards. The Q method typically uses a sample of 30 to 60 statements selected from the population of all possible statements. The sample of statements is often stratified or structured to ensure that it represents all relevant dimensions. Relevance is derived from available theory about the subject matter in question. Occasionally, factorial designs are used. At the stage of selecting a structured sample of statements the researcher is making explicit his or her expectations about what is important. It is important that statements which have maximum diversity are selected and they are expressed in language relevant to the subject.

In addition to written statements Q method has been used with a variety of non-written items, for example, photographs, stills from movies, posters, advertisements, postcards and

recently, cassettes of Country and Western songs. In the area of resource management Gauger and Wyckoff (1973) have studied aesthetic preferences for water resource projects using photographs of water development projects. The photographs showed varying degrees of nature dominance or human dominance. Results showed preferences for naturalness which did not exclude developments which complemented the natural landscape. In New Zealand, Q Sort was used in the Auckland Regional Landscape Study (Brown, 1984) in which preferences were elicited for photographs of a range of landscape types.

Kaplan (1985) has argued for the validity of using visual preference methods for investigating perception. In this study visual images have the added advantage of making potential future situations legible and accessible to respondents. Although expressed as two dimensional 'pictures', visual images nonetheless convey complex information about a wide range of environmental attitudes. The use of photographs as surrogates for environmental experience has been widely debated (Bernaldez et al. 1988), and although there are clearly limits to the extent to which photographs can express other sensory modes, such as smell, the empirical evidence suggests that they are reasonably reliable when used to elicit attitudes and preferences.

Use of visual images only, however, could lead respondents to infer that the study was focused solely upon 'scenic' issues. Images were therefore combined with statements to provide a more rounded package of information on predicted effects. The study thus uses a basic form of multi media technique. Although problems of 'information overload' emerged as significant issues during the pre testing, the overall results suggest that the combination of images and words has been a successful approach, albeit with preferences for the image over the written word.

2.3 Preparation of Visual Images

2.3.1 Objectives and Approach

The primary purpose of the visual images was to communicate to respondents a consistent set of information about the likely character of different potential land uses in the study area. The aim was therefore to produce a set of images that represented as authentically and consistently as possible the effects of a range of land uses.

There are a number of approaches possible. The method most widely used in the past (and used in the Boffa Miskell landscape study) is to produce manual sketches in pencil or ink. This has the merit of speed and efficiency, but clearly presents an 'abstract' picture, and lacks the authenticity of photographs, whilst also being open to criticisms of artistic licence, or bias. Photographic montages have also been used, in which images are combined manually. This increased the authenticity of the image but is laborious and time-consuming, and also open to bias.

The advent of computer graphics has revolutionised image production. The most sophisticated programmes now available enable complex 3D digital models of landscape to be developed. These are typically based upon digital terrain models, with surface patterns and textures created using algorithms. However, despite the rapid advances of recent years, digital models still lack the subtlety of colour, patterns and detailed visual cues visible in real

life, and reproduced highly authentically in conventional photography. They also require a major investment in hardware, software and operator skills. A cost effective alternative is to use computer-based image editing. Graphic programmes such as Adobe PHOTOSHOP enable photographs to be digitised, and then amended, or edited, by the addition of new colours, textures or shapes. PHOTOSHOP is only a 2D tool, which lacks the accuracy of 3D digital terrain models when locating areas and objects in the landscape. However, it does enable high levels of visual authenticity to be achieved.

The first stage of this project required the production of between thirty and fifty images of diverse land uses on four different land forms. The decision was therefore made to place emphasis upon authenticity and cost effectiveness, at the expense of some loss of locational and scale accuracy, and to produce the images using PHOTOSHOP. Potential bias was minimised by the use of manual calibration techniques (to gauge scale) and by the use of expert review panels (to assess the predicted effects).

Opportunities for combining PHOTOSHOP with digital terrain modelling will be explored in a subsequent stage of the overall programme.

2.3.2 Variables Relevant to the Study

There are several variables involved in image preparation. The most important is consistency of viewpoint. Kaplan (1985) has highlighted the significance of the spatial structure of the landscape in determining preference, and in order to achieve comparability between different land use options, a single viewpoint was selected for each land form. Choice of location and framing of the view were particularly problematic. Eye-level views are clearly most representative of what people typically see, but on large plains, such as the Mackenzie/Waitaki Basin, these typically include extensive areas of foreground, which can have a disproportionate effect on the character of the overall image. Conversely, oblique aerial views, although providing a more balanced overview, are less representative of the normal experience of residents and visitors.

Because public access and views from public areas are also particularly sensitive issues in the high country, viewpoints were chosen looking at eye level from public roads towards and across 'typical' examples of the four land forms to be modelled. More elevated views will be used in subsequent modelling of complex composite land use scenarios. Views were chosen to avoid foreground framing by trees, etc., and thus to minimise bias due to adoption of a picturesque structure for the image.

Distance of objects such as plantations from the viewer is a second major issue. The relative scale of objects in an image, and the way they structure the view, are significant variables in preference. The sensitivity of distance is further illustrated by the emphasis placed in the landscape study (Boffa Miskell, 1992) upon visual setbacks from public roads. Images for this study were selected and edited to ensure that first, the land use changes being modelled were normally a consistent distance from the viewpoint (commencing one kilometre from the viewer, and extending back a further kilometre or so), and the scale of objects such as trees was calibrated manually against known objects in the view to ensure that their relative scale was reasonably accurate. One of the variables in the land use predictions was the area of available land to be covered (15 per cent or 70 per cent). A particular problem with ground level views is the disproportionate effect that the foreground has on the image as a whole.

Furthermore, any view will inevitably involve land types other than those being modelled, as background for example. The approach adopted was to select views in which the target land form occupied the centre of the image, and to highlight it with a white line on the image. Within this line, land use changes (such as plantations) were modelled to cover an area visually proportional to their overall coverage of that land type, such as a 15 per cent land use would be modelled to cover 15 per cent of the image area of that land type. The pattern of land uses was modelled to provide views into and through the area in question (for example, shelterbelts were angled away from the view, and plantations modelled to cover only part of the scene), in order to minimise possible bias due to differences in spatial structure.

An important recommendation of the Boffa Miskell landscape study that is consistent with theoretical and empirical work overseas was that land use change, particularly forestry, should be placed to follow land form, rather than conflict with it. The study also recommended use of amenity planting to 'soften' the edge of plantations. These 'landscape guidelines' were followed in the image generation, although they are clearly open to a degree of interpretation. Thus, plantations were normally modelled running across slopes, rather than following cadastral boundaries, and had amenity edge planting added.

The image set also included several images intended to test respondent sensitivity to the landscape guidelines. The initial intention was to test all the variables involved (distance from the road, slope, edging, etc.), but the results of the pilot testing forced a reduction of the total number of images, and as variation in land use was the primary focus of the study, most 'visual landscape' variables were removed from the final set. Several were retained, however, and the field survey included a variation on plantation shape, and upon the distance of wilding trees from the road.

Wilding management was a further key variable, and a range of land uses was modelled with and without wilding control. A problem here was how to treat wilding spread from outside the frame of the image, or across other land types within the image. The general policy was to show wildings if they were predicted to spread from the land use change modelled **within** the image, but with one exception to **not** model 'off' view spread. The exception was included to test respondent sensitivity to spread coming close to the road.

Perception studies overseas have highlighted the importance of consistent weather and lighting conditions across images, and images were selected and edited to minimise variations. Familiarity and involvement by respondents with particular places are also important influences in preference (Uzzell, 1991). When investigating community sense of place, for example, such influences are of direct relevance and value to the researcher. In this study, however, the intention is to seek attitudes towards land use change for the study area as a whole. The image editing capability of PHOTOSHOP was therefore used to remove visual cues to particular properties: buildings, vehicles, or distinctive trees were edited out, and two images were reversed. The final effect was images that were characteristic of the area as a whole, but that could not be specifically identified by respondents.

Choice of species was determined according to economic feasibility and land capability. In the event the range modelled was limited to corsican pine (*pinus nigra*) Douglas Fir, and poplar shelterbelts. Images of trees and grasses were captured photographically and with

video from sites elsewhere in the study area that corresponded most closely in their character to the survey sites, and imported into the study images.

2.3.3 Limitations in Visual Modelling

Clearly the major limitation in the visual modelling was the need for expert interpretation of land areas and effects. As noted above, this was a conscious trade-off to gain visual authenticity and cost effectiveness. Similarly, the use of images inevitably prestructures the information presented to respondents in some way. Despite the attempts to standardise views, some minor inconsistencies crept in. Furthermore, as we note below, some stakeholders disagreed with the technical predictions presented to them. On balance, however, the richness of the visual data outweighs its disadvantages. The main advantage is that each stakeholder responded to the **same** stimuli, and were thus equally exposed to any bias. In contrast, a survey based on text only would leave open the probability of a very wide range of possible interpretations of effects by stakeholders.

2.4 Testing and Developing the Final Set of Image Cards

The first stage of our approach to the study of stakeholders' preferences for different land use options was to prepare images of the land uses for each of the land forms, as described above. We pilot tested 46 images with no descriptive labels and asked subjects to do a Q sort for what was most acceptable and least acceptable to them for the Mackenzie/Waitaki Basin as a whole. This first test worked well with each Q sort taking about 20 to 30 minutes and each subject was able to give a good explanation for their particular Q sort.

The next stage of development involved labelling each image to avoid confusion regarding the land use and the land form. In addition, there was a need to convey to the stakeholders important background information about the land area, the location of each of the four land forms, the income and employment effects, and the soil status effects of the land use. A4-size cards were prepared that showed the labelled image, the land form location map (with its area) and the effects. This second stage test integrated both visual and written information. The second stage of testing showed that there were too many factors to consider and test subjects found that the Q sort task was nearly impossible. As the integration of image and other information was crucial to our design we sought to simplify the procedure.

The first step in the simplification was to set aside from the Q sort cards the constant information about land form areas and locations. To this end we prepared an A3 sized background information sheet that showed the four land forms without any specified land uses, the location maps, and the areas involved. The second step in the simplification process was to use separate Q sorts for each of the four land forms. This allowed subjects to bear in mind the location and area of the land form, then to consider the acceptability of the six land use options. These simplification steps provided for Q sorting that was relatively easy, yet integrated visual image with consideration of other effects. Test subjects were seen to respond to the challenge of modifying their selection of a preferred visual image in the light of considering the economic and ecological effects associated with that land use.

While four separate Q sorts covered each of the four land forms, it did not address directly

the issue of stakeholders' preferences for different land uses for the Basin as a whole. To obtain data on this general viewpoint, we included an overall Q sort where all the cards for the four land forms (with photograph, label and effects) were Q sorted together. This combination of Q sorts provided data on preferred land uses both within and between land forms.

The remaining issue to be addressed in the testing of the image cards was the total number to use. The number of variables that were considered relevant to the study exceeded the number that was workable. Since the initial testing showed that the sorting task was potentially very complex, every attempt was made to minimise the number of cards to be sorted. The following variables were therefore omitted from the study: forage crops (salt bush), a 15 year scenario, regimes involving broad-leaved tree species, and a number of variations on the landscape guidelines proposed by Boffa Miskell. The final number of image cards and the Q sort distribution for each of the land forms was as follows:

	Number	Distribution
Hills	8	1 2 2 2 1
Lower slopes	10	1 2 2 2 2 1
Higher rainfall flats	10	1 2 2 2 2 1
Lower rainfall flats	8	1 2 2 2 1
Overall	36	1 2 3 4 5 6 5 4 3 2 1

The final design used 36 cards. There were six land uses and four land forms. The land uses were: destocking, no change (continued grazing), shelterbelts and improved pasture, agroforestry and improved pasture, non-commercial plantations, and plantations. All land use options were portrayed as 50 year scenarios occurring on either 15 per cent or 70 per cent of the land form. In the case of destocking and continued grazing the area was 100 per cent of the land form. There was no systematic wilding management (wilding removal) unless specified. Similarly, edge planting with alternative species to soften boundary lines was included in all planting options. Most images showed the land use as being 1,000 metres from the road, as specified in the landscape guidelines being promoted at the time of the study, although a single variation was included to test respondents' sensitivity to this issue. The boundaries of the forestry options were shown to follow the line of the land form unless otherwise stated. One option showed trees planted up to cadastral (legal) boundaries which ran across the line of the landscape. These decisions regarding image cards were numerous and occasionally subtle so it was important to make them known to the stakeholders. A detailed instruction sheet was used to explain those details to stakeholders. The full text of the instruction sheet used by interviewers is shown in Appendix 1. Each stakeholder was shown an information sheet which displayed the locations of each land form and the relevant area of each land form. Table 1 shows the identifying characteristics of each land form and their areas.

Table 1
Definition and Areas of Each Land Form

	Definition	% of Total Study Area
Hill slopes	35° - 16°	22
Lower slopes	15° - -8°	3
Higher rainfall flats	< 8°, > 800mm rainfall	2.5
Lower rainfall flats	< 8°, < 800mm rainfall	13

Notes: 1. Excludes land over 1100m in altitude and all agriculture and conservation priority land.

2. Available land comprised 40.5 per cent of the study area after unsuitable land, developed land, and land already identified or designated as priority land for agriculture or conservation was excluded.

2.5 Selection of Stakeholders and Field Procedures

Successful Q method analysis requires that the non-random sample of stakeholders be a diverse group. This diversity can then be put to work on the carefully selected sample of items to be Q sorted, and it ensures that divergent patterns of sorting will occur. These patterns form the basis of distinctive factors. The main stakeholders in the Mackenzie/Waitaki Basin and the numbers and types used in this study are shown in Table 2. Four of the 77 stakeholders belonged to two stakeholder groups because they were runholders but also a service provider, politician, tangata whenua (represented by Ngai Tahu) or member of a recreation/conservation group. In the table, three of these four cases are classified in their non-runholder capacity, with one representative of the tangata whenua classified as a runholder because he was chosen as a runholder but was found later to be Ngai Tahu. One of the recreation/conservation group is also Ngai Tahu. Thus, in this group of 77 stakeholders there were four Ngai Tahu.

The appropriateness of Q sort methodology as a way of consulting with the tangata whenua was discussed with the Ngai Tahu Trust Board in the early stages of the research. At that time it was agreed that tangata whenua interest would be adequately addressed by inviting key representatives of relevant runanga to undertake the Q sort procedure. However, there are fewer Ngai Tahu in the final 77 respondents analysed than was originally intended. This occurred for two reasons. First, there were difficulties in making contact with and interviewing Ngai Tahu representatives, and these delays meant that two Ngai Tahu Q sorts only became available after data analysis had commenced. Second, two of the Ngai Tahu runanga when approached believed that they did not have sufficient involvement in the study area to make a contribution. However, subsequent analysis of the two additional Q sorts

suggests that they are not exceptional in any way and the comments on the Q sorts were similar to those from other stakeholder groups.

Table 2
Numbers and Types of Male and Female Stakeholders

Stakeholder group	Males	Females	Total
Runholder/manager	13	9	22
Service provider	3	7	10
Commercial advisor	4	0	4
Local business	10	6	16
Local/regional politician	3	1	4
Tangata Whenua (represented by Ngai Tahu)	1	1	2
Recreation/conservation	4	3	7
Statutory advisor	8	3	11
Regional advisor	1	0	1
TOTAL	47	30	77

Field work began in May 1993 and continued to June 1993, although some Q sorts were not completed until September 1993. The two field researchers (Lisa Langer and Jacky Bowring) visited stakeholders at their place of work or at their home and conducted the Q sorts in parallel (where there were two members of a couple). The objectives of the study were explained and the relevant background information provided (see Appendix 1) before the five Q sorts were completed. During or after each Q sort the stakeholders made comments on the sorted cards. These were written down on each data sheet and the comments were tape recorded. Following the Q sorts, additional questions were asked and recorded as part of a study not reported here. These questions were in an open-ended format and designed to learn about stakeholders' views in more depth. The questions included the following topics:

Current and previous involvement in the Mackenzie/Waitaki Basin;
What they value most, and least, about the area;
A sustainable land management option for the Mackenzie/Waitaki Basin;
Vision for land use in 50 years time;
Degree of influence they have, and would like to have, in the planning process;
Ways an expansion of forestry would affect the area;
Constraints to tree planting; and
Personal characteristics and time spent in the area.

Additional questions for runholders and managers were:

Length of occupancy;
Ownership of property;
Degree of control/influence over management and role play;
Planning horizon time scale;
Employment of family and non-family;
One major factor which would improve quality of life;
Extent and advantages/disadvantages of inherited and planted trees;
Planting intentions in next five years under existing constraints,
and without constraints; and
Scale of future plantings, their affect on farm management and management.

2.6 Technical Procedures

The Q sort data were recorded using the reference numbers of all images used in the pilot testing. (Hence the reference numbers exceed the number of cards sorted in the field survey.) Each data sheet for each Q sort listed the numbers in the relevant piles from least acceptable on the left to most acceptable on the right. The original number for each image card for each Q sort was subsequently renumbered in a sequence starting with number one to suit the requirements of the computer package used for the analysis. The computer package was operated on the Lincoln University mainframe computer and provided centroid factor analysis with either manual or hand rotation options.

The Q sort distribution must have an odd number of piles so that the central pile, receiving a zero score, has an equal number of piles on either side. The Q sorts for lower slopes and higher rainfall flats had ten image cards in an even number of piles in the following distribution:

1 2 2 2 2 1

To achieve an odd number of piles two dummy items were inserted into the neutral point of each Q sort. Since these items were in the same location for each Q sort they can play no part in the generation of factors.

Hand rotation of centroid factor rotations can be used in sophisticated analysis of Q sort data. Typically this approach is used when particular subjects are examined and axes rotated to locate the specified subject on a factor in order to have a factor as a pure expression of a particular viewpoint. In this study Varimix rotation was used since we are interested in the variety of view points and have no strongly developed theoretical leads to types of perception of land uses. Further, the uniformity of technique is advantageous when five Q sorts per subject are to be analysed.

The Q sort data were entered into the computer programme which provided a matrix of corrections between each Q sort. Centroid factor analysis then provided a factor matrix showing each subject's loading on seven factors. Factor loadings are correlation coefficients representing the degree to which a Q sort correlates with a factor. The standard error of a

zero-order correlation loading is equal to one divided by the square root of the number of images sorted. In the case of the hills Q sort there were eight images and the standard error is 0.35. For a loading to be significant at the 0.05 level it must exceed the standard error by 1.96, that is, the loading must exceed 0.70. In determining the number of factors it is necessary to have at least two significant loadings.

CHAPTER THREE
RESULTS

3.1 Introduction

This chapter presents results of the Q sort survey. The key factors for each of the four land forms are identified and described. The approach used is to begin the analysis for each land form by describing the factor loadings for each. This set of data reveals the general pattern of the results and is used to identify stakeholders with high loadings. The factors for all stakeholders for all Q sorts are listed in full in Appendix 2. Then the data sheets for each stakeholder with a high loading were examined and the Q sort for each stakeholder interpreted in terms of the description of the land use on the image card (and its Q sort score) and in terms of the comments made by each stakeholder about each image. This description is presented in the text not as direct quotes but as a summary that paraphrases the words of the stakeholder. (Particular care was taken to include reference to any comments made about the written effects noted on each card.) It should be noted that the term 'acceptable' is used to describe any card that appears on the right hand side of the array, and 'unacceptable' on the left. This does not imply that the option is acceptable in all its facets, but that it is rated as acceptable compared with the other less acceptable options. At the end of each description a brief summary of the key points is provided for that stakeholder. Then, building on these individual descriptions and the array of images for that factor, the main points are listed in order to interpret and characterise the factor. Finally, for each land form the factors are compared by identifying the distinguishing characteristics of each factor. The final sections of the chapter compare the results across the four land forms, examine the characteristics of the stakeholders in terms of factors, and analyses the overall Q sort.

The results presented in this chapter are quite detailed. All the factors are described in detail rather than excluding apparently minor factors. Readers may focus on specific factors in particular land forms if that is their main interest, or they may focus on the summary characteristics of the main factors and on the comparison of factors across land forms and other more general issues towards the end of the chapter.

3.2 Hill Slopes

Of the 77 stakeholders analysed there were 52 who had statistically significant loadings on one of four factors for the hill slopes (see Table 3). For a Q sort with eight items the factor loadings have to be high (at least 0.7) before they are significant. Of the remaining 25 stakeholders there were 23 who had a non significant loading between 0.5 and 0.7. Of these 23 cases, eight loaded on only one factor and 15 loaded on two or more factors. These 'non-significant' 23 stakeholders do therefore have some affinity with those who had significant loadings on the four factors. The final two stakeholders had loadings less than 0.5 and these cases had little affinity with the factors. Their Q sorts were unique and dissimilar.

For the hill slopes Q sort there were four factors identified and for each factor there were

stakeholders who loaded positively and stakeholders who loaded negatively. The number of positive loadings exceeds the number of negative loadings. Positive loadings identify stakeholders who define acceptability for a range of land uses in a certain order, with the first choice being most acceptable. Negative loadings identify stakeholders who define acceptability in the reverse order. The negative factors will be examined but because they represent minority viewpoints the focus of the analysis will be on the positive factors.

Table 3
Distribution of Significant Loadings for the Hills Q Sort

	Factors				
	1	2	3	4	
Significant loadings:					
Positive	21	9	6	5	41
Negative	3	3	3	2	11
Subtotal	24	12	9	7	52
			Non significant loadings		25
				TOTAL	77

The characteristics of each factor (distinctive set of preferences) are best illustrated by reference to individual stakeholders who correspond most closely to the 'typical' case. For each factor up to four stakeholders who had the highest loadings on that factor have been selected, and their Q sorts and comments are used to characterise the factor. Typically, stakeholders with a loading of 0.9 or above were used, or else the two highest loading stakeholders were used. For each stakeholder considered, their Q sort is shown by numbers only but the images can be seen in the figure at the end of the sub section. The overall factor array is shown and the order of images for each selected stakeholder matches the factor order very closely.

In the following presentation of data the images are identified by their original number (that is, the numbers are not in sequential order starting with one) and images or numbers placed to the right or the top are most acceptable, while images or numbers placed to the left or the bottom are least acceptable.

3.2.1 Factor 1: 'Plantations, Not Grazing, to Use and Improve the Land'

The first distinctive factor emphasises the role of forestry on the hills.

Illustrations of Positive Loadings Factor 1

Example: Stakeholder number 75, factor loading = 0.98, male, tangata whenua.

	13	37	18	
54	55	66	62	42

"Plantations on 70 per cent of available land without wilding management (42,) is most acceptable (loading +2) because of the value trees will give to birds and other animals, with significant return on income and employment benefits. Trees must improve soil status, return rainfall to the area and put oxygen into the air. Plantations with wilding management (62, +1) is acceptable. Plantations on 15 per cent of available land (18, +1) is also acceptable: the wildings look like birds have dropped them. Exotic and indigenous trees can go together and the return of birds will spread natives. Plantations on 15 per cent with wilding management (37) receives a neutral score (0), as does plantations on 15 per cent with wilding management and following cadastral borders (66, 0) (presumably because there is not enough cover on the hills). Destocking on hills with wilding management (13, -1) is not acceptable although it can give grazing benefits to country that has been burnt or has hieracium. Continued grazing (55, -1) is not acceptable because it is not afforestation. The hills need longer rotation than radiata which will lead to less damage to natives - at 40 years totara would be established and would still remain. Continued grazing with wilding management (54, -2) is least acceptable because grazing is not good for the economy. Thousands of acres of desert are not good for hill country. Grazing can occur economically on the flats where irrigation can be used. The best goal is to destock and reforest the hills."

In summary, stakeholder 75 has responded to both visual images and economic and ecological effects, and finds plantations, rather than grazing, most acceptable on the hills. He believes that plantations should be planted along with natives to reforest and improve the hills. Continued grazing is the least acceptable option for the hill slopes

Example: Stakeholder 12, loading = 0.95, male, runholder.

	55	37	62	
13	54	66	18	42

"Plantations on 70 per cent without wilding management (42, +2) is most acceptable because it has income and employment and soil benefits compared with hieracium and rabbits at present. Plantations on 70 per cent with wilding management (62, +1) and plantations on 15 per cent (18, +1) are acceptable because of their positive effects. The former is preferred because it is tidy although wildings can be productive. Each of these top three choices is appreciated because they look natural. Plantations on 15 per cent with wilding management (37, 0) and plantations on 15 per cent with wilding management and following cadastral borders (66, 0) are not as visually appealing and are detracting from the landscape. Continued grazing (55, -1) and continued grazing with wilding management (54, -1) are not acceptable because of the effects and are not sustainable. Finally, destocking with wilding management (13, -2) does not do much for anybody and could lead to land degradation due to hieracium spreading on to land which has never been grazed."

Stakeholder 12 has responded to economic and ecological effects, and the visual image, in that order, and prefers trees to open countryside. Larger plantations are preferred while traditional land uses are seen as unsustainable. Destocking is least acceptable.

Example: Stakeholder 14, loading = 0.95, female, service provider.

	55	37	62	
13	54	66	18	42

"Plantations on 70 per cent (42, +2) is most acceptable because trees stabilise both land and employment and are acceptable visually. Plantations on 70 per cent with wilding management (62, +1) is acceptable because it is controlled planting rather than the haphazard appearance of plantations on 15 per cent (18, +1). However, the former is rather too ordered in scenic terms hence is not as acceptable as the 70 per cent cover without wilding management. Plantations on 15 per cent with wilding management (37, 0) and plantations on 15 per cent following cadastral borders (66, 0) are both visually wrong: they are quite artificial and look much the same. Continued grazing with wilding management (54, -1) is like destocking on hills with wilding management (13, -2) and are not acceptable because they are barren and not being made use of."

Stakeholder 14 has responded to both images and other effects, and prefers larger plantations that are seen as the best way to maximise use of the land.

Example: Stakeholder 13, loading = 0.92, male, local business.

	13	66	18	
54	55	37	42	62

"Plantations on 70 per cent with wilding management (62, +2) is most acceptable because there is maximum use with minimal interference visually. It is controlled compared to what has been, especially with wildings. Plantations on 15 per cent (18, +1) and plantations on 70 per cent (42, +1) are acceptable with some reservations. The former needs more planting: the latter has the virtue of softer lines but the percentage of cover is too high. Plantations on 15 per cent with wilding management (66 and 37) each have a neutral score because they do not look good because of planting along vertical lines rather than along the contour which would complement the natural landscape. Destocking with wilding management (13, -1) is not acceptable but preferred over continued grazing because it would not damage tussock or foster rabbits and hieracium. Continued grazing (55, -1) is not acceptable because it is the worst of both worlds: grazing plus wildings. Finally, continued grazing with wilding management (54, -2) is least acceptable because it is incompatible with a sensitive and marginal environment."

Stakeholder 13 thus emphasises visual considerations and finds plantations on 70 per cent to be most acceptable. Continued grazing is least acceptable.

Example: Stakeholder 72, loading = 0.95, male, local business.

	54	66	62	
13	55	37	18	42

"Plantations on 70 per cent (42 , +2) is most acceptable because the image is easier on the eye and has a better appearance than bare land. Plantations on 70 per cent with wilding management (62, +1) and 15 per cent (18, +1) are both acceptable because they are an improvement on bare land, although not as vast as in image 42. Plantations on 15 per cent with wilding management (37, 0) receives a neutral score as does plantations on 15 per cent with wilding management and following cadastral borders (66,0). Continued grazing with wilding management (54, -1) is not acceptable although a certain amount is needed. Continued grazing (55, -1) is not acceptable because it looks like an accident even though

it looks better than dry barren hills. Finally, destocking with wilding management (13, -2) is least acceptable. Generally, the visual impression is important. Grazing is still needed but plantings are more pleasing on the eye while bare land is boring. "

Stakeholder 72 has responded to the visual images only and finds acceptable plantations that cover the hills. Least acceptable is destocking.

Summary: Main Features of Factor 1 (21 stakeholders)

'Plantations, Not Grazing, to Use and Improve the Land' (see Figure 2)

13 54 55 66 37 18 62 42

Stakeholders loading on Factor 1 all prefer plantation images which show a large degree of coverage of the hills. In fact the rank ordering of the images from most acceptable to least acceptable shows gradually diminishing cover of trees. Plantations are favoured because they are seen as both productive and visually attractive, with an emphasis given to the derivative significant income and employment effects and the significant soil status effects. There is no great concern over wildings: the most acceptable image shows wildings and generally the wilding management options are spread evenly across the array of images. Plantations are seen as good for the land and the people. Also emphasised is that plantations need to be managed and controlled, presumably because they are favoured for their productive uses not for their conservation values. The images that show 15 per cent cover with wilding management are not liked because they do not look good. Thus, there is a balance of productive and visual values that underlie this factor. Further, as will be noted shortly, grazing is not favoured so the plantations at 15 per cent which leave room for grazing are not really acceptable. The two grazing options are not acceptable because grazing is seen as unsustainable. However, destocking is not acceptable as an alternative to grazing because it is considered that it could lead to land degradation in a sensitive environment. Such an environment needs trees to help improve the land and to provide productive employment.

Illustrations of Negative Loadings Factor 1

This section describes the views of those who ranked the options in reverse order to the Factor 1 respondents.

Example: Stakeholder 18, loading = -0.95, male, local business.

	62	66	55	
42	18	37	54	13

"Destocking with wilding management (13, +2) is most preferred because the open tussock country is good the way it is and is typical of the area. This barren countryside is similar to Montana. Tourists find it unique and the grass changes with different light which makes it spectacular. Destocking may not be possible but it is preferred. Continued grazing with wilding management (54, +1) is acceptable, and continued grazing (55, +1) is acceptable provided the trees are not allowed to get out of hand. For all the other images the plantations are unacceptable especially at 70 per cent because it covers the whole image. Only shelterbelts have any place on the land. Even the 15 per cent options are unattractive

because they look patchy."

Stakeholder 18 finds barren countryside with minimal trees most acceptable. The familiar identity of the countryside is maintained, whereas trees threaten this ideal image. Least acceptable is plantations on 70 per cent.

Example: Stakeholder 19, loading = -0.88, female, recreation/conservation/runholder.

	18	66	37	
42	62	13	55	54

"Continued grazing with wilding management (54, +2) is most preferred because grazing provides income. Nothing grows under pines, so their presence is a threat to income. Continued grazing (55, +1) and plantations at 15 per cent with wilding management (37, +1) are only just acceptable because of their compatibility with grazing. Destocking with wilding management (13, 0) would only be acceptable in some eastern locations, where it may be required. Generally, the plantation options are unacceptable with the 70 per cent option the worst possible form. In part the objection is to the species: birches would be better."

Stakeholder 19 finds grazing for income most acceptable. Only those plantations options that allow grazing are acceptable, the rest are not. Least acceptable is plantations on 70 per cent.

Summary: Main Features of Negative Factor 1 (3 stakeholders)

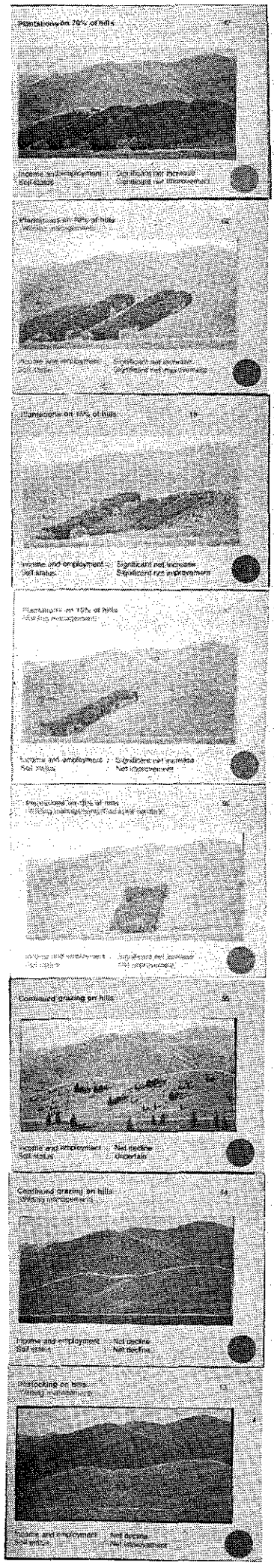
'Open Country - No Plantations' or 'Trees threaten status quo' (see Figure 2)

42 62 18 37 66 55 54 13

Stakeholders negatively loading on Factor 1 all prefer grazing or open tussock country. The motivation is slightly different for each of the cases considered. One case finds the open tussock country acceptable because it is typical of the area and is good for tourism. The other wants grazing for income and to control trees. In both cases trees are seen as a threat to the benefits of open countryside. Thus, images with considerable plantation cover are rejected strongly. In both cases there is evaluation of the images in terms of personal economies and not an assessment of the effects of land use on the study area as a whole. This factor, while a negative version of Factor 1 is not a simple opposite. Factor 1 emphasises plantations and production but the negative form, while against plantations, is still production oriented but sees this as best derived from grazing.

Figure 2

Array of Hills Factor 1 Images



3.2.2 Factor 2: 'Grazing Separate from Plantations, Wilding Management Crucial'

The second distinctive factor, or set of preferences, emphasises a combination of grazing and plantations.

Illustrations of positive loadings Factor 2

Example: Stakeholder 50, loading = 0.90, male, runholder.

	55	18	37	
13	42	54	66	62

"Plantations on 70 per cent with wilding management (62, +2) is most acceptable because it shows a reasonable amount of forestation with management and with grazing. Plantations on 15 per cent with wilding management (37, +1) and plantations on 15 per cent with wilding management and following cadastral borders (66, +1) are acceptable because they show pastoral land use and acceptable plantation form. Plantations on 15 per cent (18, 0) receives a neutral score because, while it shows trees, it has no forest management. In fact, continued grazing on hills with wilding management (54, 0) receives a neutral score also, but is preferable if there is not going to be forest management. Continued grazing (55, -1) is not acceptable because it is forestry by default. Plantations on 70 per cent (42, 1) is not acceptable. Finally, destocking with wilding management is least acceptable because it would lead to deterioration of land that has potential as good stock country. Generally, trees have to be managed wherever they are."

Stakeholder 50 finds acceptable well managed plantations that have wildings under control. Least acceptable is excessive plantations or destocking.

Example: Stakeholder 45, loading = 0.88, female, runholder.

	55	54	37	
13	18	42	66	62

"Plantations on 70 per cent with wilding management (62, +2) is most acceptable because if the area is no use to stock then the alternative is to plant it in trees. But if any area of land is for grazing it should be used for this, balanced according to each farm. Ideally, there should be pockets of trees. Plantations on 15 per cent with wilding management (37, +1) is acceptable and preferable to plantations on 15 per cent with wilding management and following cadastral borders (66, +1) because the latter is a strip that is not pleasing to the eye and should be more carefully planted such as at the end of the hill. Continued grazing with wilding management (54, 0) receives a neutral score and is all right as long as it can be grazed. Plantations on 70 per cent (42, 0) receives a neutral score because it has wildings. If the trees were managed the image would be more acceptable. Continued grazing (55, -1) and plantations on 15 per cent (18, -1) are not acceptable. Least acceptable is destocking with wilding management (13, -2. Hills might have to end up like this if nothing else is possible. Generally, trees must be managed."

Stakeholder 45 finds acceptable well managed plantations with land suitable for grazing being so used. Least acceptable is destocking.

Summary of Main Features of Factor 2 (8 stakeholders)

'Grazing Separate from Plantations, Wilding Management Crucial' (see Figure 3)

13 55 42 18 54 37 66 62

Stakeholders loading on Factor 2 see an important place for plantations alongside grazing. Trees can provide a return but management is very important. In particular wilding management is essential. The three most acceptable images show tidy, well managed plantations with clear boundaries between trees and grazing. Even the image with trees planted following cadastral borders is acceptable while for all other types this image is unappealing. Stakeholders loading on Factor 2 find this image acceptable because it recognises the practical realities of establishing plantations: sometimes they have to follow cadastral borders. Continued grazing with wilding management is acceptable but its location after the three most acceptable images is noteworthy. Grazing is an integral part of land management and is something that carries a responsibility to do correctly. However, grazing as the main land use in the past is not viable alone and needs to be worked in with forestry. The main concern with plantations is wilding spread. The Q sort for Factor 2 has all but one image with wilding management located at the acceptable end of the distribution. (The exception, destocking with wilding management, is not acceptable because of the destocking). Control of wildings is thus fundamental to this factor. Control means that grazing can be integrated into land management. Grazing among wildings (image 55) is not acceptable, as no advantages from wilding trees in this setting can be seen. Thus, grazing and plantations are seen as separate activities. Destocking is least acceptable: it provides no solution and will still lead to problems.

Illustrations of Negative Loadings Factor 2

Example: Stakeholder 11, loading = -0.87, male, service provider.

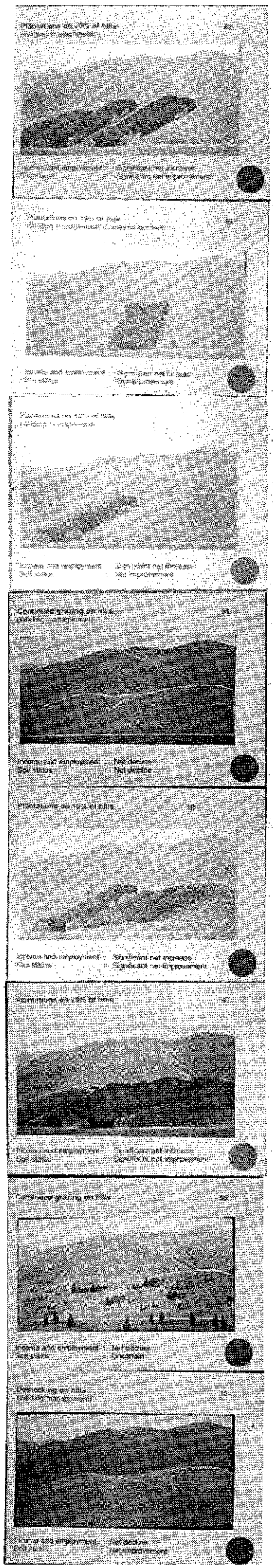
	62	54	42	
66	37	18	55	13

"Destocking with wilding management (13, +2) is most acceptable because it is aesthetic and shows tussocks which should be restored. Plantations on 70 per cent (42, +1) is acceptable and would be promoted more if it was not over the whole area. Continued grazing (55, +1) is acceptable. Continued grazing with wilding management (54, 0) receives a neutral score but is aesthetic. Plantations on 15 per cent receives a neutral score. Plantations on 70 per cent with wilding management (62, -1) is not acceptable because it does not look large enough. Plantations on 15 per cent with wilding management (37, -1) is not acceptable. Finally, plantations on 15 per cent with wilding management and following cadastral borders (66, -2) is least acceptable because it does not look natural. Generally, it is important to retain the wide, scenic feel of the hills and not cover them with strips."

Stakeholder 11 finds the view of ungrazed tussock most acceptable, and also finds acceptable hills well covered in plantations. Least acceptable is any plantation that looks unnatural.

Figure 3

Array of Hills Factor 2 Images



Example: Stakeholder 66, loading = -0.82, male, recreation/conservation.

	62	54	55	
66	37	13	18	42

"Plantations on 70 per cent (42, +2) is most acceptable because it is the best future and there is vegetation to compete with rabbits and hieracium. Trees should be grown as a crop but with some other trees for autumn colours and to give a good range and create a sculptural effect so that we can see a change. Continued grazing (55, +1) is acceptable because it shows wilding spread which with larch and other trees can look quite effective and give good seasonal effects and work well optically. Plantations on 15 per cent (18, +1) is acceptable because the mixture of wildings plus plantations gives a mixture of colours shapes and forms. Continued grazing with wilding management (54, 0) and destocking with wilding management (13, 0) receive a neutral score because they show the classic Mackenzie image of golden rolling hills which will never occur again. Finally, the three remaining images showing plantations with wilding management (62, -1; 37, -1; 66, -2) are not acceptable because they show ugly swathes which have little sympathy with the landscape. The blocks stand out a lot. More species are needed and to be planted in shapes other than square blocks. The Savannah effect, with stock underneath and a range of species, would be good."

Stakeholder 66 finds larger plantations and continued grazing (with wildings) acceptable, especially if they have a number of species to provide a variety of colours and forms. Least acceptable are smaller plantations that offend the landscape.

Summary of Main Features Negative Factor 2 (3 stakeholders)

"Open Views and Naturalistic Plantations" (see Figure 3)

62	66	37	54	18	42	55	13

Stakeholders loading negatively on Factor 2 are responding to aesthetic qualities of the landscape based upon open views and naturalistic plantations. The plantations must be of large scale, preferably comprising diverse species, and cover the land form in a way that looks natural. Compared to Factor 2, these stakeholders like wildings because they look better than the controlled, managed appearance of plantations with wilding management. Plantations with wilding management are objected to because they look artificial. There is an interest in grazing but the precise way it is meant to occur is quite different from that of positive Factor 2. There, grazing is an adjunct to well managed plantations and useful for controlling wildings: for Negative Factor 2 grazing is part of managing the open views.

3.2.3 Factor 3: 'Little or No Grazing, Smaller Plantations, Concern with Wildings'

The third factor is more oriented towards conservation concerns.

Example: Stakeholder 32, loading = 0.95, female, service provider.

	55	62	13	
54	42	18	66	37

"Plantations on 15 per cent with wilding management (37, +2) is most acceptable because it is managed. Destocking on hills with wilding management (13, +1) is acceptable because animals should not be up on the hills, although that does not mean that they should be bare: the first stage is to destock then have managed planting. Plantations on 15 per cent of hills with wilding management, and following cadastral borders (66, +1) is acceptable because there are not too many trees. Plantations on 15 per cent of hills without wilding management (18, 0) is less preferable because pines are taking over the land. Plantations on 70 per cent with wilding management (62, 0) is not too bad because the hills are a bad (sic) place for trees. They can help with erosion, and with wilding management the trees will not crowd everything out. Management will confine trees to the area. Plantations on 70 per cent (42, -1) is not acceptable because it shows wilding spread with nobody doing anything about it. Control of wildings is the responsibility of the land owner. Eventually trees will cover nearly all the area. Continued grazing (55, -1) is not acceptable because there is no wilding management. Finally, continued grazing with wilding management (54, -2) is least acceptable because grazing should not extend up to the hills. Farmers are greedy going this far and there is risk of snow."

Stakeholder 32 finds modest plantations and destocking most acceptable because in her view the hills are not the place for sheep. There is concern about wildings taking over the land. Least acceptable is continued grazing.

Example: Stakeholder 65, loading = 0.88, male, service provider.

	18	62	13	
54	55	42	66	37

"Plantations on 15 per cent with wilding management (37, +2) is most acceptable although slightly more forestry (say 25 per cent) would be preferred (like native forest). The block of trees does not go with landscape. Destocking with wilding management (13, +1) is acceptable because it is good to keep natural tussock areas as part of our heritage, even if this may be living in a dream world. We have chopped out forests in New Zealand and burnt out tussocks. Plantations on 15 per cent with wilding management and following cadastral borders (66, +1) is acceptable. Plantations on 70 per cent with wilding management (62, 0) receives a neutral score. Plantations on 70 per cent without wilding management (42, 0) receives a neutral score because the forestry area to be covered is too large, although complete cover in this image is appreciated. These plantations on 25 per cent of hills would be acceptable. Plantations on 15 per cent (18, -1) is not acceptable because there are wildings and these need to be managed for best economic returns otherwise there is no point in having plantations. Continued grazing (55, -1) is not acceptable. Finally, continued grazing with wilding management (54, -2) is least acceptable. Farmers are trying to make ends meet in a difficult climate where tussocks should not be burnt off anyway. Generally, there is a need for a mixture of forestry and stock, with grazing on the more productive land rather than 70 per cent plantations. It is important not to create another problem with wildings. Conifers may cloud the atmosphere and remove clear skies which would be bad for tourism."

Stakeholder 65 finds most acceptable modest plantations between 15 per cent and 70 per cent along with destocking, if possible, in some areas. Least acceptable is continued grazing, although it is acceptable on the better quality land.

Summary of Main Features Factor 3 (6 stakeholders)

'Little or No Grazing, Smaller Plantations, Concern with Wildings' (see Figure 4)

54 55 42 62 18 66 13 37

Stakeholders loading positively on factor 3 are keen to have some plantations on the hills as an alternative to grazing. Smaller plantations with wilding management are acceptable. There is concern about grazing and destocking is acceptable. In one case there is categorical rejection of grazing and in the other acceptance of grazing only on better land. These stakeholders are reacting to past land uses and want to see changes. However their affinity for plantations is limited and they do not want to see the hills completely covered in trees. They value the tussock landscape but the value seems to be in conservation terms rather than aesthetic terms. There were few references to visual appreciation of the landscape. Further, they are concerned about wildings because these would jeopardise their preference for tussock. The three most acceptable images have wilding management. No reference is made to production from plantations or to maximising land use because the key criterion is conservation. Plantations are acceptable but not the end of land use in itself.

Illustrations of Negative Loadings Factor 3

Example: Stakeholder 44, loading = -0.94, male, runholder.

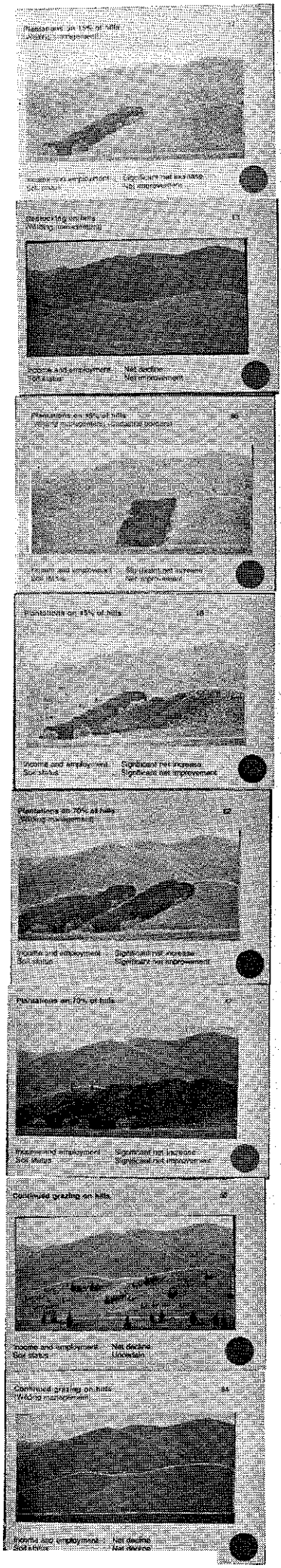
	37	62	54	
13	66	18	42	55

"Continued grazing (55, +2) is most acceptable provided the wildings are of good quality and type and are not too thick. This land can be grazed and the trees provide shelter. Generally, this is what is going to happen without anybody doing anything. Continued grazing with wilding management (54, +1) is acceptable and typifies current use of land as a grazier. Plantations on 70 per cent (42, +1) is acceptable and wildings are all right provided they are contained in the area and the trees are good for timber (e.g., Douglas Fir compared with contorta). Plantations on 15 per cent (18, 0) and 70 per cent with wilding management (62, 0) are more acceptable than smaller plantations because the former is a larger group of trees. Plantations on 15 per cent with wilding management (37, -1) is not acceptable as is plantations on 15 per cent with wilding management and following cadastral borders (66, -1) because the plantations look out of place when they are clumped in blocks. Trees should be along a slope not straight up. Finally, destocking with wilding management (13, -2) is least acceptable because destocking does not achieve anything. The land does not look after itself."

Stakeholder 44 is a grazier who finds most acceptable continued grazing. This land use is compatible with forestry which should correspond to the land form . Wilding control is not a significant issue. Least acceptable is destocking.

Figure 4

Array of Hills Factor 3 Images



Example: Stakeholder 60, loading = -0.88, male, politician.

	66	18	54	
13	37	62	42	55

"Continued grazing without wilding management (55, +2) is most acceptable because wilding trees can be a resource and look pleasing to the eye. Continued grazing with wilding management (54, +1) is acceptable and the grazing regime has to be well managed including rabbits. Trees combine with sheep as the resource to control wildings. Plantation on 70 per cent (42, +1) is acceptable because if there is going to be forestry then it is best to do it completely. Plantations on 15 per cent (18, 0) and plantations on 70 per cent with wilding management (62, 0) receive a neutral score. Plantations on 15 per cent with wilding management and following cadastral borders (66, -1) and plantations on 15 per cent with wilding management (37, -1) are not acceptable because they do not look right and do not fit in. Finally, destocking with wilding management (+13, -2) is least acceptable because it is not necessary to lock up high altitude country. Managed correctly it is a resource to be used."

Stakeholder 60 finds most acceptable grazing with some plantations. Least acceptable is destocking.

Summary of Main Features Negative Factor 3 (3 stakeholders)

'Grazing, Larger Plantations, Wildings Tolerable' (see Figure 4)

37	13	66	18	62	42	55	54

Stakeholders loading negatively on Factor 3 emphasise grazing and see this as working in with scattered wildings which are a resource that can improve the soil and provide shade and shelter for stock. While their first preference is for grazing and some trees as wildings they find acceptable larger plantations because they look better than the 15 per cent options, which are out of place, stripy or do not fit in. These stakeholders accept that plantations can be productive and have no real concern about wildings. The main orientation is towards grazing, and trees are accepted with wildings being controlled by grazing. Compared to Factor 3, these stakeholders are simply the opposite: they like grazing, are not concerned with wildings, and find larger plantations acceptable.

3.2.4 Factor 4: 'Grazing or Open Views and Well Managed Larger Plantations'

The final factor for the hills emphasises managed and productive land uses whilst recognising existing landscape values.

Illustrations of Positive Loadings Factor 4

Example: Stakeholder 8, loading = 0.91, female, runholder.

	18	37	13	
55	66	62	42	54

"Continued grazing with wilding management (54, +2) is most acceptable because it is aesthetically pleasing and managed. Destocking with wilding management (13, +1) is acceptable because it looks good but it would be preferable for it to be managed. Plantations on 70 per cent (42, +1) is acceptable because if there are going to be trees they might as well be in larger form. Plantations on 15 per cent with wilding management (37, 0) receives a neutral score but is tidy and managed. Plantations on 70 per cent with wilding management (62, 0) receives a neutral score for while there is shelter there are too many trees for stock. Plantations on 15 per cent (18, -1) is not acceptable because, although visually acceptable, the wildings are not. Plantations on 15 per cent with wilding management and following cadastral borders (66, -1) is not acceptable because of its visual appearance. Finally, continued grazing (55, -2) is least acceptable because wilding spread will worsen. Generally, wilding spread is not good."

Stakeholder 8 finds most acceptable continued grazing with wilding management. Visual aspects are important. Least acceptable is continued grazing (without wilding management).

Example: Stakeholder 28, loading = 0.92, male, politician.

	18	42	54	
55	66	37	62	13

"Destocking with wilding management (13, +2) is most acceptable although it is an ideal - a pipe dream. However, it can be economic and we need people on land. Continued grazing with wilding management (54, +1) is acceptable as an option and is the way the land would go if managed. Plantations on 70 per cent with wilding management (62, +1) is what we are going to see with a variety of species planted to fit landscape guidelines. Plantations on 70 per cent (42, 0) is somewhat acceptable because the edge planting breaks it up a bit. It is better to have larger areas than little sporadic bits of trees all over the place. Plantations on 15 per cent with wilding management (37, 0) has a neutral score. Plantations on 15 per cent (18, -1) is not acceptable because there are many wildings and it would be preferable to see the trees following contours and natural boundaries. Plantations on 15 per cent with wilding management and following cadastral borders (66, -1) is a 'blot on the landscape'. Finally, continued grazing (55, -2) is least acceptable because it lacks management. What is needed is a decent management scheme to make it productive so the farmer has a role and can pay rates. Generally, I hate wilding spread and plantations are acceptable in certain areas. Large tracts of land as reserves should be set aside and managed by farmers not government."

Stakeholder 28 finds managed grazing or destocking most acceptable but accepts forestry in certain areas provided the trees are planted to follow contours in certain areas. Least acceptable is continued grazing with its attendant unmanaged wildings.

Summary of Main Features Factor 4 (5 stakeholders)

'Grazing or Open Views and Aesthetic Larger Plantations' (see Figure 5)

55 66 37 18 62 42 54 13

Stakeholders loading on Factor 4 like the open countryside shown in the two images that have no trees. It does not matter whether it is destocking or continued grazing that is the land use to achieve this view. Appearance is important so that larger plantations are acceptable because they cover the land form naturally. Mature wildings pose no problems because they look good but younger, scattered wildings do not look so good and the image with these is not acceptable. There is a visual objection to wildings rather than a management objection because where wildings fill the landscape in an aesthetically appealing way they are acceptable. Further, straight lines and scattered wildings are not acceptable because they detract from the visual effect. Factor 4 has some parallels with Factor 1 in that the images with plantations are ranked in the same order which shows larger areas of plantations as more acceptable. The difference in the order of images is that Factor 4 has the two treeless images (13 and 54) as more acceptable than plantations while Factor 1 has the two treeless images as not acceptable.

Illustration of Negative Loadings Factor 4

Example: Stakeholder 20, loading = -0.95, male, runholder.

	42	62	66	
13	54	18	37	55

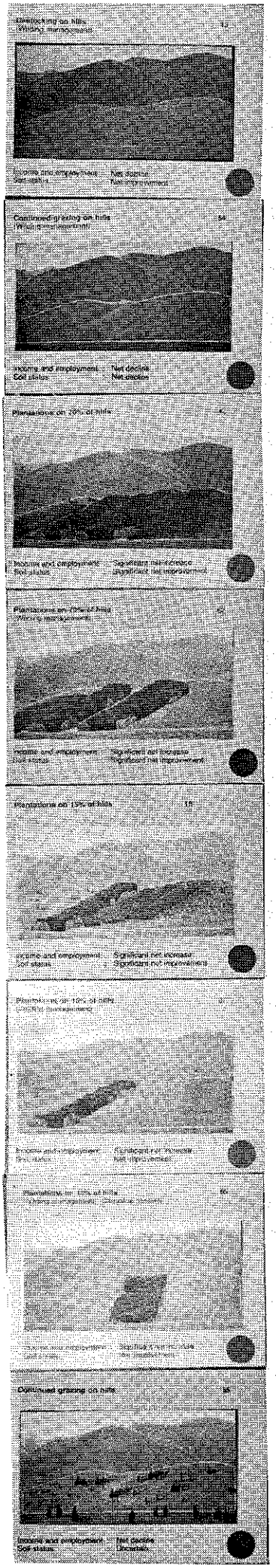
"Continued grazing (55, +2) is most acceptable because it shows a landscape with dotted trees much like a savannah. This is conservation forestry well suited to the dry Mackenzie hills. It can be developed with a mixture of species (e.g., Spanish oak, mountain mahogany, hickory, some pine, macrocarpa and oregon). These species can break up the environment to allow other species to grow. This system represents control with stocking and management. Plantations on 15 per cent with wilding management and following cadastral borders (66, +1) is acceptable on sloping ground, especially with Oregon on slopes greater than five degrees. Plantations on 15 per cent of hills with wilding management (37, +1) is acceptable. Plantations on 70 per cent with wilding management (62, 0) is only acceptable if located where there is sufficient rainfall, but where there is low rainfall it is unacceptable. Plantations on 15 per cent (18, 0) is not really acceptable because of the problem of wildings. It is a worry to know how to stop them. Plantations on 70 per cent (42, -1) is not acceptable because it is too much production forestry for this sort of country. Continued grazing with wilding management (54, -1) is one way to control wildings but really this needs scrubby plants like sweet briar (without prickles), and mountain mahogany. These would be suitable in hieracium areas.

Finally, destocking on hills with wilding management (13, -2) is least acceptable because it would take away the productive base to manage the land and raises the question of who would provide the management. Generally, wildings cannot be controlled, wilding control will not happen when areas are destocked, and further, the area is not close enough to ports or markets to have viable production forestry. The need is for trees and shrubs for protective planting."

Stakeholder 20 finds protection forestry using diverse species in a savannah style of management acceptable. Least acceptable is destocking because that removes the productive base.

Figure 5

Array of Hills Factor 4 Images



Example: Stakeholder 52, loading = -0.84, female, service provider.

	42	62	55	
13	54	18	66	37

"Plantations on 15 per cent (37, +2) with wilding management is most acceptable because there has got to be some trees for the ozone problem and to lift the wind. Continued grazing (55, +1) is acceptable although with wilding spread this scene will look like image 42 where trees and wildings cover the hill. Plantations with wilding management and following cadastral borders (66, +1) is acceptable. Plantations on 70 per cent with wilding management (62, 0) has a neutral score but really it is not acceptable because it has too much forestry, and similarly plantations on 15 per cent (18, 0) and plantations on 70 per cent (42, -1) are not acceptable because there is too much forestry or too much wilding spread. It is likely that wildings will cover everything. Continued grazing (54, +1) with wilding management is not acceptable because it has no trees. Finally, destocking with wilding management (13, -2) is least acceptable because the land has to have stock. Generally, grazing is essential provided something can be done about rabbits and hieracium; if these problems can not be solved then forestry is better (although there may be risks to trees from snow). Grazing is the preferred land use with some afforestation."

Stakeholder 52 finds most acceptable grazing with some trees for environmental protection. Wilding spread is a problem. Least acceptable is destocking and grazing without trees.

Summary of Main Features Negative Factor 4 (2 stakeholders) (see Figure 5)

'Grazing and Modest Protection Forestry'

13 54 42 62 18 37 66 55

Subjects loading negatively on Factor 4 see the ideal land use as a balance of grazing with trees. Fundamentally, trees provide conservation and protection benefits to the land and are essential for the environment. However, there are no commercial benefits from trees hence larger plantations are excessive. The land is too dry for commercial production. Grazing is an essential part of land use with trees. There is some concern over wilding spread. Generally, the array of images shows the most acceptable as continued grazing with scattered trees and then a graduation of increasing plantation cover finishing with the open land uses of continued grazing (with wilding management) and destocking. Grazing is compatible with protection forestry and it is this environmental requirement which is significant, not the aesthetic. These stakeholders are similar to those loading on Factor 4 because they favour grazing and are sceptical about forestry returns. Neither type of stakeholder mentioned income and employment from trees. Negative loading stakeholders emphasise protection forestry in modest proportions while positive loading stakeholders emphasise aesthetic plantations over larger areas.

3.2.5 Distinguishing Characteristics of Each Factor

The essential characteristics of the four hills factors can be summarised. Table 4 shows each of the four factors along with six main criteria which were identified in the interpretations derived from the stakeholders who loaded highly on each factor. The table shows which of

the main criteria are relevant to a factor.

Table 4
Main Criteria for Each of the Hills Factors

Factor	Conservation	Grazing	Plantations		Wilding Management	Visual Aspects	Production
			Small	Large			
1				X			X
2		X		X	X		X
3	X		X		X		
4		X		X		X	

Factor 1: 'Plantations, Not Grazing, to Use and Improve the Land'
Factor 2: 'Grazing Separate from Plantations, Wilding Management Crucial'
Factor 3: 'Little or No Grazing, Smaller Plantations, Concern with Wildings'
Factor 4: 'Grazing on Open Views and Well Managed Larger Plantations'

It is also possible to illustrate the distinguishing characteristics for each positive factor by comparing the scores of key images. Table 5 shows the Z scores for all statements which are significantly different at the 0.01 level when compared to all other factors. In effect this shows the relative weighting for each image in respect to each factor. The asterisk shows which images are sufficiently significant to act as a distinguishing image for that factor. These data are derived from the comparison of factors, not from the Q sorts of selected stakeholders as above, and thus form an alternative approach to characterising the factors. Note that these factors relate only to this land form.

Table 5
Distinguishing Images for the Hills Factors

		Factors			
		1	2	3	4
18.	Plantations on 15 per cent	0.7*	-0.4	0.0	-0.5*
37.	Plantations on 15 per cent (wilding management)	0.0*	0.9	1.4	-0.5
42.	Plantations on 70 per cent	1.4*	-0.7	-0.7	0.6*
54.	Continued grazing (wilding management)	-1.2	0.1*	-1.4	1.2*
66.	Plantations on 15 per cent (wilding management, cadastral borders)	-0.1*	1.0	0.7	-0.8*

The table shows four images as distinguishing images for Factor 1, four for Factor 4, one for Factor 2, and none for Factor 3.

Plantations on 15 per cent (18) is acceptable to Factor 1 because it shows good coverage of the area in trees, is not acceptable to Factor 2 because it shows wildings, is neutral to Factor 3 because it is of larger size even though a 15 per cent option, and not acceptable to Factor 4 because it is neither an open view nor an aesthetic, larger plantation. Plantations on 15 per cent with wilding management (37) and plantations on 15 per cent with wilding management and following cadastral borders (66) both show a similar pattern. They are neutral to Factor 1 because the plantation is small and shows considerable grazing, are acceptable to Factor 2 because wildings are controlled and they have grazing, are acceptable to Factor 3 because they have smaller plantations with wildings controlled, and not acceptable to Factor 4 because they have neither open views or larger plantations. Plantations on 70 per cent (42) is most acceptable to Factor 1 because it shows larger plantations without grazing, is not acceptable to Factor 2 because there are wildings and grazing is seen as excluded, is not acceptable to Factor 3 because it shows larger plantations and wildings, and is acceptable to Factor 4 who prefers larger plantations and will manage these and wildings along with grazing or open views. Continued grazing with wilding management (54) is not acceptable to Factor 1 because plantations are the best land use for hills, is near to neutral for Factor 2 because it shows no plantations at all and Factor 2 finds acceptable grazing and plantations as separate activities, is not acceptable to Factor 3 because little or no grazing is acceptable, and is acceptable to Factor 4 because it is an open view. There are no distinguishing images for Factor 3.

The data in Table 5 can also be analysed by factor, rather than by statement as in the above paragraph, to highlight key features of each factor. Factor 1 has a high score for plantations on 70 per cent (42) because the larger plantation, including wildings, appeals. The lowest score is for continued grazing with wilding management (54). Factor 2 has the highest score for plantations on 15 per cent with wilding management and following cadastral borders (66) because even though this image is not aesthetically appealing the priority is managing wildings. Plantations on 70 per cent has the lowest score because it shows too much plantation and too many wildings. Factor 3 has the highest score for plantations on 15 per cent with wilding management (37) because it is a smaller plantation with managed wildings. Unlike Factor 2, Factor 3 has its lowest score for continued grazing with wilding management (54) because little or no grazing is preferred. Factor 4 is quite the opposite rating this image (54) with the highest score because grazing and open views are most acceptable. The lowest score is for plantations on 15 per cent with wilding management and following cadastral borders (66) because this plantation is too small and not aesthetic.

3.3 Lower Slopes

Of the 77 stakeholders there were 63 who loaded significantly onto a factor in the lower slopes Q sort (see Table 6). The standard error for ten images is 0.62 at the 0.05 level. There were four factors and on only Factor 2 was there more than two significant loadings. Because this negative factor is a minor element of the lower slopes Q sort it is omitted from this analysis.

Table 6
Distribution of Significant Loadings for Lower Slopes Q Sort

	Factors				
	1	2	3	4	
Significant loadings:					
Positive	21	20	10	7	58
Negative	1	3	1	0	5
Subtotal	23	23	11	7	63
			Non significant loadings		14
				TOTAL	77

3.3.1 Factor 1: 'Grazing, Trees for Shelter, Wilding Management Crucial'

Illustrations of Positive Loadings Factor 1

Example: Stakeholder 45, loading = 0.96, female, runholder.
(Hills Factor 2, loading = 0.88)

	57	38	70	47	
7	29	63	56	50	34

"Shelterbelts and improved pasture on 70 per cent with wilding management (34, +3) is most acceptable because shelter is essential and provides possibilities for the future. It is best to farm the land, even with vineyards or roses, but shelter is essential even for haymaking. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (47, +2), and shelterbelts and improved pasture on 15 per cent with wilding management (50, +2) are both acceptable for the same reasons. Plantations on 15 per cent with wilding management (70, +1) are slightly acceptable because it may be acceptable in the right places but is no good for making hay. Continued grazing with wilding management (56, +1) is slightly acceptable because it may be an option if people cannot afford trees. Plantations on 70 per cent with wilding management (63, -1) is not really acceptable because plantations should be on other areas of land without blotting out the skyline. In some areas plantations are essential and are the best investment. Plantations on 70 per cent (38, -1) is not really acceptable, and continued grazing (57, -2) and plantations on 15 per cent (29, -2) are not acceptable because wildings have to be kept under control. If you cannot keep them under control you should not be farming. Finally, destocking on lower slopes with wilding management (7, -3) is least acceptable because it is the last resort: one may as well quit. It is better to put a major effort into planting. Generally, lower slopes should be used for farming not just planted out in trees. Planting is expensive so it is better to keep farming and, if possible, to combine shelterbelts with farming."

Stakeholder 45 finds most acceptable shelterbelts or agroforestry (woodlots) and improved pasture. Larger plantations are not acceptable and destocking is least acceptable. Control of wildings is important.

Example: Stakeholder 56, loading = 0.96, male, runholder (manager).
(Hills Factor 2, loading = 0.79)

	57	38	56	50	
7	29	63	70	47	34

Shelterbelts and improved pasture on 70 per cent with wilding management (34, +3) is most acceptable because it is an excellent land use (shelter) that all farmers should be headed towards. Shelterbelts and improved pasture on 15 per cent with wilding management (50, +2) and agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (47, +2) are both acceptable. Continued grazing with wilding management (56, +1) is slightly acceptable (continued grazing requires inputs of fertiliser) and plantations on 15 per cent with wilding management (70, +1) is slightly acceptable. Plantations on 70 per cent (38, -1) and plantations on 70 per cent with wilding management (63, -1) are not really acceptable because lower slopes should not have plantation forestry. For the same reason plantations on 15 per cent (29, -2) is not acceptable. Continued grazing (57, -1) is not acceptable because the country is too good to let wilding trees get away. Finally, destocking with wilding management is least acceptable because the lower slopes should be kept for grazing as it is often the best stock grazing country. Generally, the land use emphasis is on good stock management with trees to add shelter. Trees look all right and there is economic return. Fertiliser application is important to maintain grazing land and economic pressure is the only reason for stopping application. Sheep farming is in the bottom of a trough right now."

Stakeholder 56 finds most acceptable grazing with shelterbelts or agroforestry (woodlots) that give shelter to pasture. Least acceptable is destocking and wildings need to be controlled.

Example: Stakeholder 44, loading = 0.93, male, runholder.
(Hills Negative Factor 3, loading = -0.94)

	38	29	70	47	
7	57	63	50	34	56

"Continued grazing with wilding management (56, +3) is most acceptable because grazing dictates what happens to farmers and at present it is an awkward situation with low wool prices. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding control (47, +2) is acceptable because it is better than plantations at 15 per cent because it is better utilisation of the country. Shelterbelts and improved pasture on 70 per cent with wilding management (34, +2) is acceptable. Plantations on 15 per cent with wilding management (70, +1) is quite acceptable and shelterbelts and improved pasture on 15 per cent with wilding management (50, +1) is slightly acceptable because it is possible to do better than this on lower slopes. Plantations on 15 per cent (29, -1) is not really acceptable because the wildings need to be removed. Plantations on 70 per cent with wilding management (73, -1) has a bit too much of the plantations. Plantations on 70 per cent (38, -2) is not acceptable because it has far too much forest. Continued grazing (57, -2) is not acceptable because

wilding trees need to be controlled on these slopes. Finally, destocking with wilding management (7, -3) is least acceptable because it is not an option. The land takes a lot of looking after."

Stakeholder 44 finds acceptable continued grazing with wilding management, but not plantations or grazing without wilding management.

Summary of Main Features Factor 1 (23 stakeholders)

'Grazing, Trees for Shelter, Wilding Management Crucial' (see Figure 6)

7 57 29 38 63 56 70 50 47 34

Factor 1 represents the view of stakeholders who emphasise grazing on lower slopes. Trees have an important role as an adjunct to grazing by providing shelter with either shelterbelts or agroforestry woodlots, which at 15 per cent are small and serve as shelterbelts. Their enthusiasm for shelterbelts means that the 70 per cent option is chosen as most acceptable. These options are all more acceptable than continued grazing with wilding management which has no trees at all. Plantations, with wilding management, are not really favoured. The 15 per cent option is slightly acceptable because it is a small area. However, the 70 per cent options are seen as excessive and these are all not acceptable. Plantations are valued for shelter for grazing and little reference is made to timber values. Wilding management is a major issue for these stakeholders because it jeopardises their grazing. The plantation options and continued grazing which do not have wilding management are all not acceptable. All the options that are acceptable have wilding management except for destocking with wilding management which is least acceptable because grazing is seen as the best land use for lower slopes. Factor 1 for lower slopes corresponds directly with Factor 2 for hills.

3.3.2 Factor 2: Plantations or Shelterbelts and Improved Pasture to Use the Land

Illustrations of Positive Loadings Factor 2

Example: Stakeholder 12, loading = 0.96, male, runholder.
(Hills Factor 1, loading = 0.95)

	7	70	47	63	
56	57	50	29	34	38

"Plantations on 70 per cent (38, +3) is most acceptable because it is visually appealing and both income and employment and soil status have significant increases. This land use is what we should aim for. Wildings are all right because they improve the soil and because currently there is a world shortage of timber. Thus, wildings are an advantage, even on hills. Plantations on 70 per cent with wilding management (63, +2) is acceptable and is more appealing than shelterbelts and improved pasture on 70 per cent with wilding management (34, +2) which however produces the ultimate in shelter and reduces evapotranspiration rates of pasture. The result is good pasture and good shelter. Both 63 and 34 have significant gains for income and employment, and for soil status. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (47, +1) is slightly acceptable but it covers a relatively small area of the landscape and does not fit in

so well. Plantations on 15 per cent (29, +1) is slightly acceptable because it is appealing but the considerable wilding spread could lead to economic problems. There are significant gains in the estimated effects. Plantations on 15 per cent with wilding management (70, -1) and shelterbelts and improved pasture on 15 per cent with wilding management (50, -1) are both not so acceptable. They are small areas on a wider landscape and are less appealing. Destocking with wilding management (7, -2) is not acceptable. Although the wilding management is effective it is not practical. Continued grazing (57, -2) is not acceptable. Finally, continued grazing with wilding management (56, -3) is least acceptable because there is net decline in employment and the soil decline means that it is unsustainable."

Stakeholder 12 has responded to images and effects and finds most acceptable large plantations and shelterbelts with improved pasture. Wildings are seen as a benefit. Least acceptable is continued grazing or destocking.

Example: Stakeholder 54, loading = 0.92, male, runholder.
(Hills Factor 1, loading = 0.86)

	56	47	63	38	
7	57	70	50	29	34

"Shelterbelts and improved pasture on 70 per cent with wilding management (34, +3) is most acceptable because of the improved pasture. Grazing paddocks are still needed to complement the rest of the landscape. Plantations on 70 per cent (38, +2) is acceptable because it is doing something with the land. Plantations on 15 per cent (29, +2) is acceptable because it is realistic and there is no cost for wilding control. The idea is to plant and prune trees on the better soils, that is on the lower slopes. Here there is available moisture to shorten the rotation time. The wilding spread up onto the hills is all right: there is relatively low rainfall on hills so the trees are a bonus. Plantations on 70 per cent with wilding management (63, +1) is slightly acceptable because while it is 70 per cent it also has wilding control which is not wanted. Shelterbelts and improved pasture on 15 per cent with wilding control (50, +1) is slightly acceptable: at least there is improved pasture. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (47, -1) is not really acceptable. It is nearly the status quo and is not doing much, and there is very little improved pasture. Plantations on 15 per cent with wilding management (70, -1) is not really acceptable because forestry is only on 15 per cent of the slopes. Continued grazing with wilding management (56, -2) is not acceptable because it is not sustainable and does not produce much foreign exchange. Continued grazing (57, -2) is not acceptable because you are not putting anything in to the land you are just getting what you can from the land. Finally, destocking with wilding management (7, -3) is least acceptable because it is not an option. Generally, the lower slopes have the best soil and best climate and production can be twice as good. They are the first sites to have grass growth in the spring. Lower slopes should not be preserved solely for pasture and should have more plantations. Further, wilding management will hamstring forestry in the high country unless use a tree which does not produce seed."

Stakeholder 54 is a runholder who is enthusiastic about forestry production although sees a place for some grazing. Forestry is economically viable and needs to be in larger plantations. Least acceptable are destocking and continued grazing. Wildings are a virtue.

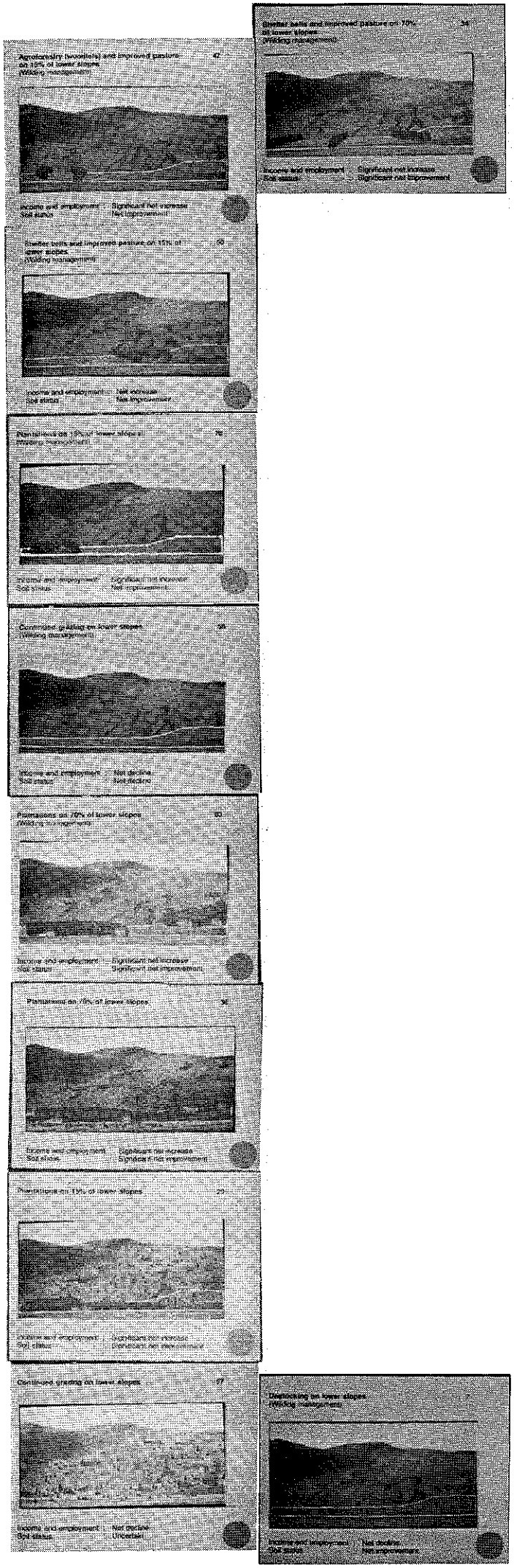


Figure 6

Array of Lower Slopes Factor 1 Images

Example: Stakeholder 68, loading = 0.92, male, statutory advisor.
(Hills Factor 3, loading = 0.83)

	57	7	63	38	
56	70	50	47	29	34

"Shelterbelts and improved pasture on 70 per cent (34, +3) is most acceptable because it reflects an agricultural background where pasture is the prime option and trees are in shelter belts. Plantations on 70 per cent (38, +2) and on 15 per cent (29, +2) are acceptable because it is making a positive thing of forestry and taking it seriously. Plantations on 70 per cent with wilding management (63, +1) is slightly acceptable because it has no wildings to give a mellowing effect. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (47, +1) is slightly acceptable. Destocking on lower slopes with wilding management (7, -1) is not really acceptable because of its visual effects. Shelterbelts and improved pasture on 15 per cent with wilding management (50, -1) is not really acceptable because it looks like a job half done. Continued grazing (57, -2) is not acceptable because it slows the early stages of isolated trees. Plantations on 15 per cent with wilding management (70, -2) is not acceptable because it is like a pocket handkerchief in the middle of nowhere. Finally, continued grazing with wilding management (56, -3) is not acceptable because it looks offensive."

Stakeholder 68 finds acceptable grazing with shelterbelts and larger plantations with wilding spread. Less acceptable are smaller plantations that look out of place. Least acceptable is continued grazing. The visual appearance is important in the evaluation of land use.

Summary of Main Features Factor 2 (17 stakeholders)

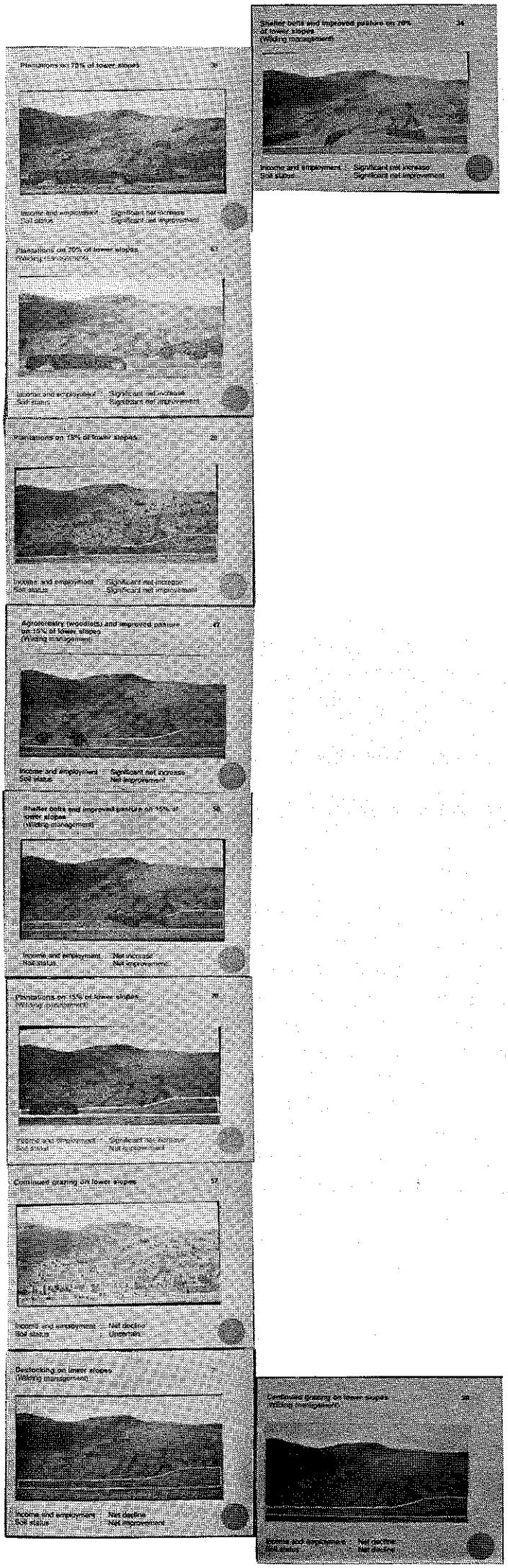
'Plantations or Shelterbelts and Improved Pasture to Use the Land' (see Figure 7)

56 7 57 70 50 47 29 63 38 34

Stakeholders loading positively on Factor 2 favour shelterbelts or plantations on lower slopes. They are enthusiastic about forestry either because it looks good or is judged to be a more economic land use compared to grazing. Grazing is acceptable only when it occurs with shelterbelts and improved pasture. Continued grazing in the traditional way is rejected. The acceptability of plantations is linked to acceptability of wilding spread. These are seen as a better land use or as a better visual appearance rather than as a problem to be controlled. In fact, for one runholder, control of wildings is seen as a threat to forestry. Because of the enthusiasm for plantations the smaller options are not favoured. Agroforestry(woodlots) and improved pasture that are 15 per cent options are not large enough and do not appeal because there are not enough trees. Destocking and continued grazing are least acceptable because they do not use or improve the land. Generally, Factor 1 represents a production orientation where trees are valued, and grazing is acceptable provided it is with improved pasture. Factor 2 for the lower slopes corresponds with Factor 1 for hills.

Figure 7

Array of Lower Slopes Factor 2 Images



3.3.3 Factor 3: Conservation With Some Plantations and Control of Wildings

Illustrations of Positive Loadings Factor 3

Example: Stakeholder 4, loading = 0.94 male, service provider.
(Hills factor, no loading)

	56	38	34	7	
57	29	50	47	70	63

"Plantations on 70 per cent with wilding management (63, +3) is most acceptable even though it is a compromise between the open views and positive income and employment effects. It is not critical to have hillsides free of trees. Destocking with wilding management (7, +2) is acceptable because the open landscape has appeal. Plantations on 15 per cent with wilding management (70, +2) is acceptable because the edges are softened. Shelterbelts and improved pasture on 70 per cent with wilding management (34, +1) is slightly acceptable. It is seen in the Mackenzie now and is not as preferable as agroforestry (woodlots) and improved pasture with wilding management (47, +1) which, although it has straight lines gives benefits and is bulkier than shelterbelts. Plantation on 70 per cent (38, -1) and shelterbelts and improved pasture on 15 per cent with wilding management (50, -1) are not really acceptable, the latter shows straight lines. Continued grazing with wilding management (56, -2) is not acceptable because it continues the status quo and soil status declines. Plantations on 15 per cent (29, -2) is not acceptable because the wilding pines look scruffy. Finally, continued grazing (57, -3) is least acceptable because of the wilding pines which give no benefit and because the land will change swiftly. Generally, forestry is developing on hill slopes already so it is acceptable and provides opportunity for income and the soil status can improve."

Stakeholder 4 has responded to the effects and likes open views but accepts plantations because they have positive effects. Visual appearance is important in ranking the images. Little reference is made to grazing. Least acceptable is wilding spread because of its appearance.

Example: Stakeholder 28, loading = 0.91, male, politician.
(Hills factor 4, loading = 0.91)

	38	56	34	63	
57	29	50	47	70	7

"Destocking on lower slopes with wilding management (7, +3) is most acceptable. Government should be encouraging destocking. There are other uses other than forestry and the land should be handed back to government. We are not going to be able to plant much on the flats (sic). Plantations on 70 per cent with wilding management (63, +2) and plantations on 15 per cent with wilding management (70, +2) are acceptable. Shelterbelts and improved pasture on 70 per cent with wilding management (34, +1) is slightly acceptable, at least it is trying to do something with the land and there are no wildings. Shelterbelts are acceptable because they are needed. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (47, +1) is slightly acceptable. Continued grazing with wilding management (56, -1) is not really acceptable because the land is not

being used for anything and it is a waste of land. Shelterbelts and improved pasture on 15 per cent with wilding management (50, -1) is not really acceptable. Plantations on 70 per cent (38, -2) is not acceptable because there is lack of wilding control and they will overrun the land. Plantations on 15 per cent (29, -2) is not acceptable because of the wildings. Finally, continued grazing (57, -3) is not acceptable because of wildings: there has to be a wilding management plan. Generally, forestry plantings are acceptable provided there are not wildings and they follow the contour of the land. Generally, forestry is preferable in places other than the Mackenzie which was never covered in forest. There is no evidence of huge forests in the Mackenzie, especially not on flats. Only high rainfall slopes would have had forest."

Stakeholder 28 sees the lower slopes as not suitable for grazing and prefers destocking. However, some grazing is accepted and some plantations along with wilding management. Wildings are seen as a major problem.

Example: Stakeholder 74, loading = 0.89, male, recreation/conservation.
(Hills factor, no loading)

	29	56	50	70	
38	57	34	47	63	7

"Destocking with wilding management (7, +3) is most acceptable because it allows existing vegetation to regrow, income and employment declines but not in the long term because of future options with tourism and conservation values. By halting degradation the options for the future are kept open. There may be income from other uses such as wind. Plantations on 15 per cent with wilding management (70, +2) and plantations on 70 per cent with wilding management (63, +2) are acceptable: blocks of trees are all right and visually suitable. Even for the 70 per cent option the block of trees is not a problem. What is important is the way they are planted. Shelterbelts and improved pasture on 15 per cent with wilding management (50, +1) is slightly acceptable but I prefer the visual effect of plantations on lower slopes. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (47, +1) is slightly acceptable but the strips of trees and the colour of the green improved pasture are unattractive. Probably the shelterbelts will not be there in the long term. Similarly, shelterbelts and improved pasture on 70 per cent with wilding management (34, -1) is not really acceptable. Continued grazing with wilding management (56, -1) is not really acceptable because of degradation of vegetation which will happen before degradation of soil status. It is important to maintain soil structure and fertility. However, doing nothing with the land is not good so changes in grazing management are needed so that it is related to stocking levels, pest control and nutrient transfer. Plantations on 15 per cent (29, -2) and continued grazing (57, -2) are not acceptable because they are a threat to the conservation and visual values of the surrounding countryside and show lack of control. Finally, plantation on 70 per cent (38, -3) is least acceptable because it has the threat of wildings intensified by the 70 per cent coverage. Generally, the main objective is to prevent the main cause of degradation (grazing), achieve greater opportunities for the future and have pest control."

Stakeholder 74 seeks to manage and conserve the land by limiting or controlling grazing and does consider income and employment and soil status. Plantations are more acceptable than shelterbelts. Least acceptable are land uses that have unmanaged wildings.

Summary of Main Features Factor 3 (4 stakeholders)

'Conservation With Some Plantations and Control of Wildings' (see Figure 8)

57 29 38 56 50 34 47 70 7 63

Stakeholders loading on Factor 3 are conservationists concerned about degrading lar Plantations are acceptable but so also is destocking to allow the vegetation to recover fr grazing. There is no widespread acceptance for plantations - they have a role but the m aim is conservation. In fact conservation can have positive economic benefits in futu While plantations do have a significant role, agroforestry (woodlots) and shelterbelts do r because they are linked to grazing. Continued grazing has to be stopped or modified so t it is part of good management of the land. Original vegetation is preferred and all the nc wilding management images are not acceptable because of wilding spread. Factor 3 h some correspondence with Hills Factor 4 but here there is more emphasis on conservati and wilding control.

3.3.4 Factor 4: 'Trees for Shelter; Grazing'

Illustrations of positive loadings Factor 4

Example: Stakeholder 32, loading = 0.86, female, service provider.
(Hills Factor 3, loading = 0.95)

	38	63	29	47	
57	56	34	7	70	50

"Shelterbelts and improved pasture on 15 per cent with wilding management (50, +3) is most acceptable because shelterbelts are a good idea and they are managed. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (47, +2) is acceptable because it is quite neat looking and is being managed and used for something beneficial. Plantations on 15 per cent with wilding management (70, +2) is acceptable and is managed. Plantations on 15 per cent (29, +1) is only slightly acceptable because it looks messy with trees all over the place. Destocking with wilding management (7, +1) is slightly acceptable because it shows high country tussock and it is preferable not to have sheep in these areas when it may be better in trees. Sheep eat tussock down and there is not a lot of growth. Plantations on 70 per cent with wilding management (63, -1) is not really acceptable although it is not too bad. Shelterbelts and improved pasture on 70 per cent with wilding management (34, -1) is not really acceptable but at least it is managed and the shelterbelts are a good idea giving stock shelter from the heat of the day or from winter. Plantations on 70 per cent (38, -2) is not acceptable because there is a high percentage of cover and no wilding management so there is no room for grazing. Continued grazing on lower slopes with wilding management (56, -2) is not so acceptable because it is a bit far away for farming. Finally, continued grazing (57, -3) is least acceptable because it is an unruly mixture of grazing and wildings. Wilding spread will force out grazing, and it is not well maintained."

Figure 8

Array of Lower Slopes Factor 3 Images

Stakeholder 32 shows an ambivalent attitude to grazing. Shelterbelts and improved pasture is most acceptable but there is general support for plantations too. Wildings are seen as messy. Least acceptable is continued grazing (with wilding spread). It seems that acceptability is defined in terms of grazing with improved pasture and shelterbelts or woodlots, or plantations as an alternative.

Example: Stakeholder 1, loading = 0.85, male, statutory advisor.
(Hills Factor 3, loading = 0.70)

	57	34	29	70	
38	56	63	7	50	47

"Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (47, +3) is most acceptable because it shows people in the landscape. There is a place for improved pasture and woodlots. Plantations on 15 per cent with wilding management (70, +2) and shelterbelts and improved pasture on 15 per cent with wilding management (50, +2) are both acceptable. Plantations on 15 per cent (29, +1) is only slightly acceptable because it is not managed. Destocking on lower slopes with wilding management (7, +1) is slightly acceptable because it is maintaining the present visual situation. Shelterbelts and improved pasture on 70 per cent with wilding management (34, -1) is not really acceptable because it shows straight lines. Plantations on 70 per cent with wilding management (63, -1) is not really acceptable because it has too much in plantations. Continued grazing (57, -2) is not acceptable because soil status declines and income and employment declines. This land use is a continuous downward trend. Continued grazing with wilding management (56, -2) is not acceptable. Finally, plantations on 70 per cent (38, -3) is least acceptable because the whole area under trees is not wanted. It is uncontrolled and unmanaged. The effects show a decline. Generally, improved pasture and managed forestry is the best land use."

Stakeholder 1 has responded to the effects and finds most acceptable grazing improved pasture along with managed plantations of modest size. Wildings are a sign of lack of management. Least acceptable is large plantations (with wildings).

Example: Stakeholder 63, loading = 0.81, male, commercial advisor.
(Hills Factor 3, loading = 0.49 N.S.)

	38	63	47	34	
57	7	29	56	50	70

"Plantations on 70 per cent with wilding management (70, +3) is most acceptable because it gives potential income and provides shelter. Shelterbelts and improved pasture on 70 per cent with wilding management (34, +2) and shelterbelts and improved pasture on 15 per cent with wilding management (50, +2) are both acceptable but a commitment to forestry or plantations, rather than half grazing and half forestry, would be preferred. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (47, +1) is only slightly acceptable because there is doubt about agroforestry and whether the combination would work. Continued grazing with wilding management (56, +1) is slightly acceptable but there should be more pasture improvement. Plantations on 70 per cent with wilding management (63, -1) is not really acceptable because the percentage is too high. Lower

slopes have more grazing potential than higher ground. Plantations on 15 per cent of lower slopes (29, -1) is not really acceptable because it is unmanaged. Plantations on 70 per cent (38, -2) is not acceptable because the percentage is too high and it is unmanaged. Destocking with wilding management (7, -2) is not acceptable because it too is unmanaged in a different sort of way. Finally, continued grazing (57, -3) is least acceptable. Generally, options are needed for pasture improvement with shelter for which there is plenty of room on the lower slopes."

Stakeholder 63 has responded to the effects and finds most acceptable smaller plantations and grazing on improved pasture, but is not keen on agroforestry. Least acceptable is continued grazing.

Summary of Main Features Factor 4 (4 stakeholders)

'Trees for Shelter; Grazing' (see Figure 9)

56 38 57 63 7 29 34 50 70 47

Stakeholders loading positively on Factor 4 emphasise management of the land with management directed at both grazing and plantations. Grazing is best on improved pastures hence the agroforestry (woodlots) on 15 per cent, plantations on 15 per cent, and shelterbelts on 15 per cent, all with wilding management are acceptable. Two of these images show trees in combination with improved pasture. The plantations on 15 per cent with wilding management (70) is acceptable even though it does not show improved pasture. Perhaps this image was interpreted as showing improved pasture or perhaps it appealed because it was a smaller, managed plantation along with grazing. There is some affinity among these stakeholders for destocking with wilding management (7) because it is in the middle of the distribution rather than being rejected (as it was for Factor 1), which could be expected since management and production are important. However, the position of this image reflects these stakeholders' view that grazing is best on improved pasture so that if it is not improved it should not be grazed. A stronger, traditional grazing orientation would reject this image and have it further to the left. Located just to the right of destocking is plantations on 15 per cent (29). Perhaps this is seen as better than destocking or continued grazing because it is a better land use, albeit not as good as well managed trees with improved pasture. This is the only image on the acceptable side of the array that does not have wilding management. Wilding management is important. Plantations at 70 per cent is too much for these stakeholders. Continued grazing is least acceptable because it is not integrated with trees or is not part of management which includes improved pasture.

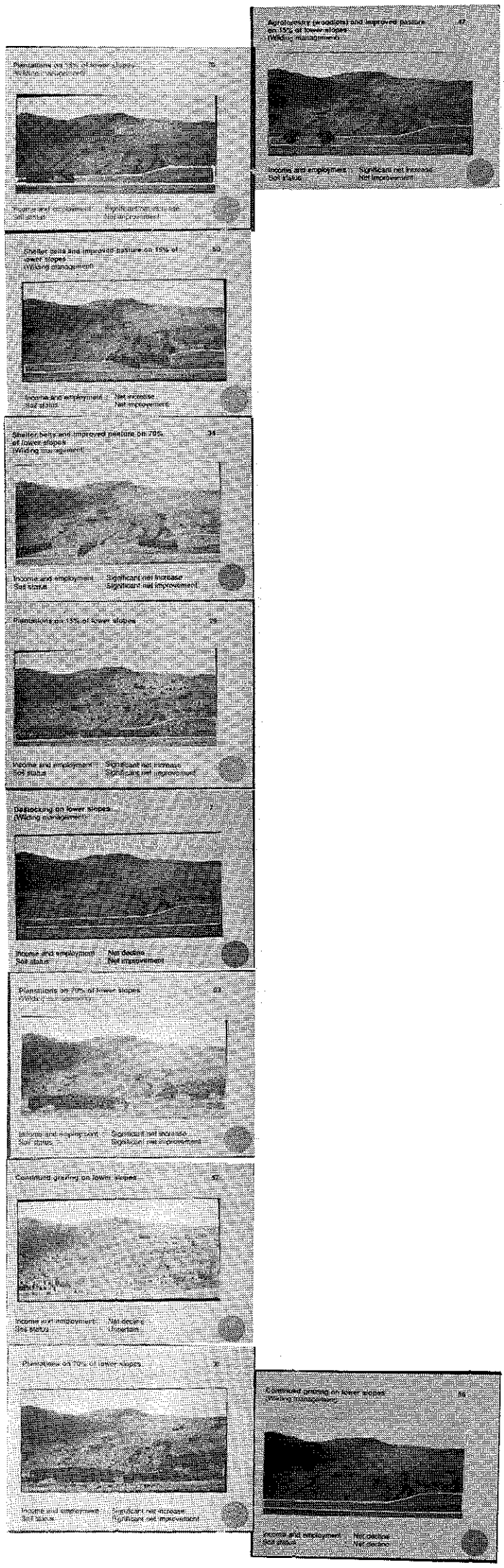


Figure 9

Array of Lower Slopes Factor 4 Images

3.3.5 Distinguishing Characteristics of Each Factor

Table 7 shows the main criteria for each factor for each of the lower slopes factors.

Table 7
Main Criteria for Each of the Lower Slopes Factors

Factor	Conser-vation	Shelter	Grazing	Plantations		Wilding Manage-ment	Visual Aspects	Produc-tion
				Large	Small			
1		X	X			X		X
2		X		X				
3	X			X		X		
4		X	X		X			

Factor 1: 'Grazing, Trees for Shelter, Wilding Management Crucial'
Factor 2: 'Plantations or Shelterbelts and Improved Pasture to Use the Land'
Factor 3: 'Conservation with Some Plantations and Control of Wildings'
Factor 4: 'Trees for Shelter; Grazing'

Table 8 shows the Z scores for all statements which are significantly different at the 0.(level when compared for all factors.

Table 8
Distinguishing Images for the Lower Slopes Factors

		Factors			
		1	2	3	4
56.	Continued grazing (wilding management)	0.4*	-1.6	-0.9	-1.5
38.	Plantations on 70 per cent	-1.0	1.4*	-1.1	-1.3
70.	Plantations on 15 per cent (wilding management)	0.7	-0.5*	1.2	1.2
7.	Destocking on lower slopes (wilding management)	-1.3	-1.3	1.2*	-0.2*

Continued grazing with wilding management (56) receives its only positive score from Factor 1 because it has grazing and management of wildings. For all other factors it receives a negative score: from Factor 2 because it is not compatible with plantations which are seen as the best land use, from Factor 3 because grazing is counter to conservation, and from Factor 4 because the grazing is not linked to improved pasture. Plantations on 70 per cent (38) is not acceptable to Factor 1 because it is too large and has uncontrolled wildings, is acceptable to Factor 2 because it is a large plantation, not acceptable to Factor 3 because conservation is defined in terms of only some plantations, and not acceptable to Factor 4 because shelter and grazing is the main objective. Plantations on 15 per cent with wilding management (70) is acceptable to Factor 1 because it allows grazing with smaller, managed plantations, is unacceptable to Factor 2 because the plantation is too small, is acceptable to Factor 3 because it is small and managed but not for grazing as for Factor 1 but for conservation, and is acceptable to Factor 4 for the same reasons as for Factor 1. Finally, destocking with wilding management (7) is unacceptable to Factor 1 because of their grazing orientation, and is unacceptable to Factor 2 because it has no plantations. Factor 3 finds destocking with wilding management acceptable because it is the means to achieve conservation, and Factor 4 is only somewhat negative about this land use because of their preference for grazing on improved pasture only: if not it should be destocked.

3.4 Higher Rainfall Flats

Table 9 shows the number of significant loadings on the four factors for the higher rainfall flats. In this Q sort most stakeholders load onto Factor 1, and there are positive and negative loadings on Factor 2. There are some residual loadings on Factors 3 and 4. All four factors are examined.

Table 9
Distribution of Significant Loadings for Higher Rainfall Flats Q Sort

	Factors				
	1	2	3	4	
Significant loadings:					
Positive	34	12	3	3	52
Negative	1	10	1	0	12
Subtotal	35	22	4	3	64
			Non significant loadings		13
				TOTAL	77

3.4.1 Factor 1: 'Grazing, Trees for Shelter, Wilding Management Important'

Illustration of Positive Loadings Factor 1

Example: Stakeholder 21, loading = 0.98, female, runholder.
(Hills Factor 2, loading = 0.83)
(Lower slopes Factor 1, loading = 0.65)

	58	39	43	61	
26	59	15	64	51	33

"Shelterbelts and improved pasture on 70 per cent with wilding management (33, +3) is most acceptable because it is the best of both worlds with a nice balance of trees and pasture. This rainfall area can accommodate both options. Both agroforestry (woodlots) and shelterbelts on improved pasture at 15 per cent (61, +2 ; 51, +2) are acceptable because there is some pasture or hay paddocks or lucerne, with trees on the windward side for shelter. Plantations at 15 per cent or at 70 per cent with wilding management (43, +1 ; 64, +1) are slightly acceptable as a compromise but 70 per cent is far too much : wildings will take land out of production (sic). Plantations on 15 per cent (39, -1) and 70 per cent (15, -1) are not really acceptable because of wildings. Continued grazing (59, -2) is not acceptable because of wildings. Continued grazing with wilding management (58, -2) is not acceptable although more preferable than continued grazing with wildings. Finally destocking with wilding management is not acceptable because it has no advantage at all."

Stakeholder 21 finds acceptable grazing with trees as shelterbelts or agroforestry woodlots, and even larger plantations on higher rainfall flats are somewhat acceptable. Wildings are seen as a threat to grazing land and least acceptable is destocking.

Example: Stakeholder 50, loading = 0.98, male, runholder.
(Hills Factor 2, loading = 0.90)
(Lower slopes Factor 1, loading = 0.66)

	59	39	64	61	
26	58	15	43	51	33

"Shelterbelts and improved pasture on 70 per cent with wilding management (33, +3) is most acceptable because this land use is ideal in the Mackenzie. Shelterbelts and improved pasture on 15 per cent with wilding management (51, +2) is acceptable as is agroforestry (woodlots) on 15 per cent with wilding management (61, +2) but the woodlots are preferable because there is more money from woodlots than from shelterbelts. Plantations on 70 per cent and 15 per cent with wilding management (64, +1 ; 43, +1) are slightly acceptable although the 70 per cent option is preferable because there is more productivity or rate of return per hectare. Plantations on 15 per cent and 70 per cent (39, -1 ; 15, -1) are not really acceptable because they both have wilding spread. Continued grazing (59, -2) is not acceptable although it is better than destocking. Continued grazing with wilding management (58, -2) is not acceptable although better than wilding trees. Finally, destocking with wilding management (26, -3) is least acceptable."

Stakeholder 50 finds most acceptable grazing on improved pasture in conjunction with shelterbelts or agroforestry woodlots. Woodlots are more productive than shelterbelts. Wildings are a threat to grazing and destocking is least acceptable.

Example: Stakeholder 52, loading = 0.98 female, service provider.
(Hills Negative Factor 4, loading = -0.84)
(Lower slopes Factor 1, loading = 0.70)

	58	15	64	61	
26	59	39	43	51	33

This stakeholder made few comments on her Q sort. Most acceptable was improved pasture and shelterbelts for weather and shelter patterns. Plantations without wilding management were not acceptable because of concern that the land will all become covered in wildings. Generally, trees are needed for wind protection and exotic trees are alright but wildings are not. There were trees here, burnt by Maoris. Total tree cover or spreading native trees would be acceptable.

Summary of Main Features Factor 1 (34 stakeholders)

'Grazing, Trees for Shelter, Wilding Management Important' (see Figure 10)

26	59	58	15	39	43	64	61	51	33

Stakeholders with high loadings on Factor 1 all show a consistent sorting pattern and emphasise shelterbelts and improved pasture with wilding management. The 70 per cent option is most acceptable indicating strong support for this and for pastoral development on the higher rainfall flats. Also acceptable are agroforestry woodlots and plantations and significant scale is indicated by the acceptance of the 70 per cent plantations over the 15 per cent option. All of these acceptable land uses have wilding management and this feature is important to this group of stakeholders because they are concerned that wilding spread will be a problem in terms of jeopardising grazing. Continued grazing with wilding management is not acceptable because proper land use entails improved pasture and shelter. Continued grazing is not acceptable because wildings will prevent grazing. Destocking is least acceptable because it entails no production or management. The main emphasis is on trees for shelter. Factor 1 is similar to Hills Factor 2 and Lower Slopes Factor 1.

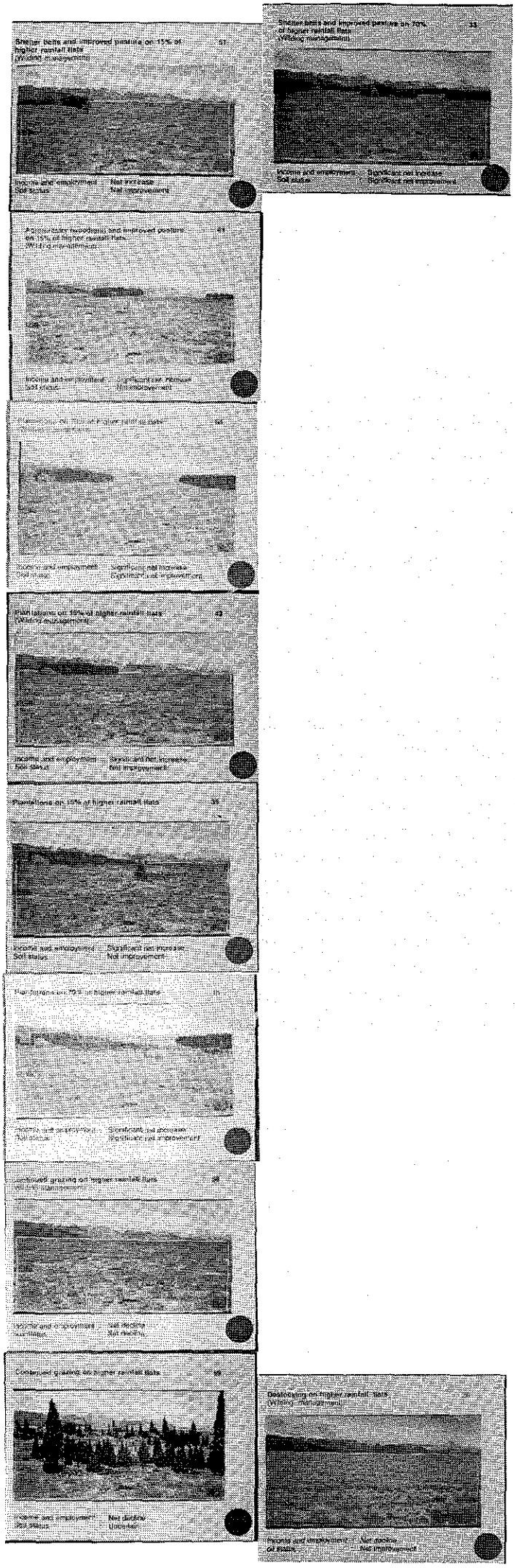


Figure 10

Array of Higher Rainfall Flats Factor 1 Images

3.4.2 Factor 2: 'Conservation for Open Views, Some Grazing, Some Trees, Wilding Management Crucial'

Illustration of Positive Loadings Factor 2

Example: Stakeholder 2, loading = 0.97, male, recreation/conservation.
(Hills Factor 3, loading = 0.73)
(Lower Slopes Factor 3, loading = 0.67)

	39	64	51	58	
15	59	33	43	61	26

"Destocking with wilding management (26, +3) is most acceptable because it is visually most appealing for this land form which is only a small area of the basin. From the map these areas are more remote and scenic. Continued grazing with wilding management (58, +2) is acceptable but less desirable because of degrading soil status despite no real benefits (sic). Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (61, +2) is acceptable because forestry has benefits to trade off against the visual impact. Shelterbelts and improved pasture on 15 per cent with wilding management (51, +1) is slightly acceptable as is plantations on 15 per cent with wilding management (43, +1). Plantations on 70 per cent with wilding management (64, -1) is not really acceptable because the visual impact is large because of the large area. Shelterbelts and improved pasture on 70 per cent with wilding management (33, -1) is not really acceptable but has the virtue that it has management of 70 per cent and is preferable to 15 per cent that is unmanaged. Thus, plantations on 15 per cent (39, -2) is not acceptable. Continued grazing (59, -2) is not acceptable because of the negative visual image of wildings. This is a do nothing option with no sense of management. Finally, plantations on 70 per cent (15, -3) is lest acceptable because a large part of the area is blanketed with forest and there is no wilding control."

Stakeholder 2 acknowledges the effects of land uses and expresses a conservation view and finds most acceptable the visual appeal of the open views associated with destocking. Land uses which work in with open views are favoured. Large plantations and wildings are a threat to scenic views and are not acceptable.

Example: Stakeholder 4, loading = 0.97, male, service provider.
(Hills Factor 4, loading = 0.68, N.S.)
(Lower slopes Factor 3, loading = 0.94)

	39	64	43	61	
15	59	33	51	58	26

"Destocking with wilding management (26, +3) is most acceptable because the alpine valleys are important for the aesthetic contrast with beech. Roading and harvesting can have negative effects in these areas. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (61, +2) is acceptable although it is the lesser of two evils by virtue of the low density of planting. Continued grazing with wilding management (58, +2) is acceptable because of strong concern about open spaces despite net decline in soil status. Plantations on 15 per cent with wilding management (43, +1) is slightly acceptable as is

shelterbelts and improved pasture on 15 per cent with wilding management (51, +1). Both plantations on 70 per cent with wilding management (64, -1) and shelterbelts and improved pasture on 70 per cent with wilding management (33, -1) are not really acceptable because the 70 per cent means that there is too much in this area. Plantations on 15 per cent (39, -2) and continued grazing (59, -2) are not acceptable because they are not managed and have no positive benefits. Finally, plantations on 70 per cent (15, -3) is least acceptable because there is no wilding management and the trees are too dense."

Stakeholder 4 has responded to some of the effects and finds most acceptable destocking or land uses that are compatible with open space. Larger plantations and wildings are least acceptable.

Example: Stakeholder 58, loading = 0.93, male, local business.
(Hills Negative Factor 4, loading = 0.47, N.S.)
(Lower Slopes Factor 1, loading = 0.62)

	15	64	43	58	
59	33	39	51	61	26

"Destocking with wilding management (26, +3) is most acceptable because of the view of this landscape and preservation of native grasslands. Continued grazing with wilding management (58, +2) is acceptable and preferable to agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (61, +2) which is closer to what we have now. Plantations on 15 per cent with wilding management (43, +1) is slightly acceptable as is shelterbelts and improved pasture on 15 per cent with wilding management (51, +1). Plantations on 70 per cent with wilding management (64, -1) is not really acceptable. Plantations on 15 per cent (39, -1) is not really acceptable because the 15 per cent is uncontrolled. Plantations on 70 per cent (15, -2) is not acceptable because it lacks wilding management. Shelterbelts and improved pasture on 70 per cent with wilding management (33, -2) is not acceptable because it is at the 70 per cent level. Finally, continued grazing (59, -3) is least acceptable because the wildings are uncontrolled. Generally, it is time to consider destocking the flats to preserve the natives as they are known today. The 15 per cent level for agroforestry and shelterbelts are reasonably acceptable because they are controlled."

Stakeholder 58 finds most acceptable destocking with its open views, and control of land use, especially wildings. Least acceptable is plantations on 70 per cent.

Summary of Main Features Positive Factor 2 (12 stakeholders)

'Conservation for Open Views, Some Grazing, Some Trees, Wilding Management Crucial" (see Figure 11)

15	59	39	33	64	51	43	61	58	26

Clearly, the stakeholders loading on Factor 2 favour conservation of the higher rainfall flats that allows for open views of traditional tussock. They tend to recognise that the area is small and therefore could be conserved without significant loss to production. Because open views are preferred the land uses that have minimal impact are preferred. Thus, continued

grazing, agroforestry (woodlots), plantations, or shelterbelts and improved pasture, on 15 per cent are acceptable. The 70 per cent options for shelterbelts and improved pasture or plantations are really too large and interfere with the open view. As for Factor 1 management of wildings is very important: all the options with wilding management are ranged from the acceptable end of the distribution. But here the concern is not with threats to production but threats to conservation of native species. Because of the concern about wildings the continued grazing and plantation options (without wilding management) are all not acceptable. Little reference is made to production. Generally, conservation has as its objective the maintenance of open views typically of traditional tussock. This goal requires management of the land. Some grazing is acceptable because it is compatible with the open views. Trees are reluctantly accepted as part of the managed land use, but only in the form of the smaller options. Factor 2 is similar to Lower Slopes Factor 3.

Illustration of Negative Loadings Factor 2

'Plantations to Use and Improve the Land'

Example: Stakeholder 48, loading = -0.96, female, local business.
(Hills Factor 1, loading = 0.63 N.S.)
(Low Slopes Factor 2, loading = 0.87)

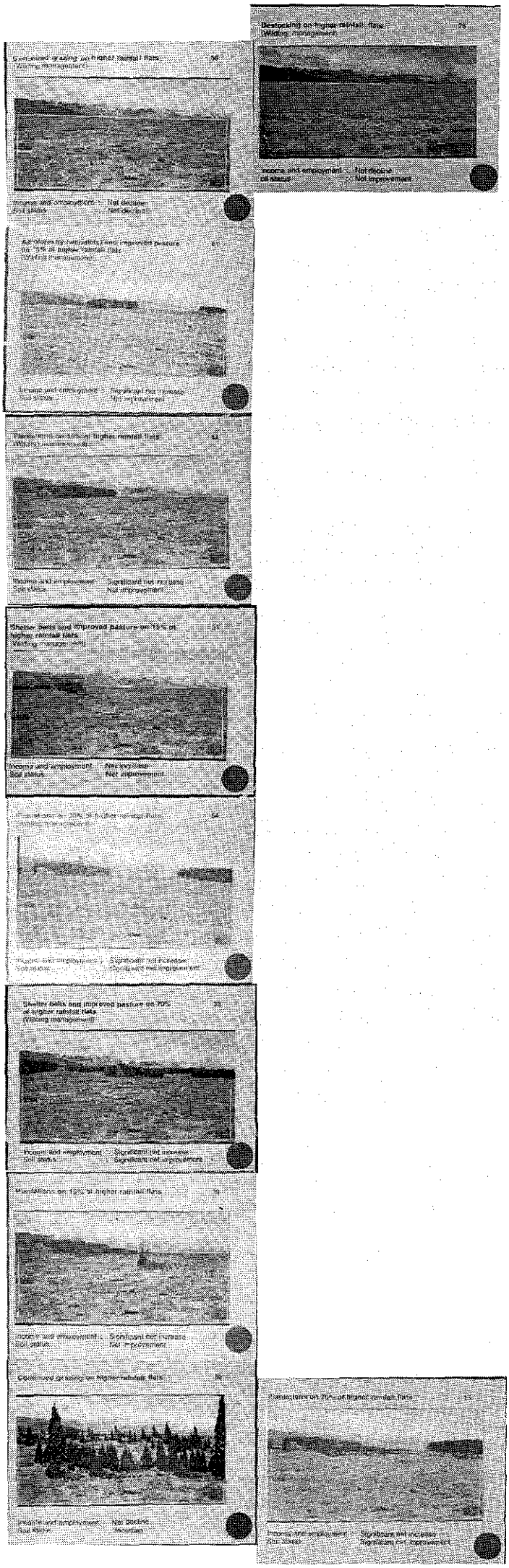
	58	61	59	33	
26	43	51	64	39	15

"Plantations on 70 per cent (15, +3) are most acceptable because it looks good and while not under management the wildings have not really taken off. Plantations are profitable. Shelterbelts and improved pasture on 70 per cent with wilding management (33, +2) is acceptable because it looks widely spread and improved pasture looks good. Plantations on 15 per cent (39, +2) is acceptable. Continued grazing (59, +1) is slightly acceptable because it looks good and seems to be all over (the image). Wildings will not get out of control because of the climate. Plantations on 70 per cent with wilding management (64, +1) is slightly acceptable. It is a wide open area and there may be erosion. Both shelterbelts and improved pasture on 15 per cent (with wilding management) (51, -1) and agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (61, -1) are not really acceptable. Continued grazing with wilding management (58, -2) is not acceptable as is plantations on 15 per cent with wilding management (43, -2). Finally, destocking with wilding management (26, -3) is least acceptable. Continued grazing or destocking with wilding management are not acceptable because there is nothing much happening in them. Generally, if trees can grow in the higher rainfall flats then this is a good thing."

Stakeholder 48 finds most acceptable larger plantations and is not concerned with wilding spread. Least acceptable is destocking.

Figure 11

Array of Higher Rainfall Fl Factor 2 Images



Example: Stakeholder 67, loading = -0.86, male, statutory advisor.
(Hills Factor 1, loading = 0.89)
(Lower slopes Factor 2 = 0.78)

	51	61	39	15	
58	26	43	59	33	64

"Plantations on 70 per cent with wilding management (64, +3) is most acceptable because it has wilding control which maintains open areas to allow grazing. This option could improve the land. The altered landscape leaves room for variability. Plantations on 70 per cent (15, +2) is acceptable because it shows improvement on 70 per cent along with pasture management. Shelterbelts and improved pasture on 70 per cent with wilding management (33, +1) is acceptable but there is land use degradation on 30 per cent of the land and would prefer to see planting or seedlings or wildings rather than 30 per cent continued grazing. The shelterbelts look like woodlots. Plantations on 15 per cent (39, +1) is slightly acceptable for which the forest can be used as a nucleus for other developments, such as wildings for rehabilitation: the 15 per cent is too small. Continued grazing (59, +1) is slightly acceptable as a prospect for a forest by natural establishment. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (61, -1) is not really acceptable because it is not enough. Plantations on 15 per cent with wilding management (43, -1) is not really acceptable because a major area is unaffected and given the rapidity of decline it is not enough to play around with 15 per cent. Shelterbelts and improved pasture on 15 per cent with wilding management (51, -2) is not acceptable for while it is visually attractive it does not address the land management problem sufficiently. Destocking with wilding management (26, -2) is not acceptable because it leaves rabbit control as an ongoing cost only dealt with as an urgent problem. Finally, continued grazing with wilding management (58, -3) is least acceptable because the opportunity to rehabilitate and use land productively is being lost. Generally, low levels of grazing without wilding control is alright but some control and direction is needed. For example, no wildings allowed in RAP's (Recovered Areas for Protection) and graze more intensive areas and introduce more desirable species where appropriate."

Stakeholder 67 finds most acceptable larger plantations and wildings are an asset because trees can improve the land. Least acceptable is continued grazing.

Example: Stakeholder 37, loading = 0.82, female, runholder.
(Hills Negative Factor 1, loading = -0.88)
(Lower slopes, no loading)

	26	64	33	39	
58	61	43	51	15	59

"Continued grazing (59, +3) is most acceptable because it looks good but would like to see soil status improve. It is important to anchor the land by having something on it. Plantations on 15 per cent (39, +2) and on 70 per cent (15, +2) are acceptable because trees are all right on higher rainfall flats and wildings take away the regimented look. Shelterbelts and improved pasture on 70 per cent with wilding management (33, +1) and on 15 per cent (51, +1) are slightly acceptable because they improve the land so much, although these are not suitable for hills. Plantations on 70 per cent with wilding management (64, -1) and on

15 per cent with wilding management (43, -1) are not really acceptable although as plantations they do not really hit you in the eye as on the hill and they benefit the soil and income and employment. Destocking with wilding management (26, -2) is not acceptable because of the income and employment effects but it looks good. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (61, -2) is not acceptable for while there are some positive aspects there is not as much for the future as having plantation. Finally, continued grazing with wilding management (58, -3) is least acceptable because nothing is improving and it does not look good. Generally, there is none of this higher rainfall flats land type on our farm so we have no strong feelings about it. Trees grow all right here and the lines and blocks of trees do not show up as much and do not look artificial."

Stakeholder 37 has responded to the effects and to the absence of higher rainfall flats on her farm. Wildings, with grazing, and plantations with wildings are acceptable, and the visual effect of trees is emphasised. Least acceptable is continued grazing. Trees are seen as improving the soil.

Summary of Main Features Negative Factor 2 (10 stakeholders)

'Plantations to Use and Improve the Land' (see Figure 11)

26 58 61 43 51 64 33 39 59 15

Stakeholders loading negatively on Factor 2 want to see plantations on the higher rainfall flats because they use and improve the land. Plantations are the preferred land use and wildings are a beneficial part of the plantation. Continued grazing is acceptable because the image shows many trees. Plantations on 15 per cent is acceptable because, while it is 15 per cent, the wildings fill the landscape and show trees improving the land. The three most acceptable images do not have wilding management because to these stakeholders trees and wildings are essential to improving the land. For this reason the sequence of images show a gradation of extensive tree cover down to little or no tree cover. Generally, there is interest in improving the land by using trees. Some production is a possibility but this is not emphasised. Not to do anything with the land is seen as accepting continued land degradation. Negative Factor 2 is similar to Hills Factor 1 and Lower Slopes Factor 2.

3.4.3 Factor 3: 'Grazing with Some Trees'

Illustration of Positive Loadings Factor 3

Example: Stakeholder 43, loading = 0.82, female, runholder.
(Hills Factor 1, loading = 0.68 N.S.)
(Lower slopes Factor 1, loading = 0.84)

	5	15	43	61	
26	39	64	33	59	58

"Continued grazing with wilding management (58, +3) is most acceptable because our own experience shows that these areas can handle it. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (61, +2) is acceptable on the flats.

Continued grazing (59, +2) is acceptable and is a compromise to have wildings to keep grazing. Plantations on 15 per cent with wilding management (43, +1) is slightly acceptable but would like to see less plantations on this area. Shelterbelts and improved pasture on 70 per cent with wilding management (33, +1) is slightly acceptable. Plantations on 70 per cent (15, -1) is not really acceptable and plantations on 70 per cent with wilding management (64, -1) is not really acceptable. Shelterbelts and improved pasture on 15 per cent with wilding management (51, -2) is not acceptable. Plantations on 15 per cent (39, -2) is not acceptable because planted trees would be better than wilding trees. Finally, destocking with wilding management (26, -3) is least acceptable because it is not on for the higher rainfall flats."

Stakeholder 43 shows a grazing orientation and accepts plantations or trees that are compatible with grazing. Agroforestry, larger shelterbelts or plantations with wilding management are acceptable. Least acceptable is destocking. Wilding management is not a key issue.

Example: Stakeholder 22, loading = 0.74, male, runholder.
(Hills Factor 2, loading = 0.67)
(Lower slopes Factor 1, loading = 0.88)

	39	59	64	33	
26	43	15	51	61	58

"Continued grazing with wilding management (58, +3) is most acceptable. Shelterbelts and improved pasture on 70 per cent with wilding management (33, +2) is acceptable as is agroforestry (woodlots) and improved pasture on 15 per cent (61, +2). The latter is a better option than shelterbelts or plantations. Plantations on 70 per cent with wilding management (64, +1) is slightly acceptable as is shelterbelts and improved pasture on 15 per cent with wilding management (51, +1). Continued grazing (59, -1) is not really acceptable because the wilding trees would take over and there would be no grazing left. Plantations on 70 per cent (15, -1) is not really acceptable. Plantations on 15 per cent (39, -2) and on 15 per cent with wilding management (43, -2) are not acceptable. Plantations would be alright if one's own children were to take over the farm but in the meantime young stands of trees do not have a great deal of value. Finally, destocking with wilding management (26, -3) is least acceptable because there is no revenue and there will be depletion of grasses because they are not being fertilised naturally by stock. Generally, wildings have no value and even as firewood you have to keep piling it on. It is many years before they come mature and have economic value."

Stakeholder 22 is a grazier who is sceptical about the virtues and values of trees and plantations. Most acceptable is continued grazing followed by shelterbelts and smaller agroforestry woodlots. The Q sort shows some ambivalence regarding plantations: the 70 per cent option (64) is rated ahead of the 15 per cent option (43). Least acceptable is destocking.

Summary of Main Features Factor 3 (4 stakeholders)

'Grazing With Some Trees' (see Figure 12)

26	39	51	15	43	64	59	33	61	58

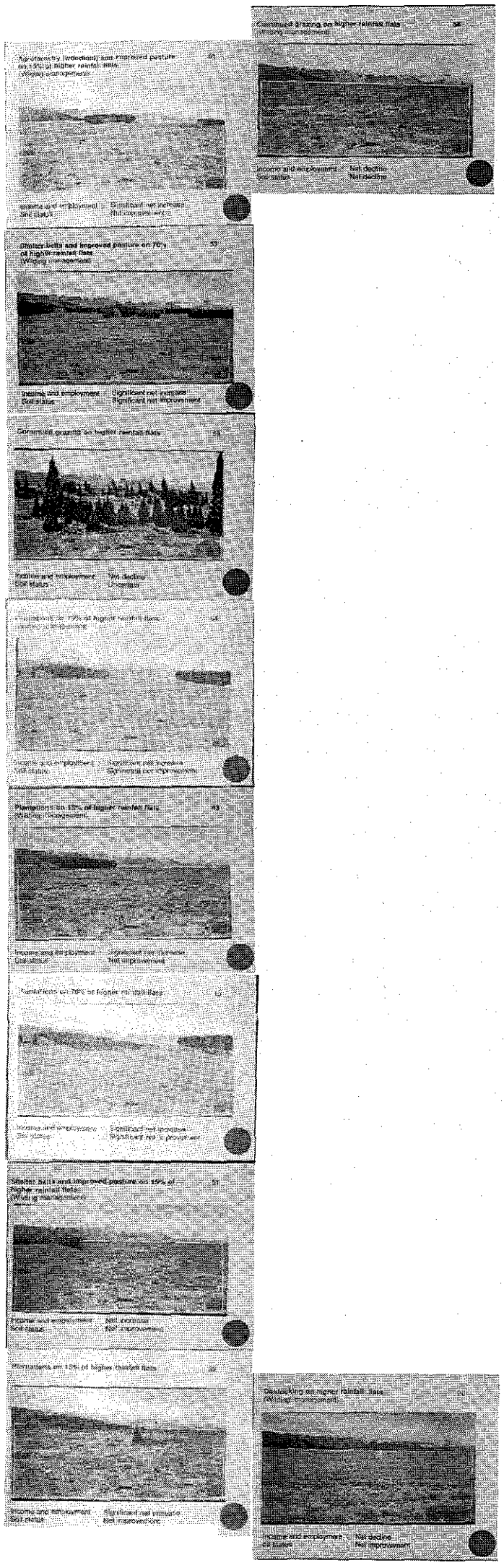


Figure 12

Array of Higher Rainfall Flats Factor 3 Images

Stakeholders loading on Factor 3 favour grazing and do not have great enthusiasm for trees or plantations, rather, these are acceptable where they fit in with grazing. Shelterbelts, or agroforestry woodlots and plantations are not emphasised as valuable options in their own right, and in at least one case there is scepticism about timber values. Consequently these stakeholders find most acceptable continued grazing followed by shelterbelts and agroforestry woodlots with improved pasture. The latter are compatible with grazing and entails no strong commitment to forestry. (This is quite different to Factor 1 who emphasises improvement of the land and has continued grazing (58) as less acceptable.) Thus, these stakeholders have a more traditional approach to land management and do not see a great need to improve management. In fact, as one of these stakeholders asserted, grazing is necessary to return fertility to the soil. Wilding management is not seen as a major issue here. It is a possible threat to grazing but option 59 (continued grazing with wildings) is acceptable because it provides grazing. There is no concern with aesthetics. However, plantations that manage wildings (43 and 64) do have slight acceptability, while the plantations with wilding spread (39 and 15) are not acceptable. Strangely, shelterbelts and improved pasture on 15 per cent (51, -2) is not acceptable while the 70 per cent option (33, +2) is acceptable. Perhaps the image portrayed a very small modified area and this made it unattractive, whereas the 70% option has more photographic appeal.

3.4.4 Factor 4: 'Grazing and Open Views'

Illustrations of Positive Loadings Factor 4

Example: Stakeholder 24, loading = 0.91, male, statutory advisor.
(Hills Factor 4, loading = 0.85)
(Lower slopes negative factor 1, loading = 0.55 N.S.)

	61	43	15	58	
59	39	64	51	33	26

"Destocking with wilding management (26, +3) is most acceptable because of the wild, open spaces with tussock. Continued grazing with wilding management (58, +2) is acceptable because it shows open spaces. Shelterbelts and improved pasture on 70 per cent with wilding management (33, +2) is acceptable and if this is going to be done it had better be done right because it will change the area completely. Plantations on 70 per cent (15, +1) is slightly acceptable. It looks good as two blocks leading from one to the other and the wildings are alright as they are not outside the general vicinity and are controlled to some extent. Shelterbelts and improved pasture on 15 per cent with wilding management (51, +1) is slightly acceptable because it shows trees under the hillside blending in with natural boundaries and still has open plains. If the trees were on the other side of the photograph they would not fit in so well. Plantations on 15 per cent with wilding management (43, -1) is reasonably acceptable with the trees planted by a hillside. Trees are not a stand alone feature. Plantations on 70 per cent with wilding management (64, -1) is not really acceptable but if trees are going to be planted it must be done right. They are alright here because they make a statement. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (61, -2) is not acceptable because the trees are out of place. Plantations on 15 per cent (39, -2) is not acceptable but looks alright except for the big wilding in the middle of the scene which makes it less acceptable. Young wildings are alright. Finally, continued grazing (59, -3) is not acceptable because the wildings make the landscape cluttered."

Stakeholder 24 finds most acceptable the open spaces of destocking or continued grazing. Trees and plantation are acceptable provided they are visually adequate. Wildings especially larger ones are not acceptable and in extreme cases look cluttered.

Example: Stakeholder 8, loading = 0.84, female, runholder.
(Hills Factor 4, loading = 0.68, N.S.)
(Lower slopes Factor 3, loading = 0.78)

	59	15	58	51	
39	43	61	64	26	33

"Shelterbelts and improved pasture on 70 per cent with wilding management (33, +3) is most acceptable because it has a mixture of pasture and good coverage and it is visually alright. Shelterbelts and improved pasture on 15 per cent with wilding management (51, +2) is acceptable although the 15 per cent is not enough. Destocking with wilding management (26, +2) is acceptable because it has good coverage of tussocks and looks like the Mackenzie used to look like, and it is managed. Continued grazing with wilding management (54, +1) is slightly acceptable because it is managed but needs some plantations or trees to help it along. Plantations on 70 per cent with wilding management (64, +1) is slightly acceptable because the 70 per cent is a good quantity and better than 15 per cent. Plantations on 70 per cent (15, -1) is not really acceptable because it is not controlled and looks a mess so it is only a small improvement. Agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (61, -1) is not really acceptable. Continued grazing (59, -2) is not acceptable because it looks out of control. Plantations on 15 per cent with wilding management (43, -2) is not acceptable because there is not enough planting. Plantations on 15 per cent (39, -3) is least acceptable because the wildings are shown spreading rapidly across the land and there is no cover. Generally, some pasture should be retained. Edge planting is not a concern."

Stakeholder 8 exhibits a grazing orientation in combination with trees and plantations. Most acceptable is shelterbelts and improved pasture and there is preference for destocking. However, plantations are acceptable and seen as helping the land and larger plantations are preferred. Management is important so the wildings are seen as messy and as a sign of lack of management. Thus, the image showing small plantations showing wilding spread is least acceptable. Stakeholder 8 evinces a visual concern but this is not the sole determinant of the Q sort.

Example: Stakeholder 27, loading = 0.72, female, runholder and service provider.
(Hills negative Factors 1 and 2, loadings = -0.48 N.S.)
(Lower slopes Factor 3, loading = 0.89)

	15	64	51	58	
59	39	61	43	33	26

"Destocking with wilding management (26, +3) is most acceptable because it looks very visible and shows the country in its natural state. Continued grazing with wilding management (58, +2) is acceptable only if it's well managed. Shelterbelts and improved pasture on 70 per cent with wilding management (33, +2) is acceptable because it is good aesthetically and works well for the farmer and is good for income and soil. Shelterbelts and improved pasture on 15 per cent with wilding management (51, +2) is slightly acceptable

but 70 per cent would be better. Plantations on 15 per cent with wilding management (43, +1) is slightly acceptable and is better than agroforestry or plantations on 70 per cent with wilding management because the trees are together and not scattered. Plantation on 70 per cent with wilding management (64, -1) is not really acceptable because it is too broken up and the trees should be in one clump. Agroforestry (woodlots) and improved pasture on 15 per cent (61, -1) is not really acceptable because the trees are scattered. Both plantations on 15 per cent and 70 per cent (15, -2 : 39, -2) are not acceptable because they are not managed. At least someone's planted something. Finally, continued grazing (59, -3) is least acceptable because the grazing area will go wild. Generally, these land uses should occur away from the highway so the tourists see only tussock and blue skies."

Stakeholder 27 has mentioned the effects on one option and finds most acceptable the open views associated with destocking.

Summary of Main Features Factor 4 (3 stakeholders)

'Grazing and Open Views' (see Figure 13)

59 39 61 43 64 15 51 58 33 26

Stakeholders loading on Factor 4 find acceptable the open views associated with destocking. Visual appearance is important, along with grazing.

3.4.5 Distinguishing Characteristics of Each Factor

Table 10 shows the main criteria for each of the higher rainfall flats factors.

Table 10
Main Criteria for Each of the Higher Rainfall Flats Factors

Factor	Conser-vation	Shelter	Grazing	Plantations		Wilding Manage-ment	Visual Aspects	Produc-tion
				Large	Small			
1		X	X			X		
2	X					X	X	
-2	X			X				
3		X	X					
4		X	X					

Factor 1: 'Grazing, Trees for Shelter, Wilding Management Important'
Factor 2: 'Conservation for Open Views, Some Grazing, Some Trees, Wilding Management Crucial'
Factor -2: 'Plantations to Use and Improve the Land'
Factor 3: 'Grazing with Some Trees'
Factor 4: 'Grazing with Open Views'

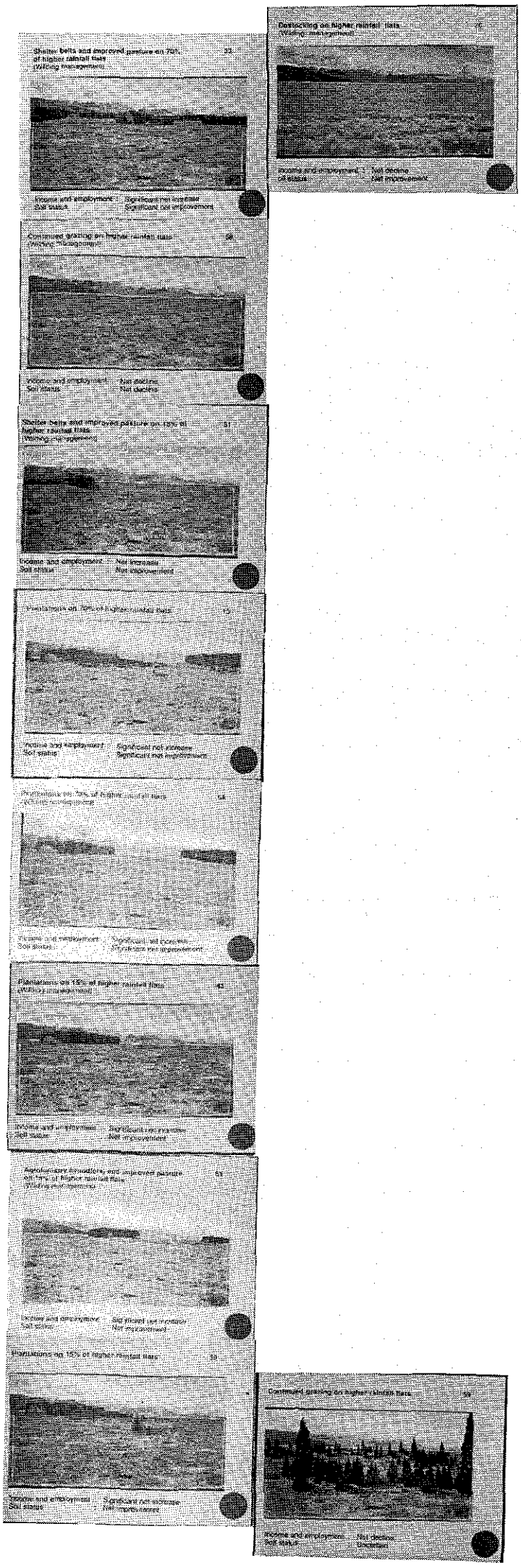


Figure 13

Array of Higher Rainfall Fl Factor 4 Images

Table 11 shows the Z scores for all statements which are significantly different at the 0.01 level when compared to all other factors. Continued grazing (59) is not acceptable to Factor 1 because it shows unmanaged wildings but is acceptable to Factor 3 who prefers grazing. Plantations on 70 per cent with wilding management (64) is acceptable to Factor 1 because it is managed to control wildings. Plantations on 70 per cent (15) is not acceptable to Factor 2 because open views are favoured. Shelterbelts and improved pasture on 70 per cent with wilding management (33) is also not acceptable to Factor 2, but less so because it exceeds the preferred level of grazing. Shelterbelts and improved pasture on 15 per cent with wilding management (51) is not really acceptable to Factor 3 whereas continued grazing (58) is acceptable and these preferences are opposite to all other factors. Finally, agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (61) is not acceptable to Factor 4 but is to all other factors.

Table 11
Distinguishing Images for the Higher Rainfall Flats Factors

		Factors			
		1	2	3	4
59.	Continued grazing (wilding management)	-1.0*	1.2	2.0*	1.0
64.	Plantations on 70 per cent (wilding management)	0.7*	-0.7	-0.1	-0.2
15.	Plantations on 70 per cent	-0.8	-1.6*	-0.3	0.0
33.	Shelterbelts and improved pasture on 70 per cent (wilding management)	1.6	-0.8*	0.6	1.3
51.	Shelterbelts and improved pasture on 15 per cent (wilding management)	1.1	0.5	-0.5*	0.7
58.	Continued grazing	-1.0	-1.0	0.4*	-1.6
61.	Agroforestry (woodlots) & improved pasture on 15 per cent (wilding management)	0.9	1.0	1.0	-0.9*

3.5 Lower Rainfall Flats

Table 12 shows the number of significant loadings on the three factors for the lower rainfall flats. For this Q sort there are only three factors and most of the stakeholders load onto Factor 1.

Table 12
Distribution of Significant Loadings for the Lower Rainfall Flats

	Factors			
	1	2	3	
Significant loadings:				
Positive	32	14	4	50
Negative	1	1	2	4
Subtotal	33	15	6	54
			Non significant loadings	22
			Unable to complete Q sort	1
			TOTAL	77

3.5.1 Factor 1: 'Shelterbelts, Non-commercial Plantations and Grazing'

Illustrations of Positive Loadings Factor 1

Example: Stakeholder 26, loading = 0.97, male, local business.
(Hills Factor 1, loading = 0.79)
(Lower slopes Factor 2, loading = 0.87)
(High rainfall flats Factor 1, loading = 0.85)

	22	67	40	
60	74	53	52	19

"Shelterbelts and improved pasture on 70 per cent with wilding management (19, +2) is most acceptable, especially since it has trees and wilding management. Non-commercial plantations on 70 per cent (40, +1) is acceptable because even these trees have commercial aspects such as firewood, timber or pulp potential. Shelterbelts and improved pasture on 15 per cent with wilding management (52, +1) is acceptable. Shelterbelts and improved pasture on 15 per cent (67, 0) receives a neutral score because the area is small and the wildings are unmanaged. Non commercial plantations on 15 per cent (53, 0) receives a neutral score. Destocking with wilding management (22, -1) is not acceptable because it is not doing anything but at least it improves the soil. Continued grazing (74, -1) is not acceptable because it is doing nothing but at least some shelter is being formed to stop wind erosion. Finally, continued grazing with wilding management (60, -2) is least acceptable because nothing is being done and hieracium will take over."

Stakeholder 26 finds most acceptable shelterbelts and improved pasture on a large scale and prefers trees with grazing to the extent that non commercial plantations are quite acceptable, being seen as having commercial potential. Wilding management has some importance. Least acceptable is continued grazing with wilding management.

Example: Stakeholder 64, loading = 0.97 male, commercial advisor.
(Hills Factor 1, loading = 0.86)
(Lower slopes : non significant loadings on Factor 1, 2 and 4)
(Higher rainfall flats Factor 1, loading = 0.95)

	74	67	52	
60	22	53	40	19

"Shelterbelts and improved pasture on 70 per cent with wilding management (19, +2) is most acceptable because of a preference to see pasture and it is not realistic without trees which are more critical here than elsewhere, especially if they attract rain. Shelterbelts and improved pasture on 15 per cent with wilding management (52, +1) is acceptable because it is trying to get more out of the land so pasture is needed but 15 per cent is not enough. Non-commercial plantations on 70 per cent (40, +1) is acceptable but with mixed feelings. The volume of trees is good and it has increased income and employment and soil improvement. Shelterbelts and improved pasture on 15 per cent (67, 0) receives a neutral score because it is untidier than 52 (with wilding management). Non-commercial plantations on 15 per cent (53, 0) receives a neutral score because it has less trees. Continued grazing (74, -1) is not acceptable. Trees are more useful in lower rainfall areas: they need trees. I would have expected net improvement in soil status. Destocking with wilding management (22, -1) is not acceptable. Finally, continued grazing with wilding management (60, -2) is not acceptable."

Stakeholder 64 has responded to the effects (and is sceptical of some of the assessments) and finds most acceptable improved pasture with trees as shelterbelts. However, non-commercial plantations are acceptable because trees are seen as critical on low rainfall flats. Least acceptable is continued grazing with wilding management.

Example: Stakeholder 71, loading = 0.97, female, recreation/conservation.
(Hills Factor 1, loading = 0.89)
(Lower slopes Factor 2, loading = 0.82)
(Higher rainfall flats, Factor 1 loading = 0.66 N.S.)

	74	67	40	
60	22	53	52	19

"Shelterbelts and improved pasture on 70 per cent with wilding management (19, +2) is most acceptable especially as it shows management of wildings. Non-commercial plantations on 70 per cent (40, +1) is acceptable and would be equivalent to 19 except for the wildings. Shelterbelts and improved pasture on 15 per cent with wilding management (52, +1) is acceptable, and it would improve the soil. Shelterbelts and improved pasture on 15 per cent (67, 0) receives a neutral score but is better than non-commercial plantations on 15 per cent (53, 0) because the land is utilised better and may provide improvement in land and employment. Continued grazing (74, -1) is not acceptable. Destocking with wilding management (22, -1) is not acceptable but is better than 74 because there is wilding management and because there is soil improvement. Finally, continued grazing with wilding management (60, -2) is least acceptable because it is not going to improve the land and the land is not being given an opportunity to improve itself."

Stakeholder 71 has responded to the effects and in particular emphasises soil status. Most acceptable are shelterbelts and improved pasture and wilding management. Least acceptable is continued grazing with wilding management.

Summary of Main Features Factor 1 (31 stakeholders)

'Shelterbelts, Non-commercial Plantations and Grazing' (see Figure 14)

60 22 74 53 67 52 40 19

Stakeholders loading on Factor 1 have interest in trees and see an important role for them on the lower rainfall flats. However, there is still a role for grazing so that the most acceptable land use is shelterbelts and improved pasture. Their enthusiasm for trees and shelter means that the 70 per cent option is preferred. It also means that the 70 per cent non-commercial plantation option is acceptable, and considerably more so than the 15 per cent option. For some of these stakeholders the non-commercial plantations are seen as having commercial value, so the interest in trees is not strictly for conservation but for production. Trees and grazing are the ideal productive uses for this land. Because trees are favoured the 15 per cent shelterbelt options are acceptable but not strongly. Another theme is some antipathy towards wildings. Thus the 15 per cent shelterbelt option without wilding management is slightly less acceptable than the same option with wilding management. Also there is some antipathy to continued grazing along with wildings presumably because the image does not show a sufficient number of trees to match the preference for shelterbelts or non-commercial plantations. Because grazing along with trees is the preferred land use destocking and continued grazing are the least acceptable land uses.

3.5.2 Factor 2: 'Grazing, Some Shelterbelts'

Illustrations of Positive Loadings Factor 2:

Example: Stakeholder 27, loading = 0.97, female, runholder/service provider.
(Hills: non significant loadings on Factor 1, 2 and 4)
(Lower slopes Factor 3, loading = 0.89)
(Higher rainfall flats Factor 4 loading = 0.72)

	53	40	52	
74	67	19	60	22

"Destocking with wilding management (22, +2) is most acceptable. Shelterbelts and improved pasture on 15 per cent with wilding management (52, +1) is acceptable and the shelterbelt trees look better in one group. Continued grazing with wilding management (60, +1) is acceptable because there are no pine trees but it needs to be grazed very carefully. Shelterbelts and improved pasture on 70 per cent with wilding management (19, 0) receives a neutral score. Non-commercial plantations on 70 per cent with wilding management (40, 0) receives a neutral score because the shelterbelts should be in one stand (i.e. there should be wilding management). Shelterbelts and improved pasture on 15 per cent (67, -1) is not acceptable but it does provide shelter. Non-commercial plantations on 15 per cent (53, -1) is not acceptable because it is messy looking and looks ready to explode. Finally, continued grazing (74, -2) is least acceptable because it shows little green dots of different sizes and they look messy. Generally, an alternative to pine is needed (although they are probably best

in terms of growth). Pines are not good because of proximity to roads and dark green trees would ruin the landscape."

Stakeholder 27 is a grazier with limited acceptance of trees in the landscape. She is aware of the delicate nature of grazing the lower rainfall flats but still sees a role for grazing. Trees are an adjustment to this in the form of shelterbelts, especially the 15 per cent option. Least acceptable is continued grazing (with wildings). Wilding management is important.

Example: Stakeholder 28, loading = 0.91, male, politician.
(Hills Factor 4, loading = 0.91)
(Lower slopes Factor 3, loading = 0.91)
(Higher rainfall flats: non significant loadings on Factor 1, 2 and 4)

	67	60	19	
74	40	53	52	22

"Destocking with wilding management (22, +2) is most acceptable but is a pipe dream. Shelterbelts and improved pasture on 70 per cent with wilding management (19, +1) is acceptable but the trees are intruding into the vista. Shelterbelts and improved pasture on 15 per cent with wilding management (52, +1) is acceptable but again is intruding into the vista because it is outside the guidelines. Continued grazing with wilding management (60, 0) receives a neutral score because it is 'much of a muchness' but better than having wildings. Non-commercial plantations on 15 per cent (53, 0) receives a neutral score. Shelterbelts and improved pasture on 15 per cent (67, -1) is not acceptable as is non-commercial plantation on 70 per cent (40, -1) because they look 'much of a muchness'. Finally, continued grazing (74, -2) is least acceptable because it has wildings. Generally, the preferred land use is forestry within guidelines with improved pasture, which means grazing and farmers using the land in a reasonably diverse way."

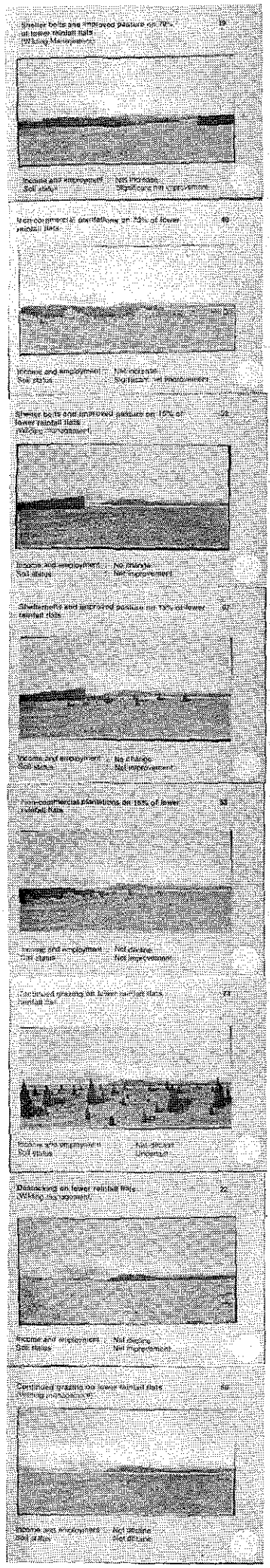
Stakeholder 28 finds most acceptable destocking but recognises that this is unlikely and settles for grazing and smaller (15 per cent) shelterbelts. Shelterbelts without wilding management or non-commercial plantations are excessive use of trees. Least acceptable is continued grazing.

Example: Stakeholder 29, loading = 0.88, female, statutory advisor.
(Hills: non-significant loadings on Factor 1, 2 and 3)
(Lower slopes: non-significant loadings on Factors 1 and 2)
(Higher rainfall flats Factor 2, loading = 0.88)

	53	19	52	
74	40	67	60	22

Figure 14

Array of Lower Rainfall Flats Factor 1 Images



"Destocking with wilding management (22, +2) is most acceptable because soil conservation is important and destocking has the greatest potential. While there is loss of production, we can live with this in this area. Shelterbelts and improved pasture on 15 per cent with wilding management (52, +1) is acceptable only with the proviso that increased tussock will result. I would like to see agroforestry or any type of crop other than pines, such as horticulture or grapes. Continued grazing with wilding management (60, +1) is acceptable with reduced stocking to give increased native ground cover. Shelterbelts and improved pasture on 70 per cent with wilding management (19, 0) receives a neutral score and while it is not really acceptable may be all right with improved tussock along with wilding management. Shelterbelts and improved pasture on 15 per cent (67, 0) receives a neutral score but is not really acceptable because there is no management. Non-commercial plantations on 15 per cent (53, -1) and on 70 per cent (40, -1) are not acceptable because there is no income and yet it is a mess. Finally, continued grazing (74, -2) is least acceptable because the landscape is totally changed with very little benefit to soil conservation. Generally, I am not convinced of the soil improvement (with trees) and I am sceptical of most of the statements about effects."

Stakeholder 29 has responded to the effects and expresses a soil conservation viewpoint because trees are not wanted and has a Q sort similar to a grazier. It is hoped that continued grazing will occur with reduced stocking. Thus, destocking is most acceptable followed by smaller shelterbelts and continued grazing. In general, trees and non-commercial plantations are not acceptable so that wilding management is important.

Summary of Main Features Factor 2 (14 stakeholders)

'Grazing, Some Shelterbelts' (see Figure 15)

74 67 53 40 19 60 52 22

Stakeholders loading on Factor 2 are graziers or conservationists who do not see that trees should play a significant role on the lower rainfall flats. For this reason destocking is most acceptable, although seen by some as an ideal. More realistic and acceptable is grazing with some or no shelterbelts. Shelterbelts or non-commercial plantations at the 70 per cent level is an excessive amount of trees, however they are better than the remaining options because they have wilding management. Wildings are seen as having no value and as a threat to either grazing or conservation.

3.5.3 Factor 3: 'Conservation with Non-commercial Plantations'

Illustrations of Positive Loadings Factor 3

Example: Stakeholder 58, loading = 0.95, male, local business.
(Hills Negative Factor 4, loading = 0.57 N.S.)
(Lower slopes Factor 1, loading = 0.62)
(Higher rainfall flats Negative Factor 2, loading = 0.96)

	19	52	53	
60	74	67	40	22

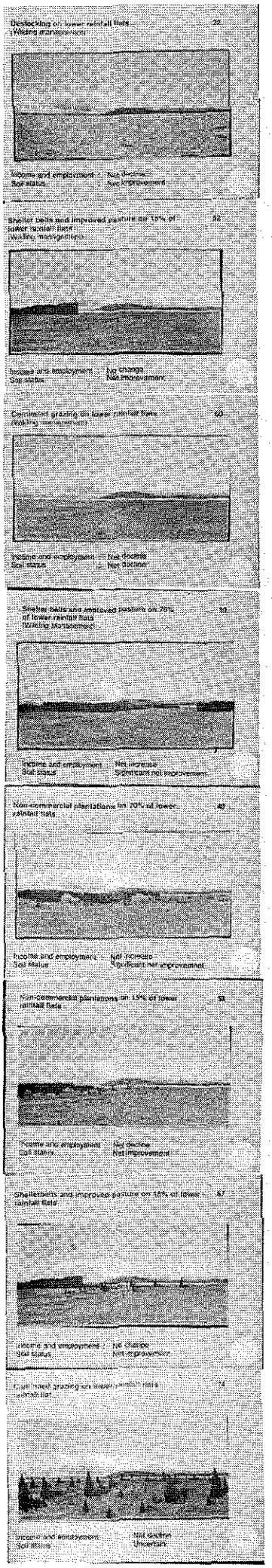


Figure 15

Array of Lower Rainfall Flats Factor 2 Images

"Destocking with wilding management (22, +2) is most acceptable. Non-commercial plantations on 15 per cent (53, +1) is acceptable because it is better than wildings establishing by themselves. Non-commercial plantations on 70 per cent (40, +1) is acceptable, but is a second option compared to 15 per cent. Shelterbelts and improved pasture on 15 per cent with wilding management (52, 0) and without wilding management (67, 0) both receive a neutral score because I cannot see how this can be achieved and would not want to see it. Shelterbelts and improved pasture on 70 per cent with wilding management (19, -1) is not acceptable because it is not feasible. Continued grazing (74, -1) is not acceptable because it is preferable to destock. Finally, continued grazing with wilding management (60, -2) is least acceptable."

Stakeholder 58 finds most acceptable the destocking option and consistently does not want grazing on the lower rainfall flats, hence shelterbelts and improved pasture are not acceptable. Instead of grazing, non-commercial plantations are acceptable.

Example: Stakeholder 1, loading = 0.89, male, statutory advisor.
(Hills: Factor 3, loading = 0.70)
(Lower slopes Factor 4 loading = 0.85)
(Higher rainfall flats Factor 1, loading = 0.82)

	19	67	53	
60	74	40	52	22

"Destocking with wilding management (22, +2) is most acceptable because the open status is preferred and soil degradation is not upsetting because it is normal for semi-arid soils. Income and employment are not important factors. Non-commercial plantations on 15 per cent (53, +1) is acceptable as is shelterbelts and improved pasture on 15 per cent with wilding management (52, +1). Shelterbelts and improved pasture on 15 per cent (67, 0) receives a neutral score as does non-commercial plantations on 70 per cent (40, 0) because for the latter the 70 per cent is too much. Shelterbelts and improved pasture on 70 per cent with wilding management (19, -1) is not acceptable because farming is not viable: it leaves little leeway and no room for error. Continued grazing (74, -1) is not acceptable. Finally, continued grazing with wilding management (60, -2) is least acceptable because grazing will worsen and more quickly lead to a cycle towards nothing. Generally, I am prepared to pay DOC to conserve the lower rainfall flats."

Stakeholder 1 expresses a conservation viewpoint and favours no grazing and smaller non-commercial plantations. The statements of effects are not important in this Q sort.

Example: Stakeholder 61, loading = 0.82, male, statutory adviser.
(Hills Factor 3, loading = 0.74)
(Lower slopes Factor 3, loading = 71)
(Higher rainfall flats: non-significant loadings on Factors 1, 3 and 4)

	19	53	67	
60	74	52	40	22

"Destocking with wilding management (22, +2) is most acceptable because it leaves options open. Shelterbelts and improved pasture on 15 per cent (67, +1) is acceptable because

probably about 15 per cent of soils in this zone are worth this land use - most of these areas are close to homesteads. Non-commercial plantations on 70 per cent (40, +1) is acceptable. The plantations will be slow growing and the shrubby vegetation and tall trees will not look regimental, and extensive grazing production is quite good. It is visually alright because it fits low in the landscape. Non-commercial plantations on 15 per cent (53, 0) receives a neutral score because the 15 per cent looks like a blob on the landscape and is not visually acceptable. Shelterbelts and improved pasture on 15 per cent with wilding management (52, 0) receives a neutral score but is less preferable than 53 because it does not look so good. Shelterbelts and improved pasture on 70 per cent with wilding management (19, -1) is not acceptable because it is not economically possible and needs huge inputs. Continued grazing (74, -1) is not acceptable because it is not sustainable. It is not the wildings that are the problem - some management can protect vistas. Finally, continued grazing with wilding management (60, -2) is least acceptable because it is unsustainable. Generally, none of the lower rainfall flats can be unmanaged as it has to be kept free of weeds and pests. Management and generation of income can take place on the limited areas with good soils or around homesteads. I am sceptical about some of the income and employment effects because they have not accounted for tourism. The poorer soils should be managed for landscape values."

Stakeholder 61 has reacted to the effects and finds most acceptable destocking and non-commercial plantations with some limited grazing. Wildings are not seen as a major problem. Least acceptable is continued grazing because the land is too dry and best conserved for landscape values.

Summary of Main Features Factor 3 (4 stakeholders)

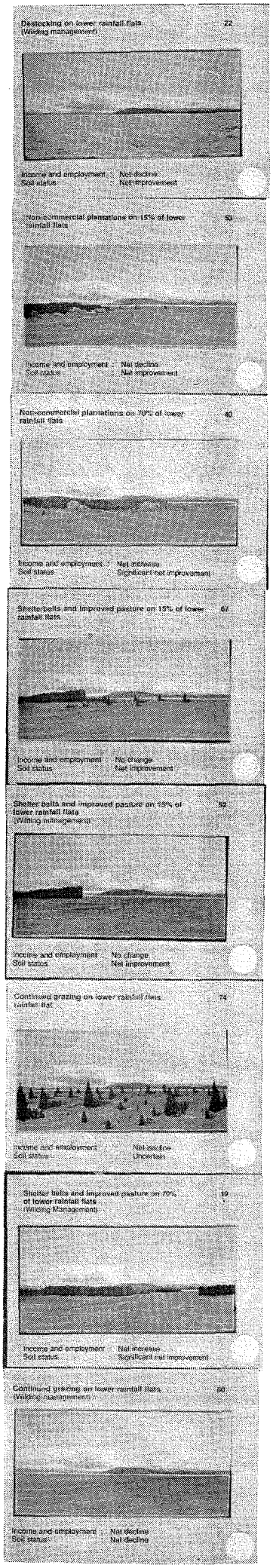
'Conservation With Non-commercial Plantations' (see Figure 16)

60 19 74 52 67 40 53 22

Stakeholders loading on Factor 3 favour destocking and little or no grazing. Essentially their viewpoint reflects a conservationist approach so that non-commercial plantations are acceptable because they conserve the land. Shelterbelts are not acceptable because they are associated with grazing. Wildings are not a major problem.

Figure 16

Array of Lower Rainfall Flats Factor 3 Images



3.5.4 Distinguishing Characteristics of Each Factor

Table 13 shows the main criteria for each of the lower rainfall flats factors.

Table 13
Main Criteria for Each of the Lower Rainfall Flats Factors

Factor	Conser-vation	Shelter	Grazing	Plantations		Wilding Manage-ment	Visual Aspects	Produc-tion
				Large	Small			
1		X		X (Non-comm.)		X		
2		X	X			X		
3	X			X (Non-comm.)				

Factor 1: 'Shelterbelts, Non-commercial Plantations, and Grazing'
Factor 2: 'Grazing: Some Shelterbelts'
Factor 3: 'Conservation With Non-commercial Plantations'

Table 14 shows the Z scores for all statements which are significantly different at the 0.01 level when compared to all other factors

Table 14
Distinguishing Characteristics for the Lower Rainfall Flats Factors

		Factor		
		1	2	3
19.	Shelterbelts and improved pasture on 70 per cent (wilding management)	1.6*	0.4	-0.9
22.	Destocking (wilding management)	-1.0*	1.6	1.6
53.	Non-commercial plantations on 15 per cent	0.0*	-0.6*	0.7*
67.	Shelterbelts and improved pasture on 15 per cent (wilding management)	0.2	-0.7*	0.1*
40.	Non-commercial plantations on 70 per cent	0.7	-0.2*	0.7
60.	Continued grazing (wilding management)	-1.4	0.4*	-1.5
74.	Continued grazing	-0.9	-1.6*	-0.6

Shelterbelts and improved pasture on 70 per cent with wilding management (19) is acceptable to Factor 1 because this is a 70 per cent option for the most favoured land use, is only slightly acceptable to Factor 2 because only some shelterbelts are needed for grazing and not acceptable to Factor 3 because grazing on improved pasture is incompatible with conservation. Destocking with wilding management (22) is not acceptable to Factor 1 because grazing is wanted, is acceptable to Factor 2 because, while it is a grazing orientation, there is attraction to the open tussock view, and is acceptable to Factor 3 because destocking is essential for conservation. Non-commercial plantations on 15 per cent (53) is neutral for Factor 1 because it has no wilding management, is not acceptable to Factor 2 who has only limited interest in trees, and is acceptable to Factor 3. Shelterbelts and improved pasture on 15 per cent with wilding management (67) is not acceptable to Factor 2 because it jeopardises grazing. Non-commercial plantations on 70 per cent (40) is slightly rejected by Factor 2 for the same reason. Finally, the two continued grazing options (60 and 74) receive similar scores from Factors 1 and 3: neither of these options is acceptable. However, Factor 2 accepts continued grazing with wilding management but rejects it without wilding management because the latter has too many trees and threatens grazing.

3.6 Patterns of Acceptability Across Land Forms

The previous sections have presented the results of the analysis of Q sorts for each of the four land forms. There are also some patterns in the Q sorts which show up as similar factors in different land forms. The objective of this section is to identify the patterns of acceptability of land use across the four land forms. For this purpose only those factors with large numbers of stakeholders are examined. Before characterising these factors their origins in each of the land forms is shown in Table 15.

Table 15
Factor Number for Each Theme

	Hills	Lower Slopes	Higher Rainfall Flats	Lower Rainfall Flats
Plantations	1	2	-2	-
Grazing/trees	2	1	1	-
Conservation	3	3	2	-

Table 16 shows the main criteria for each of the main factors for all land forms, that create these common themes. (Reference to Table 17 can also assist in this process because it provides a list of the full names for each main factor for all land forms.) For all but the lower rainfall flats there is a pattern of three themes across the land forms. They are labelled 'Plantations', 'Grazing/trees' and 'Conservation'. These three themes account for most of the stakeholders.

The first theme (plantations) emphasises larger plantations and production. This is hills Factor 1, lowers slopes Factor 2, and higher rainfall flats negative Factor 2. Table 17 reminds us that this theme emphasises trees ahead of grazing to use and improve the land.

The second theme (grazing/trees) emphasises grazing, wilding management and production. On the hills emphasis is given to larger plantations but on the lower slopes and higher rainfall flats it is on shelterbelts. This is hills Factor 2, lower slopes Factor 1 and higher rainfall flats Factor 1. Table 17 reminds us that this theme emphasises grazing and trees but as separate activities and for which wilding management is crucial.

The third theme (conservation) is the factor which consistently emphasises conservation and wilding management. On the hills emphasis is given to destocking and smaller plantations. On the lower slopes emphasis is given to larger plantations. On the higher rainfall flats emphasis is given to visual aspects. This is hills Factor 3, lower slopes Factor 3 and higher rainfall flats Factor 2. Table 17 reminds us that this theme emphasises only modest grazing, some trees or plantations and wilding management.

Table 16 shows that the lower rainfall flats do not have the same distinguishing characteristics as the other land forms. The two factors, comprising most of the stakeholders, shelterbelts or grazing. It is plausible that land use preferences become closer together for the lower rainfall flats because there is less rain for trees. Shelterbelts are an obvious choice for 'plantation' stakeholders and for 'grazing/trees' stakeholders.

Table 16
Main Criteria for Each Main Factor for All Land Forms

	Factor No.	No. of Cases	Cum. %	Conser-vation	Shelter	Grazing	Plantations		Wilding Manage-ment	Visual Aspects	Production
							Small	Large			
Hills											
Plantations	1	21	51					X			X
Grazing/trees	2	9	73			X		X	X		X
Conservation	3	6	88	X			X		X		
Lower Slopes											
Grazing/trees	1	21	36		X	X			X		X
Plantations	2	20	70		X			X			X
Conservation	3	10	87	X				X	X		
Higher Rainfall Flats											
Grazing/trees	1	36	56		X	X			X		
Conservation	2	14	78	X					X	X	
Plantations	-2	8	91	X				X			
					X	X					
Lower Rainfall Flats											
Grazing/shelter	1	32	64		X	X		X (Non-comm.)			
Grazing	2	14	92			X			X		

The three main themes described here account for most stakeholders who had significant loadings on one or more factors. The cumulative percentage of stakeholders who loaded significantly on a factor is shown in Table 16 for each land form. For the hills and lower slopes the three main themes account for 88 and 87 per cent of significantly loading stakeholders respectively. For the higher rainfall flats the three main themes account for 91 per cent of stakeholders. Also to be noted is that the number of stakeholders loading on the thematic factors do not match across land forms. For example, for the hills Q sort there are nine 'grazing/trees' stakeholders, compared to 21 on the lower slopes and 36 on the higher rainfall flats.

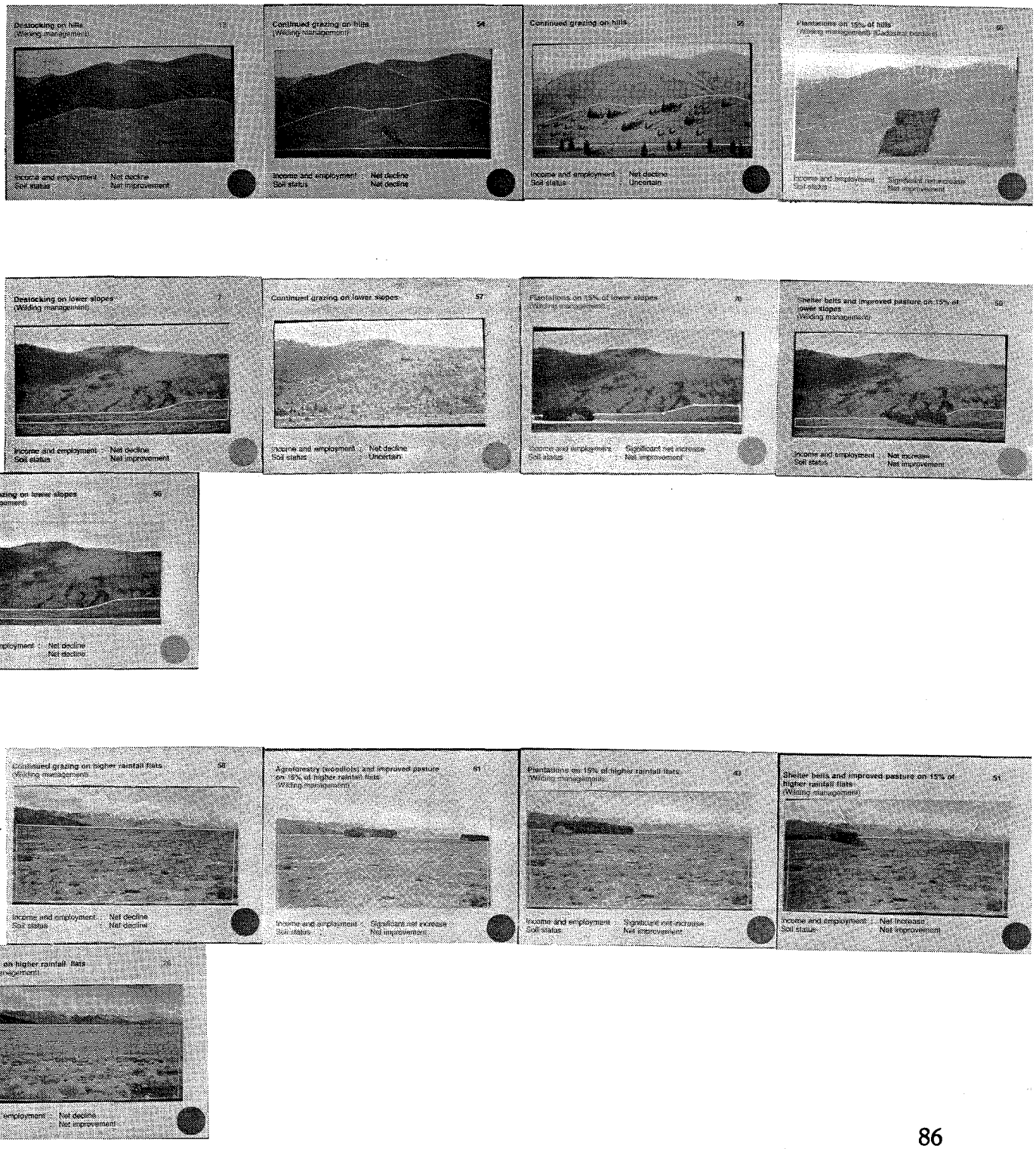
The numbers of cases loading on the three main themes does not add up to the total number of stakeholders interviewed. This is because the loading of a number of stakeholders fell outside the range that is statistically significant for the size of Q sort involved. It was noted earlier, for example, that some 23 stakeholders loaded between 0.5 and 0.7 on the plantations factor for the hills, but because the cut-off point for significance is 0.7 they do not appear in Table 16.

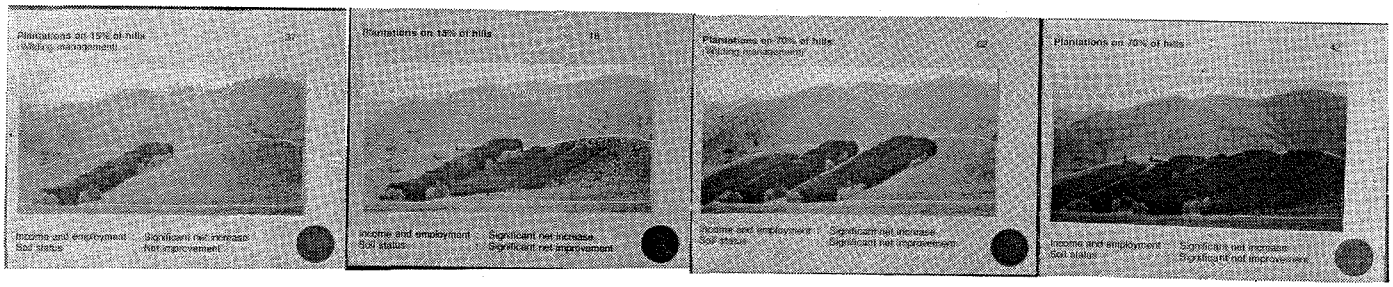
Table 17
List of Full Names for Each Main Factor for All Land Forms

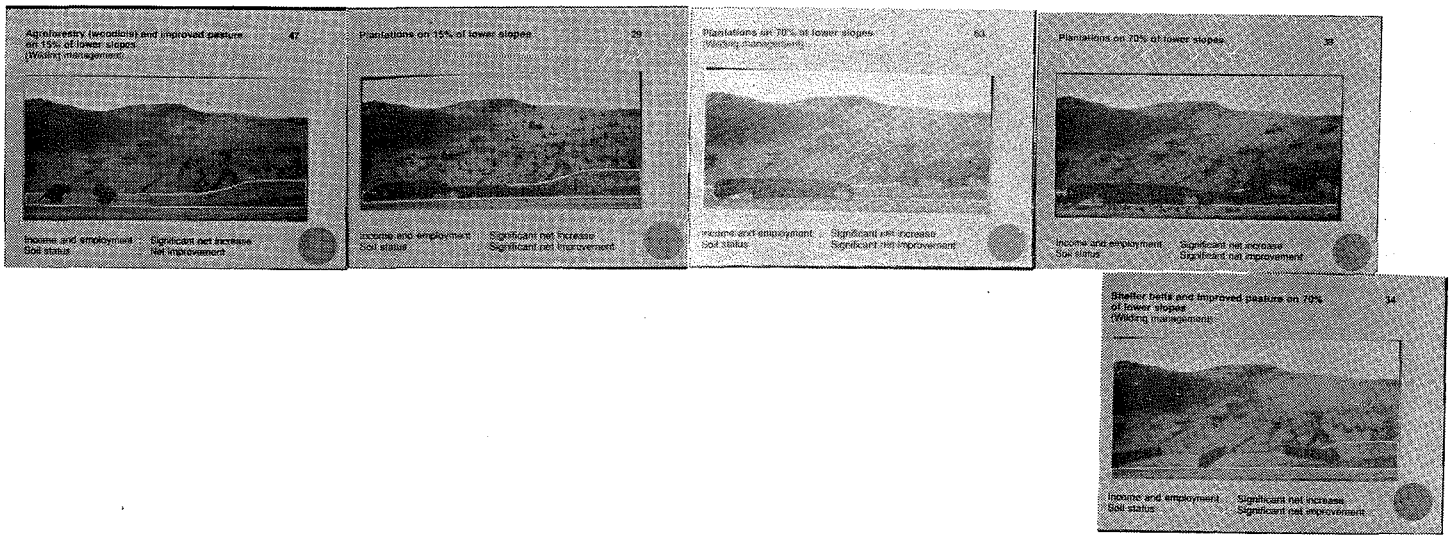
Factor No.	No. of Cases	
Hills		
1	21	'Plantations Not Grazing to Use and Improve the Land'
2	9	'Grazing Separate from Plantations, Wilding Management Crucial'
3	6	'Little or No Grazing, Smaller Plantations, Concern with Wilding Management'
Lower Slopes		
1	21	'Grazing, Trees for Shelter, Wilding Management Crucial'
2	20	'Plantations or Shelterbelts and Improved Pasture to Use the Land'
3	10	'Conservation with Some Plantations and Control of Wildings'
Higher Rainfall Flats		
1	36	'Grazing, Trees for Shelter, Wilding Management Important'
2	14	'Conservation for Open Views, Some Grazing, Some Trees, Wilding Management Crucial'
-2	8	'Plantations to Use and Improve the Land'
Lower Rainfall Flats		
1	32	'Shelterbelts, Non-commercial Plantations, and Grazing'
2	14	'Grazing, Some Shelterbelts'

The three main patterns described in this section can also be presented using the image cards. Figures 17 to 19 show the arrays of images for each of the three main themes for each land

Figure 17
Array of Images for the Plantations Theme for Hills, Lower Slopes and Higher Rainfall Flats




Plantations on 15% of hills
Plantations on 15% of hills
Plantations on 70% of hills
Plantations on 70% of hills


Agroforestry (woodlots) and improved pasture on 15% of lower slopes
Plantations on 15% of lower slopes
Plantations on 70% of lower slopes
Plantations on 70% of lower slopes
Shelter belts and improved pasture on 70% of lower slopes

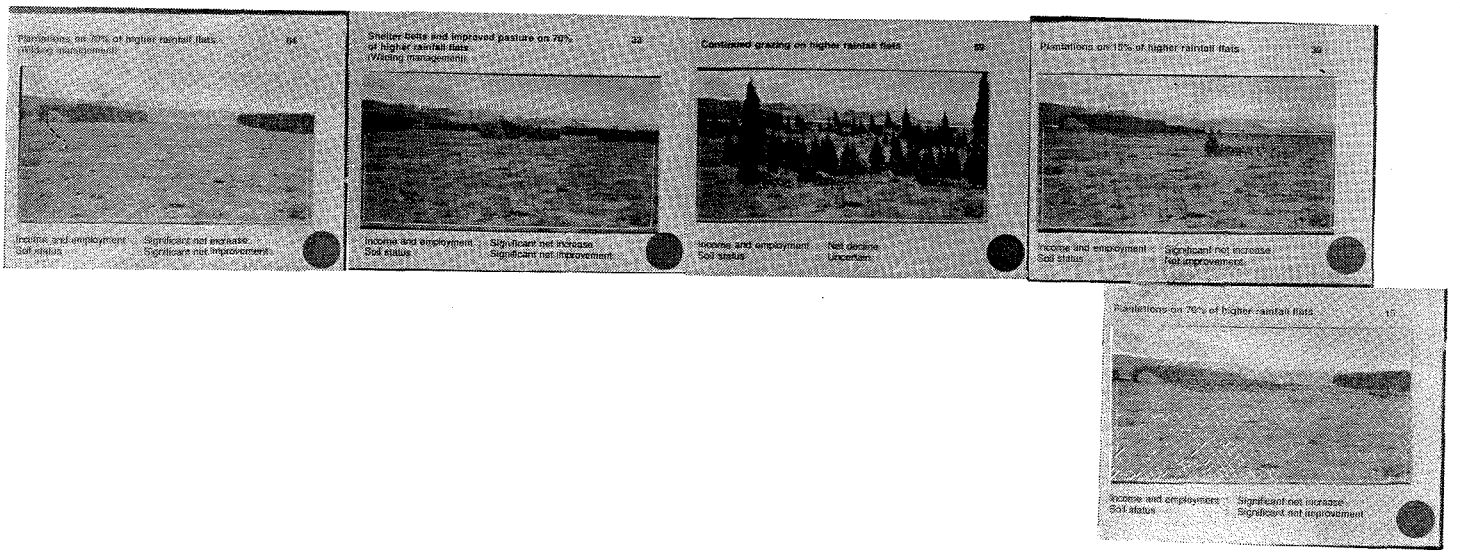
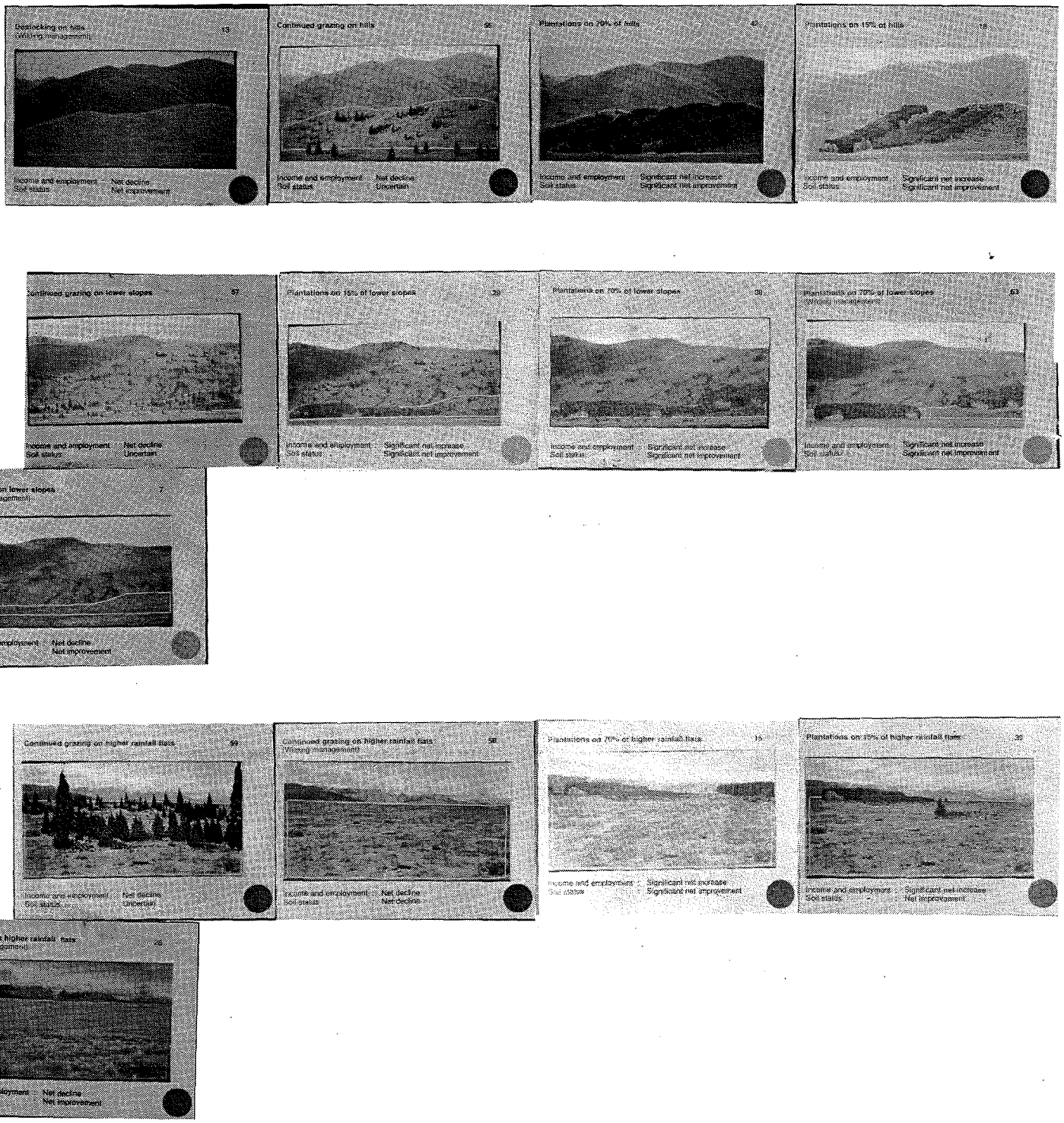
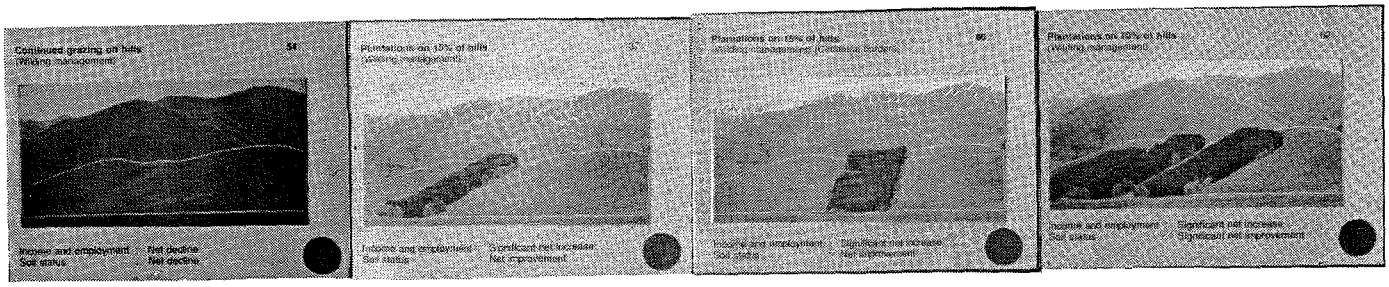
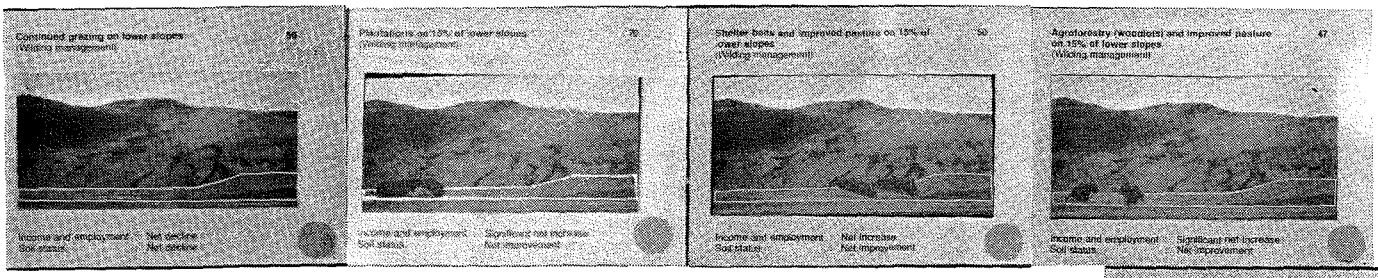
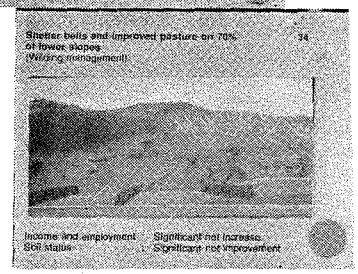

Plantations on 70% of higher rainfall flats
Shelter belts and improved pasture on 70% of higher rainfall flats
Contained grazing on higher rainfall flats
Plantations on 15% of higher rainfall flats
Plantations on 70% of higher rainfall flats

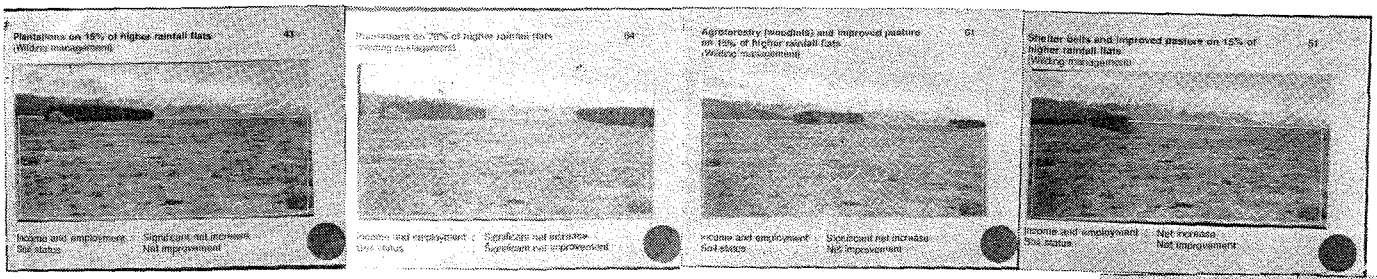
Figure 18
Array of Images for the Grazing/trees Factor for Hills, Lower Slopes and Higher Rainfall Flats




Continued grazing on hills
(Wilding management)
Income and employment : Net decline
Soil status : Net decline
Plantations on 15% of hills
(Wilding management)
Income and employment : Significant net increase
Soil status : Net improvement
Plantations on 15% of hills
(Wilding management)
Income and employment : Significant net increase
Soil status : Net improvement
Plantations on 15% of hills
(Wilding management)
Income and employment : Significant net increase
Soil status : Significant net improvement


Continued grazing on lower slopes
(Wilding management)
Income and employment : Net decline
Soil status : Net decline
Plantations on 15% of lower slopes
(Wilding management)
Income and employment : Significant net increase
Soil status : Net improvement
Shelter belts and improved pasture on 15% of lower slopes
(Wilding management)
Income and employment : Net increase
Soil status : Net improvement
Agroforestry (woodlots) and improved pasture on 15% of lower slopes
(Wilding management)
Income and employment : Significant net increase
Soil status : Net improvement


Shelter belts and improved pasture on 70% of lower slopes
(Wilding management)
Income and employment : Significant net increase
Soil status : Significant net improvement


Plantations on 15% of higher rainfall flats
(Wilding management)
Income and employment : Significant net increase
Soil status : Net improvement
Plantations on 70% of higher rainfall flats
(Wilding management)
Income and employment : Significant net increase
Soil status : Significant net improvement
Agroforestry (woodlots) and improved pasture on 15% of higher rainfall flats
(Wilding management)
Income and employment : Significant net increase
Soil status : Net improvement
Shelter belts and improved pasture on 15% of higher rainfall flats
(Wilding management)
Income and employment : Net increase
Soil status : Net improvement

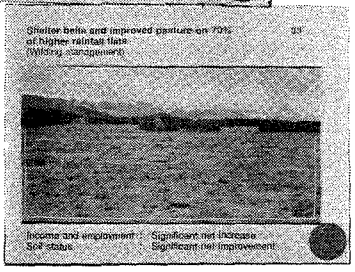
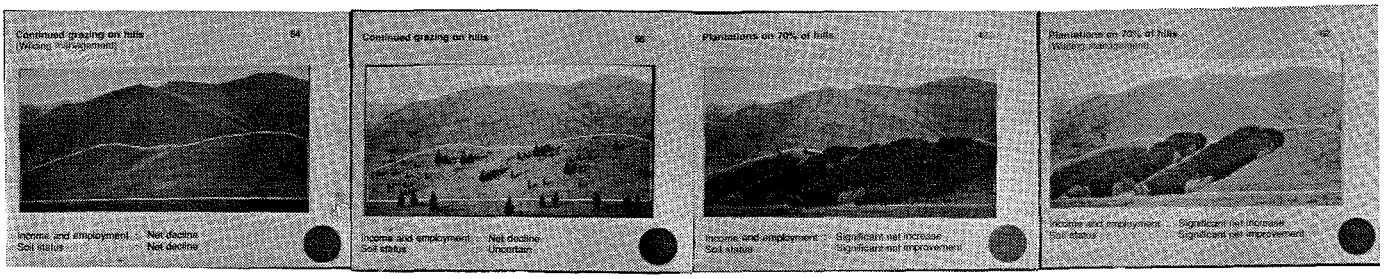
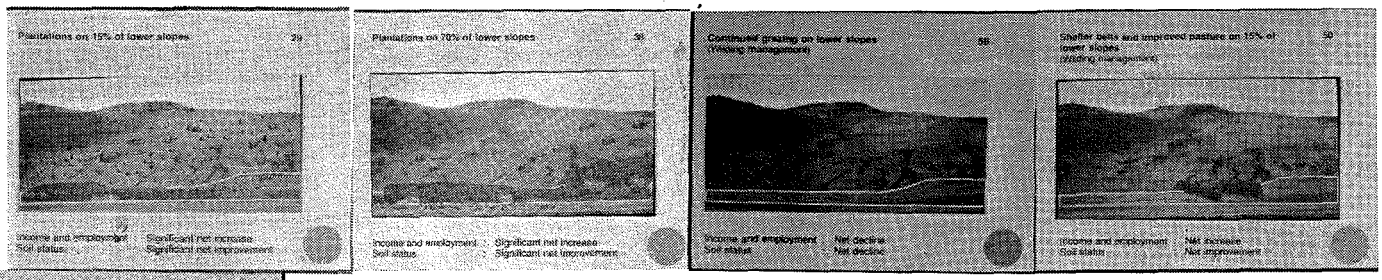
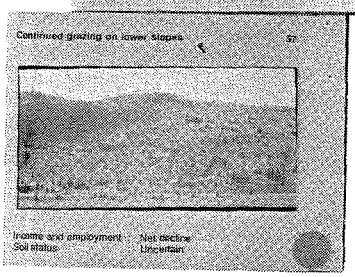
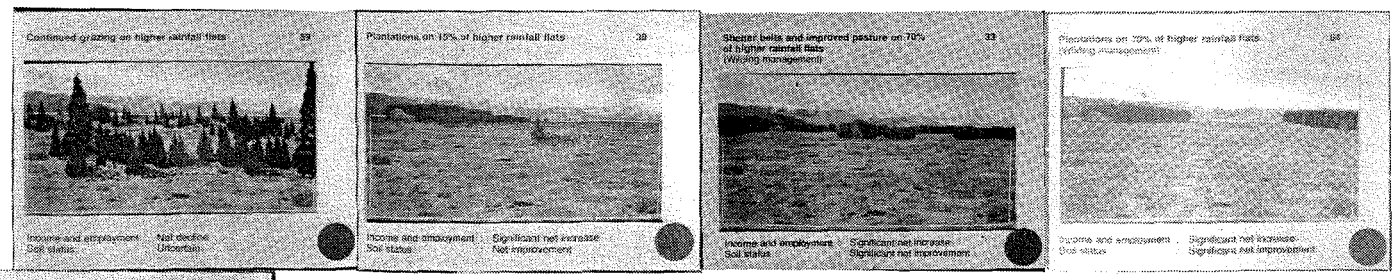

Shelter belts and improved pasture on 70% of higher rainfall flats
(Wilding management)
Income and employment : Significant net increase
Soil status : Significant net improvement

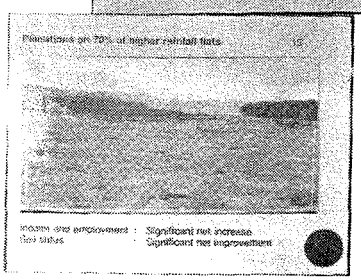
Figure 19
Array of Images for the Conservation Theme for Hills, Lower Slopes and Higher Rainfall Flats

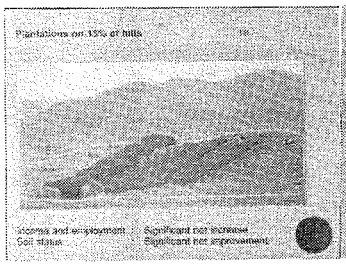


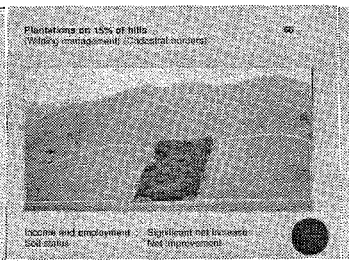


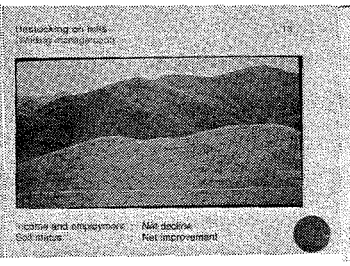


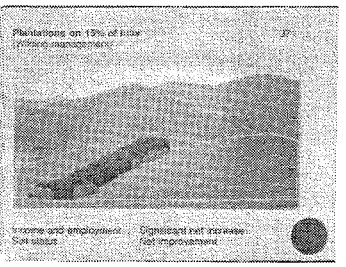


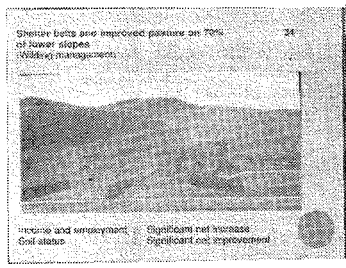


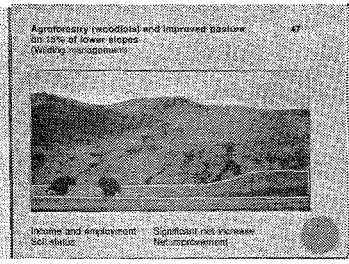

Plantations on 15% of hills 18
Income and employment : Significant net increase
Soil status : Significant net improvement

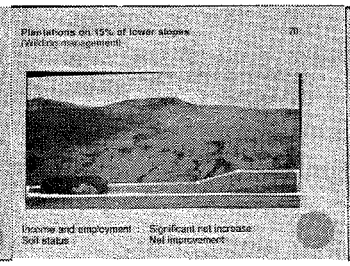

Plantations on 15% of hills 60
(Wilding management) (Industrial workers)
Income and employment : Significant net increase
Soil status : Net improvement

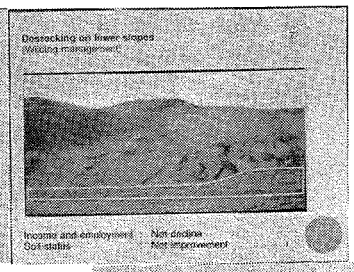

Destocking on hills 13
(Wilding management)
Income and employment : Net decline
Soil status : Net improvement

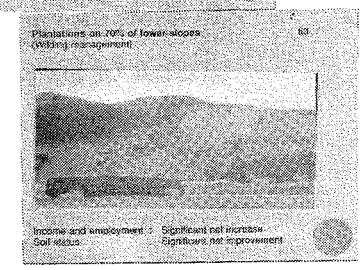

Plantations on 15% of hills 47
(Wilding management)
Income and employment : Significant net increase
Soil status : Net improvement

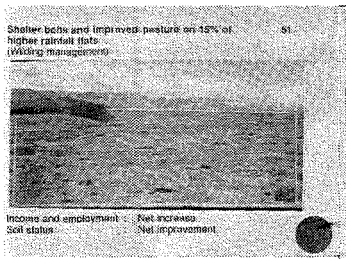

Shelter belts and improved pasture on 70% of lower slopes 24
(Wilding management)
Income and employment : Significant net increase
Soil status : Significant net improvement

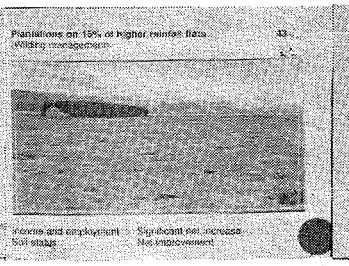

Agroforestry (woodlots) and improved pasture on 15% of lower slopes 47
(Wilding management)
Income and employment : Significant net increase
Soil status : Net improvement

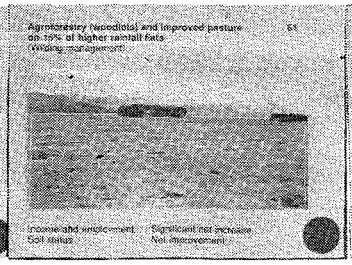

Plantations on 15% of lower slopes 78
(Wilding management)
Income and employment : Significant net increase
Soil status : Net improvement

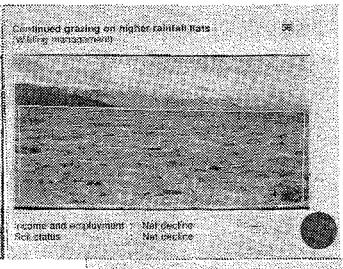

Destocking on lower slopes
(Wilding management)
Income and employment : Net decline
Soil status : Net improvement

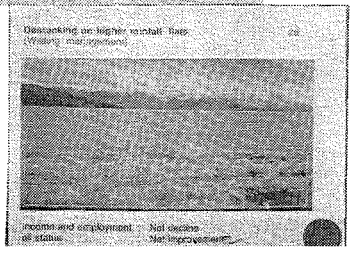

Plantations on 70% of lower slopes 60
(Wilding management)
Income and employment : Significant net increase
Soil status : Significant net improvement


Shelter belts and improved pasture on 15% of higher rainfall flats 51
(Wilding management)
Income and employment : Net increase
Soil status : Net improvement


Plantations on 15% of higher rainfall flats 43
(Wilding management)
Income and employment : Significant net increase
Soil status : Net improvement


Agroforestry (woodlots) and improved pasture on 15% of higher rainfall flats 51
(Wilding management)
Income and employment : Significant net increase
Soil status : Net improvement


Continued grazing on higher rainfall flats 56
(Wilding management)
Income and employment : Net decline
Soil status : Net decline


Destocking on higher rainfall flats 22
(Wilding management)
Income and employment : Net decline
Soil status : Net improvement

form for which they were distinctive. Figure 17 shows the plantation factor for the hills, lower slopes and higher rainfall flats. One anomaly is the acceptability of continued grazing on 70 per cent for the higher rainfall flats (59). For the other land forms this land use is not acceptable. It is likely that the closer view of the larger wilding trees in the higher rainfall flats image appeals to the plantations factor because it shows trees, which we know engenders a positive response. Aside from this anomaly the pattern of images is similar across land forms.

Figure 18 shows the grazing/trees factor for hills, lower slopes and higher rainfall flats. An anomaly is the unacceptability of continued grazing with wilding management (58) for the higher rainfall flats. Perhaps there is greater sensitivity about grazing the flats while for the hills and lower slopes it is somewhat acceptable.

Figure 19 shows the conservation factor. Plantations on 70 per cent with wilding management (63) is most acceptable for lower slopes but slightly unacceptable for the other two land forms. Also unusual is continued grazing with wilding management (58) which is acceptable on the higher rainfall flats. Perhaps this image appeared the same as destocking.

3.7 Stakeholder Characteristics of the Factors

Tables 18-21 show the stakeholder characteristics for the four separate Q sorts. Each table shows the frequency with which each type of stakeholder occurs as a factor. At the bottom of each table is a list of the factor names. There are some apparent relationships but no definitive patterns. There is no strong link between stakeholder type and factor. The hills Factor 1 ('plantations') is comprised of nearly all types of stakeholders but most support comes from local business people and service providers. Hills Factor 2 'grazing/trees' is supported mostly by runholders. Hills Factor 3 ('Conservation') has most support from statutory advisors. It should be noted that runholders supported both 'plantations' and 'grazing/trees'. The 'other' column shows which types of stakeholders were no loaders, non-significant loaders or multiple loaders. These stakeholders have idiosyncratic Q sorts. Many (six out of sixteen) of the local business stakeholders were in this category as were five out of ten statutory advisors.

The same general pattern of runholder support for 'grazing/trees' and service provider and local business support for 'plantations' occurs in the lower slopes Q sort. 'Conservation' gains support from all types of stakeholders, but, surprisingly, little support from the statutory advisors. For the higher rainfall flats, runholders and local business stakeholders support 'grazing/trees'. Local business, recreation/conservation and statutory advisors support Factor 2 'conservation'. Local business stakeholders support negative Factor 2 'plantations'. For the lower rainfall flats there is broad support from all stakeholders for Factor 1 and Factor 2.

There are no clear gender patterns to responses.

Table 18
Summary of Stakeholder Characteristics for the Hills Q Sort

Stakeholder Type	Factors								
	1	-1	2	-2	3	-3	4	-4	Other
Runholder/Manager									
12 males	3		3			1	2	1	2
9 females		1	4				1		3
Service Provider									
3 males				1	1				1
7 females	4				1			1	1
Commercial Advisor									
4 males	1		1						2
Local Business									
10 males	6	1						1	2
6 females	2								4
Politician									
3 males						1	1		1
1 females									1
Tangata Whenua									
2 males	2								
1 female						1			
Recreation/Conservation									
4 males				2	1				1
3 females	1	1							1
Statutory Advisor									
8 males	1				3		1		3
3 females	1								2
Regional Advisor									
1 male			1						
Total									
77	21	3	9	3	6	3	5	2	25

Factor 1 = 'Plantations'
Factor 2 = 'Grazing/trees'
Factor 3 = 'Conservation'

Table 19
Summary of Stakeholder Characteristics for the Lower Slopes Q Sort

Stakeholder Type	Factors 1	-1	2	-2	3	-3	4	Other
Runholder/Manager								
12 males	8		2		1		1	
9 females	3		1		2			3
Service Provider								
3 males					1		1	1
7 females	1		3			1	1	1
Commercial Advisor								
4 males	1		1				2	
Local Business								
10 males	2		4	2	1			1
6 females	1		2					
Politician								
3 males			1		1			1
1 females			1					
Tangata Whenua								
2 males			1					1
1 female	1							
Recreation/Conservation								
4 males		1			2			1
3 females	2		1					
Statutory Advisor								
8 males			3	1	2		1	1
3 females	1						1	1
Regional Advisor								
1 male	1							
Total								
77	21	1	20	3	10	1	7	14

Factor 1 = 'Grazing/trees'
Factor 2 = 'Plantations'
Factor 3 = 'Conservation'

Table 20
Summary of Stakeholder Characteristics for the Higher Rainfall Flats Q Sort

Stakeholder Type	Factors 1	-1	2	-2	3	-3	4	Other
Runholder/Manager								
12 males	7		1	1	2			1
9 females	4			1	1		2	1
Service Provider								
3 males	1		1					1
7 females	4	1				1		1
Commercial Advisor								
4 males	2			1				1
Local Business								
10 males	4		3	2				1
6 females	3		1	2				
Politician								
3 males	2							1
1 females								1
Tangata Whenua								
2 males	1		1					
1 female	1							
Recreation/Conservation								
4 males			3					1
3 females	2		1					
Statutory Advisor								
8 males	2		2	1			1	2
3 females	2		1					
Regional Advisor								
1 male	1							
Total								
77	36	1	14	8	3	1	3	11

Factor 1 = 'Grazing/trees'
Factor 2 = 'Conservation'
Factor 3 = 'Plantations'

Table 21

Summary of Stakeholder Characteristics for the Lower Rainfall Flats Q Sort

Stakeholder Type	Factors 1	-1	2	-2	3	-3	Other
Runholder/Manager							
12 males	5		1			1	5
9 females	5		3				1
Service Provider							
3 males	1		2				
7 females	3		1		1		1
Commercial Advisor							
4 males	3						1
Local Business							
10 males	4	1		1	1		3
6 females	4						2
Local/Regional Politician							
3 males	2		1				
1 females							
Tangata Whenua							
2 males	1						1
1 female						1	
Recreation/Conservation							
4 males			2				2
3 females	1		1				1
Statutory Advisor							
8 males	1		2		2		3
3 females	1		1				1
Regional Advisor							
1 male							1
Total							
77	32	1	14	1	4	2	22

Note: for the lower rainfall flats one Q sort was not completed.

3.8 Stakeholder Loadings on Factors Across Land Forms

Having described the themes across land forms and the types of stakeholders associated with each factor it is now relevant to consider the consistency of stakeholders' Q sorting across land forms - that is, to examine whether a stakeholder who was on one factor for the hills Q sort occurred on the equivalent factor on another land form. In part, this analysis is a test of the consistency of stakeholders' sense of acceptable land use effects. However, it is quite possible and plausible that stakeholders would change their ideas about the most acceptable land use effects for each land form despite the occurrence of themes already described.

Appendix 2 shows a complete list of stakeholders, with characteristics of gender and type, and the factors in which they occurred for each land form. For those stakeholders not loading on a factor, the reason is given by virtue of the following symbols: NS represents a non-significant loading, M represents multiple loading and NL represents no loading. Examination of Appendix 2 shows that there are no clear patterns in the stakeholders' loadings across land forms. That is, stakeholders do not consistently follow the major themes. For example, for the 'plantations' theme we would expect stakeholders to load on hills Factor 1, lower slopes Factor 2, and higher rainfall flats negative Factor 2. For this particular sequence there are only two stakeholders. There are five stakeholders that load on hills Factor 1, lower slopes Factor 2 and higher rainfall flats Factor 1. There is a greater degree of consistency between the hills and lower slopes land forms. There are 11 stakeholders that load on hills Factor 1 and lower slopes Factor 2 and seven stakeholders that load on hills Factor 2 and lower slopes Factor 1.

The level of consistency of stakeholders Q sorting across land forms is not therefore high. There appear to be two processes at work. First, some stakeholders have different views about appropriate land use in the different land forms and this would mean that they would load on different factors. Second, although the factors themselves have some common themes they are not identical, so this variation would affect stakeholder loadings on factors. A clue to the variation between thematic factors is indicated by the numbers of stakeholders that significantly load on them. These numbers vary (see Table 17). (Further examination of the variation in factors across land forms will be presented in the discussion.) These two processes mean that consistent loadings across land forms are unlikely. However, despite this fact, thematic factors have emerged. Thus, while individual stakeholders' definitions of acceptable land uses may change across land forms, enough similarity among stakeholders as a whole exists for each land form to have distinctive thematic factors. This fact is encouraging for the development of effective policy.

3.9 The Overall Q Sort

All stakeholders completed their Q sorting with a Q sort of the complete set of 36 image cards, that is, all cards for all land forms. This overall Q sort was observed to be quite demanding and caused a number of stakeholders significant problems. Many stakeholders relied upon the images alone as the basis of their Q sort, and comments were made on only some of the 36 images, unlike the land form Q sorts where most images received a comment. For 36 items in a Q sort the standard error of a loading is 0.33 at the 0.05 level. Since the significant levels are lower for the overall Q sort compared with the landform by landform

sorts there was a larger proportion of stakeholders with significant loadings. Table 22 shows the distribution of loadings across three factors. There is a correlation between factors 1 and 3.

Table 22
Distribution of Significant Loadings for the Overall Q Sort

	Factors			
	1	2	3	
Significant loadings:				
Positive	32	15	12	59
Negative	1	3	1	5
Subtotal	33	18	13	64
		Non significant loadings		13
			TOTAL	77

Instead of examining individual Q sorts and using them to define the factors, the Q sort arrays for each factor will be examined directly. In the following section the Factors identified in the overall Q sort are first described, then compared and related to the factors that were identified in the landform by landform Q sorts.

Overall Factor One

Table 23 shows the order of image cards for Factor 1 with the most acceptable image at the top. Focusing on the land uses shows that plantations at 70 per cent are most acceptable, followed by shelterbelts and improved pasture on 70 per cent. Least acceptable are continued grazing and destocking. The wilding management option for the various land uses is distributed evenly across the array of images, indicating that it is not an important issue. Overall Factor 1 thus represents the plantations orientation that has been described in the earlier sections. We would expect those stakeholders loading on hills Factor 1, lower slopes Factor 2 and higher rainfall flats Factor -2 to load onto overall Factor 1. This is confirmed in Table 24 which shows the patterns of loading across all Q sorts for those particular stakeholders who had a high loading on a given factor and were used to interpret the meaning of that factor. The table shows that in all cases except one, the expected pattern occurred. For the lower rainfall flats the results show that Factor 1 there corresponds with overall Factor 1.

Table 23
Plantations Factor for the Overall Q Sort With the Parallel Land Form Q Sorts

No.	Statement	Hills	Lower Slopes	Higher Rainfall Flats	Lower Rainfall Flats
62.	Plantations on 70% of hills (wilding management)	2			
33.	Shelterbelts & improved pasture on 70% of higher rainfall flats(wilding management)			4	
42.	Plantations on 70% of hills	1			
64.	Plantations on 70% of higher rainfall flats (wilding management)			6	
63.	Plantations on 70% of lower slopes (wilding management)		3		
34.	Shelterbelts & improved pasture on 70% of lower slopes (wilding management)		1		
38.	Plantations on 70% of lower slopes		2		
18.	Plantations on 15% of hills	3			
19.	Shelterbelts & improved pasture on 70% of lower rainfall flats (wilding management)				1
37.	Plantations on 15% of hills (wilding management)	4			
43.	Plantations on 15% of higher rainfall flats (wilding management)			7	
15.	Plantations on 70% of higher rainfall flats			1	
47.	A/f (woodlots) & improved pasture on 15% of lower slopes (wilding management)		5		
61.	A/f (woodlots) & improved pasture on 15% of higher rainfall flats (wilding mgmt)			8	
40.	Non-commercial plantations on 70% of lower rainfall flats				2
66.	Plantations on 15% of hills (wilding management) (cadastral borders)	5			
70.	Plantations on 15% of lower slopes (wilding management)		7		
29.	Plantations on 15% of lower slopes		4		
39.	Plantations on 15% of higher rainfall slopes			3	
50.	Shelterbelts & improved pasture on 15% of lower slopes (wilding management)		6		
51.	Shelterbelts & improved pasture on 15% of higher rainfall flats(wilding management)			5	
52.	Shelterbelts & improved pasture on 15% of lower rainfall flats(wilding management)				3
53.	Non-commercial plantations on 15% of lower rainfall flats				5
67.	Shelterbelts & improved pasture on 15% of lower rainfall flats				4
59.	Continued grazing on higher rainfall flats			2	
7.	Destocking on lower slopes (wilding management)		9		
26.	Destocking on higher rainfall flats (wilding management)			10	
57.	Continued grazing on lower slopes		8		
55.	Continued grazing on hills	6			
13.	Destocking on hills (wilding management)	8			
74.	Continued grazing on lower rainfall flats				6
22.	Destocking on lower rainfall flats (wilding management)				7
58.	Continued grazing on higher rainfall flats (wilding management)			9	
56.	Continued grazing on lower slopes (wilding management)		10		
54.	Continued grazing on hills (wilding management)	7			
60.	Continued grazing on lower rainfall flats (wilding management)				8

Returning to Table 23, we can examine the relative position of the respective land form arrays of images, for example whether the plantations factors in the four land forms are embedded in the overall Q sort in the same order. The table shows a column for each land form in which are shown numbers which show the place of that particular image when it was in the land form Q sort. We would expect roughly similar ordering in each Q sort. The hills images are spread evenly over the array, as are those for the lower slopes and higher rainfall flats. However, the lower rainfall flats plantations factor has its top image (number 19) located in ninth position. This suggests that the lower rainfall flats are less significant to stakeholders loading on to the plantations factor. Regarding the order of statements in the land form Q sorts, the table shows that for the hills factor array the order is much the same in the overall factor array. The lower slopes factor array also matches the overall factor array. The higher rainfall flats factor array does not match well. In the overall factor array plantations on 70 per cent with wilding management (64) is considerably more acceptable, as is plantations on 15 per cent (43) and agroforestry (woodlots) and improved pasture on 15 per cent with wilding management (61). Conversely, plantations on 70 per cent (15) is less acceptable, as is plantations on 15 per cent (39) and continued grazing (59). Finally, the order of the lower rainfall flats factor array matches the overall factor array. It is noteworthy that the discrepancies in the higher rainfall flats factor array involves mostly changes in the position of plantations options rather than changes in the position of other land uses. In particular, the two plantations options in a higher position have wilding management. Continued grazing is less acceptable. The overall plantation factor is thus more strongly plantation oriented than the individual land form Q sorts.

<u>Overall Factor Two</u>

Table 25 shows the order of image cards for Factor 2 in the overall Q sort. Focusing on the land uses shows destocking as the most acceptable land use, with some shelterbelts and some continued grazing as acceptable. Least acceptable are continued grazing and plantations. Wilding management is very relevant to this factor. All images in the acceptable part of the array have wilding management and all those in the bottom part are without wilding management. In fact it is the wilding management option that differentiates the acceptable shelterbelts and continued grazing from the unacceptable. Overall Factor 2 represents the conservation theme. Thus, wilding management is a major issue for 'conservation' orientated stakeholders.

Now we can return to the order of the statements in each of the land form factor arrays. Table 25 shows two columns of numbers for the hills Q sort because both Factors 3 and 4 are linked to overall Factor 2. The order of each of the hills' factor arrays is only roughly similar, although the second one is somewhat better. For the latter case, plantations on 70 per cent (42) is not acceptable in the overall Q sort but was acceptable in hills Q sort Factor 4. The lower slopes factor array has some similarities similar to the overall factor array except that continued grazing with wilding management (56) is in the middle of the array while for lower slopes it was seventh and not acceptable. Also exceptional is plantations on 70 per cent with wilding management (63) which has a neutral position in the overall factor array but was most acceptable in the lower slopes factor array. Shelterbelts and improved pasture on 70 per cent and 15 per cent with wilding management (34, 50) are both more acceptable in the overall factor array. Perhaps this overall conservation viewpoint has found plantations less acceptable: 70 and 63 are both in a lower position, whilst shelterbelts and improved pasture are more acceptable. This movement is consistent with a more thoroughgoing conservation viewpoint. The higher rainfall flats factor array has some similarity with the overall array. The exceptions lie with shelterbelts and improved pasture

on 70 per cent (33), which is acceptable in the overall Q sort but unacceptable in the land form Q sort, and agroforestry (woodlots) and improved pasture on 15 per cent (61), which is neutral in the overall Q sort but was acceptable in the land form Q sort. The lower rainfall flats factor array matches the overall factor array.

Table 24
Selected Stakeholders' Land Form Factors and Overall Factors

Hills			**Lower Slopes**		
No.	Factor	Overall Factor	No.	Factor	Overall Factor
12	1	1	44	1	3
13	1	M	45	1	3
14	1	1	56	1	3
72	1	1			
75	1	1			
45	2	2	12	2	1
50	2	1	54	2	1
			68	2	1
32	3	2	4	3	2
65	3	1	28	3	2
			74	3	2
8	4	2	1	4	NL
28	4	2	32	4	2
			63	4	M
Higher Rainfall Flats			**Lower Rainfall Flats**		
No.	Factor	Overall Factor	No.	Factor	Overall Factor
21	1	3	26	1	1
50	1	3	64	1	1
52	1	3	71	1	1
2	2	2	27	2	2
4	2	2	28	2	2
58	2	NL	29	2	2
37	-2	-2			
48	-2	1			
67	-2	1			
22	3	3	1	3	NL
30	3	M	58	3	NL
43	3	3	61	3	2
8	4	2			
24	4	2			
27	4	2			

Table 25
Conservation Factor for the Overall Q Sort With the Parallel Land Form Q Sorts

No.	Statement	Hills	Lower Slopes	Higher Rainfall Flats	Lower Rainfall Flats
26.	Destocking on higher rainfall flats (wilding management)			1	
13.	Destocking on hills (wilding management)	2 1			
22.	Destocking on lower rainfall flats (wilding management)				1
7.	Destocking on lower slopes (wilding management)		2		
33.	Shelterbelts & improved pasture on 70% of higher rainfall flats(wilding management)			7	
54.	Continued grazing on hills (wilding management)	8 2			
19.	Shelterbelts & improved pasture on 70% of lower rainfall flats (wilding management)				4
58.	Continued grazing on higher rainfall flats (wilding management)			2	
43.	Plantations on 15% of higher rainfall flats (wilding management)			4	
34.	Shelterbelts & improved pasture on 70% of lower slopes (wilding management)		5		
50.	Shelterbelts & improved pasture on 15% of lower slopes (wilding management)		6		
70.	Plantations on 15% of lower slopes (wilding management)		3		
51.	Shelterbelts & improved pasture on 15% of higher rainfall flats(wilding management)			5	
56.	Continued grazing on lower slopes (wilding management)		7		
62.	Plantations on 70% of hills (wilding management)	5 4			
37.	Plantations on 15% of hills (wilding management)	1 6			
61.	A/f (woodlots) & improved pasture on 15% of higher rainfall flats (wilding mgmt)			3	
52.	Shelterbelts & improved pasture on 15% of lower rainfall flats(wilding management)				2
47.	A/f (woodlots) & improved pasture on 15% of lower slopes (wilding mgmt)		4		
64.	Plantations on 70% of higher rainfall flats (wilding management)			6	
63.	Plantations on 70% of lower slopes (wilding management)		1		
60.	Continued grazing on lower rainfall flats (wilding management)				3
66.	Plantations on 15% of hills (wilding management) (cadastral borders)	3 7			
42.	Plantations on 70% of hills	6 3			
53.	Non-commercial plantations on 15% of lower rainfall flats				6
67.	Shelterbelts & improved pasture on 15% of lower rainfall flats				7
40.	Non-commercial plantations on 70% of lower rainfall flats				6
18.	Plantations on 15% of hills	4 5			
39.	Plantations on 15 % of higher rainfall flats			8	
15.	Plantations on 70% of higher rainfall flats			10	
29.	Plantations on 15% of lower slopes		9		
55.	Continued grazing on hills	7 8			
74.	Continued grazing on lower rainfall flats				8
57.	Continued grazing on lower slopes		10		
59.	Continued grazing on higher rainfall flats			9	
38.	Plantations on 70% of lower slopes		8		

Overall Factor Three

Table 26 shows the order of image cards for Overall Factor 3. Focusing on the land uses shows shelterbelts and improved pasture as most acceptable, with enthusiasm also for agroforestry (woodlots) and improved pasture. Some plantations options are acceptable and some are not. Least acceptable are destocking and continued grazing. Very relevant to this factor is wilding management. All images in the acceptable half of the array have wilding management. The only wilding management options that are not acceptable are those associated with destocking, and it is the destocking that is objected to. Overall Factor 3 represents the grazing/trees orientation.

Looking at the order of statements in each of the land form factor arrays in Table 26 shows that for the hills factor array the relative positions are lower in the overall factor array. This suggests that most of the attention of the stakeholders in the overall grazing/trees orientation is on lower slopes and the flats or that the hills is a source of problems or has different views. There are only 12 stakeholders here: perhaps these stakeholders are not comfortable with hills and those that are have loaded onto Factor 1. The order of the hills factor array is similar to the overall factor array, as is the order for the lower slopes factor array. The higher rainfall flats factor array is similar to the overall array, but continued grazing with wilding management (58) is acceptable in the overall factor array. Again, the overall array shows a slight concentration of meaning on the basic activity, namely grazing. As noted before there is no correspondence between the lower rainfall flats factor array and the overall factor array. The table shows the arrays for each of the three lower rainfall flats factors and none is a good match.

Stakeholder Characteristics

Finally, there are data on the characteristics of the stakeholders who load onto each of the overall factors. Table 27 shows that the overall plantations factor has stakeholders of all types, including runholders. The overall conservation factor is derived from over half of the different types of stakeholders, but with highest proportions of recreation/conservation and statutory advisors. The overall grazing/trees factor is derived mostly from runholders.

Table 26
Grazing/Trees Factor for the Overall Q Sort With the Parallel Land Form Q Sorts

No.	Statement	Hills	Lower Slopes	Higher Rainfall Flats	Lower Rainfall Flats
33.	Shelterbelts & improved pasture on 70% of higher rainfall flats(wilding management)			1	
34.	Shelterbelts & improved pasture on 70% of lower slopes (wilding management)		1		
19.	Shelterbelts & improved pasture on 70% of lower rainfall flats (wilding management)				1 4 7
50.	Shelterbelts & improved pasture on 15% of lower slopes (wilding management)		3		
47.	A/f (woodlots) & improved pasture on 15% of lower slopes (wilding management)		2		
52.	Shelterbelts & improved pasture on 15% of lower rainfall flats(wilding management)				3 2 5
51.	Shelterbelts & improved pasture on 15% of higher rainfall flats(wilding management)			2	
61.	A/f (woodlots) & improved pasture on 15% of higher rainfall flats (wilding mgmt)			3	
58.	Continued grazing on higher rainfall flats (wilding management)			8	
43.	Plantations on 15% of higher rainfall flats (wilding management)			5	
64.	Plantations on 70% of higher rainfall flats (wilding management)			4	
54.	Continued grazing on hills (wilding management)	4			
70.	Plantations on 15% of lower slopes (wilding management)		4		
37.	Plantations on 15% of hills (wilding management)	3			
56.	Continued grazing on lower slopes (wilding management)		5		
62.	Plantations on 70% of hills (wilding management)	1			
66.	Plantations on 15% of hills (wilding management) (cadastral borders)	2			
60.	Continued grazing on lower rainfall flats (wilding management)				8 3 8
63.	Plantations on 70% of lower slopes (wilding management)		6		
67.	Shelterbelts and improved pasture on 15% of lower rainfall flats				4 7 4
42.	Plantations on 70% of hills	6			
53.	Non-commercial plantations on 15% of lower rainfall flats				5 6 2
38.	Plantations on 70% of lower slopes		7		
39.	Plantations on 15% of higher rainfall slopes			6	
18.	Plantations on 15% of hills	5			
15.	Plantations on 70% of higher rainfall flats			7	
29.	Plantations on 15% of lower slopes		8		
74.	Continued grazing on lower rainfall flats				6 8 6
55.	Continued grazing on hills	7			
40.	Non-commercial plantations on 70% of lower rainfall flats				2 5 3
59.	Continued grazing on higher rainfall flats			9	
57.	Continued grazing on lower slopes		9		
22.	Destocking on lower rainfall flats (wilding management)				7 1 1
13.	Destocking on hills (wilding management)	8			
7.	Destocking on lower slopes (wilding management)		10		
26.	Destocking on higher rainfall flats (wilding management)			10	

Table 27

Summary of Stakeholder Characteristics for the Overall Q Sort Factors

Stakeholder Type	Factors 1	-1	2	-2	3	-3	Other
Runholder/Manager							
12 males	4				4		3
9 females	2		2	1	3		1
Service Provider							
3 males	1		2				
7 females	3		1	1	1		1
Commercial Advisor							
4 males	2				1		1
Local Business							
10 males	4	1					5
6 females	5						
Politician							
3 males	2	1					
1 females				1			
Tangata Whenua							
2 males	2						
1 female					1		
Recreation/Conservation							
4 males			3			1	
3 females	2				1		
Statutory Advisor							
8 males	3		4				1
3 females	1		1				21
Regional Advisor							
1 male			1				
Total							
77	32	1	15	3	12	1	13

Factor 1 = 'Plantations'
Factor 2 = 'Conservation'
Factor 3 = 'Grazing/trees'

CHAPTER FOUR
DISCUSSION

4.1 Introduction

This chapter interprets the results of the study. It is in four parts. First, the important features of the Q sort findings are summarised. Second, a number of interpretation issues are examined. Third, the findings are compared with the results of previous studies. Finally, implications for the development of composite scenarios, those that embrace all land forms, are reviewed, and five possible scenarios are presented.

4.2 Summary of Findings

The Q sort analysis has identified several distinctive themes of preference for future land use options in the Mackenzie/Waitaki Basin. The three most distinctive themes have been provisionally labelled plantations, grazing/trees, and conservation, to indicate the overall character of each theme. The themes were evident both in the Q sorts based upon specific land forms, and in the overall Q sort across all land forms. Each theme indicates the land uses whose visual and other effects were considered acceptable, and those considered unacceptable, and the criteria upon which those judgements were made.

In the plantations theme the important feature is the role of large plantations for production on the hills and lower slopes, and for conservation on the higher rainfall flats. In the grazing/trees theme the key element is the combination of trees and grazing for production, comprising plantations and grazing on the hills, and shelterbelts on the lower slopes and higher rainfall flats. Wilding management is an essential feature throughout the grazing/trees theme. The plantation and grazing/trees themes appear to place the greatest emphasis upon the productive enhancement of the land resource, either through tree planting or improved pasture.

In the conservation theme the essential features are small plantations and conservation on hills, larger plantations and conservation on lower slopes, and retention of views on the higher rainfall flats. For those in this theme conservation means destocking. Wilding management is an essential feature throughout the conservation theme. On the lower rainfall flats, these themes are modified significantly to become grazing/shelter, that emphasises the role of non-commercial plantations for shelter combined with grazing, and grazing only, maintained by wilding management.

Visual effects are significant for all themes, but each theme expresses a different landscape aesthetic. For the plantations theme, there is an apparent preference for 'naturalistic' shaped plantations, expressed by the selection of images with either 70% plantations, or 15% plantations extended by wilding spread. Comments indicate that the attraction of wildings lies in the way that they help blend plantations into the broader landscape. The grazing/trees theme, on the other hand, expresses a strong preference for clearly defined land uses, with

plantations, woodlots and grazing marked by clear boundaries. On the flats, views of the mountains beyond are also important. For the conservation theme, the image of clean, open tussock grazing land is critical, although it is important to note that clearly defined and small plantations were also acceptable on hills and slopes. On lower rainfall flats the main visual issue is retention of the sense of openness formerly associated with the tussock grasslands. Conservation is an element in some of the themes but its meaning is variable. For the conservation theme it means a preference for land use which more closely matches the original cover, with only some trees tolerated. There is emphasis given to tussocks. However, the plantations theme also has a conservation element, but here conservation is defined as using trees to improve the land.

Analysis of stakeholder characteristics and factor type showed that there was no clear pattern: there were no strong links between stakeholder type and factor. Thus it was not the case that runholders expressed preference for the grazing/trees theme. Nor were there any gender patterns. Analysis of stakeholder loadings across land forms showed lack of consistency. That is, stakeholders did not necessarily follow the major themes for each land form. However, despite this variability consistent factors emerged for each land form. There was a better fit between the overall factors and the land form factors. For example, those who loaded highly on the land form plantations factor also loaded highly on the overall plantations factor. The overall factors were slightly different from their respective land form factors in that they appeared to be a simpler and stronger expression of acceptable land use.

4.3 Interpretation Issues

Interpretation of the broad patterns of stakeholders' preferences must be qualified by a number of considerations. These fall into two categories: issues relating to the overall study, and those relating to the interpretation of specific parts of the study.

4.3.1 General Issues

(a) Variation in Willingness/Ability to Consider *all* Effects

A significant number of respondents appear to have based their judgements on the land use descriptions and the image alone. Of the 51 cases where a stakeholder loaded highly on a factor there were 20 (39 per cent) who made reference to the income and employment or soil status effects. In some cases they disagreed with our economic and ecological projections. In some cases the stakeholders' comments referred to income and employment or soil status but not in ways that acknowledged the predicted effects on the cards. Economic and ecological effects were most frequently cited when dealing with plantations and conservation. Does the lack of reference to economic and ecological effects weaken the results? We believe not. These effects may have played some part in the Q sort if not one they expressed. It demonstrates that decision making is not mechanistic. Individuals simplify complex problems by focusing upon aspects that are either understandable, acceptable or that correspond to their own perceptions. They tend to ignore data that does not match their own prejudice or experience (cognitive dissonance). It also illustrates the ease of accessibility of photographic images. Given the amount of information being processed it is not unusual that some stakeholders simplified the process. For

example, few stakeholders made reference to the areas of land involved in each land form. This observation about the variation in willingness/ability to consider all effects raises questions about the practicality of mixing visual and non-visual information, especially when the exercise is demanding.

The more frequent citing of economic and ecological effects associated with plantations reinforces the interpretation that people 'take in' good news, but 'block out' bad news, as the plantations are estimated to consistently result in improved income and soil status, whereas other land use options are typically less productive in these areas.

(b) Variation in Preferences Over the Different Land Forms

The options on the hills evoked greatest diversity and polarity in response. (There were positive *and* negative loadings on all four factors, which resulted in eight 'frames of reference'). The lower slopes evoked greater consensus, and the dry flats had fewer (only three) factors. Why is this? Several explanations can be offered. First, the hill slope options are very legible and very visible. They include significant diversity in the feasible options presented (70 per cent plantations to 100 per cent continued grazing) and their effects are also diverse. In other words, the hill slope options drew out the full range of values from stakeholders because there were options that clearly expressed them all, and that were well differentiated from each other.

The lower slopes include mixed use (plantations/woodlots and improved pasture) that are not feasible on the hills. This satisfied a wide range of positions, and enabled a greater consensus to emerge. Furthermore, the small area reduces the overall impact of change, the hill backing helps visually absorb trees, and the area is the most productive land and thus well suited to a limited range of optimum uses. In contrast, the dry flats have few available options, and thus channelled people into a narrow range of responses.

(c) Legibility and Meaning

A number of respondents had difficulty evaluating the acceptability of exotic plantations with wildings, that *looked* natural, but weren't. It is clear that the relationship of plantation boundaries to land form is critical. Photos 37 and 66 were both considered to be too artificial. The meaning of 'wilding management' was also disputed by some: does it mean control or utilisation? This illustrates the speed with which new ideas can be adopted, with publicity on the possibility of economic returns from wildings coming shortly before the field work started.

(d) Differences in Prediction and Assessment of Feasibility

A significant but small number of stakeholders disagreed with our predictions, e.g. the effect of destocking for *all* options and the feasibility of improved pasture on dry flats. Is this due to a mistake on our part, or misunderstandings by the respondents? And how has this affected their selections? There is some evidence to suggest that people disagree with options that do not fit their interests. However, this is not

necessarily so: it may be that they are being more realistic or pessimistic, and the study team was too optimistic in its predictions. On the other hand, the choice of land uses to be modelled was criticised by some as being too conservative, and biased towards proven crops. This reflected the economic input to the study. The issue appears to illustrate Amy's concern (1990) about the inevitability of value judgements when predicting in conditions of uncertainty, even when the predictions are made by experts. On balance, while there were some objections to the predictions, most stakeholders accepted them.

(e) Inconsistency in Viewpoints/Predictions

The different viewpoints across land forms for the photographs made it very difficult to achieve total consistency in the apparent proportional coverage of, for example, wildings. A number of respondents noticed and commented on this. Does this invalidate findings? No, but it probably qualifies them somewhat. However, the strength of the overall patterns suggests that minor bias in particular images has had little overall effect on responses.

(f) Differences Between Responses to Total Array as Opposed to Landform Arrays

Tables 23, 25 and 26 reveal some shift between rankings of options in the separate landforms and those in the single total array. Are these significant? They could be, *or* they could express individual inconsistencies due to the difficulty of evaluating the greater complexity of the single array. We have no way of knowing. However, several explanations can be offered. First, in the plantations theme, lower rainfall flats figure less prominently; this makes sense, as 'plantation' oriented stakeholders would be aware of the limitations of productive forestry on lower rainfall flats. They would emphasise the productive opportunities in the other three landforms. Second, in the conservation theme, overall choices are more consistent with conservation objectives than in the separate landforms arrays. This indicates that stakeholders are less flexible when judging the overall options, and are conversely more willing to consider non-conservation options in specific situations. Third, in the grazing/trees theme the hills options and lower rainfall options receive less prominence. This appears to be because they offer less potential for production.

In summary, respondents emphasise a simpler view when faced with the 'big picture'. They are more likely to accept options that diverge from their underlying preferences when considering specific situations that are not central to their overall interests. It is also likely that they did not take into account the non-visual effects and responded solely to the visual image.

(g) Inconsistency of Choices of Individual Stakeholders

Tracing choices of individual stakeholders across landforms revealed significant inconsistency. That is, they did not always select in the way that one would predict if they were 'true to type'. Yet overall there were very clear patterns across landforms (the three themes described as plantations, trees/grazing and conservation). Why is this? It appears that an individual stakeholder will adopt *different* priorities for each land type. The significance of this is that the three 'themes' do not represent

the views of coherent and distinct social groups, but rather express a way of thinking, to varying degrees, that is present within the community as a whole, and upon which individuals draw. It appears that they follow the archetypal pattern of preference most closely when faced with the complex challenge of the complete Q sort. Individual factors became more apparent when dealing with separate land types.

4.3.2 Particular Issues

There are a number of issues specific to particular images on land types:

(a) Hills

The geographic orientation of the hill was an important factor for graziers because of its effect on production and the image did not take this factor into account. Interpretation of landscape guidelines was contentious, with several stakeholders disagreeing with the way we had expressed them. It became clear that there is a need to distinguish between 70% of *all* hills, and 70% *of any particular hill.* There appeared to be sensitivity to, and preference for, land uses that covered the whole slope, in preference to 'stripping' and 'patching' uses.

(b) Lower Slopes

There was disagreement with our destocking predictions and the linearity of shelter belts was a problem for some. The term 'agroforestry' was confusing and too similar to shelterbelts; people expected savannah-type options.

(c) Higher Rainfall Flats

Here a key issue is the distance from the road; people liked to keep views of mountains, and reacted against wildings down to the road. Destocking was very contentious, and there was some disagreement with the predicted tussock vegetation shown in the images. The 'pastoral' image (33) was popular, as it combined views of the mountains with production, and had photogenic appeal.

(d) Lower Rainfall Flats

These were problematic due to the lack of options. People asked, why did we not include plantations that were more natural in shape and character. If conservation forestry was an option, why not productive forestry? Respondents seemed to be unwilling to accept the severe economic limitations on land use identified by the study team and were thus unwilling to accept our predictions.

4.4 Comparison with Other Studies

The overall significance of the general and specific issues discussed above depends in part upon the extent to which the findings are consistent with other work, and in large part upon the use to which the Q sort findings are to be put.

There has been little scientific research into high country attitudes, but much anecdotal commentary. Nonetheless, the underlying issues have been recognised for some time: O'Connor (1983) predicted the potential polarisation between forestry and grazing over a decade ago, and the respective viewpoints have been well articulated in a series of seminars and workshops (see, for example, Gregory, 1988). Two recent studies have undertaken systematic investigation of attitudes towards land use change, and the results of this study correspond closely to their findings.

Swaffield (1991) analysed attitudes amongst stakeholders in the Craigieburn Basin towards the role and management of trees and plantations. Seven common frames of reference were identified. Several were focused upon approaches to land use planning, and are not of direct relevance to this study, but four of the common frames that emphasised land management outcomes correspond closely to these Q sort themes. Swaffield identified a 'multiple use management' position, that favoured extensive plantings for production and conservation objectives, which corresponds closely to the 'plantations' theme identified here. A second frame of reference was designated 'conservation by control'. This corresponds closely to the conservation theme in this study. The grazing/trees theme we have identified appears to combine two further frames of reference: individual improvement (grazing with shelter) and conservative management (incremental change). This correspondence is reinforced by the recognition that a significant number of runholders (the individual improvers in Swaffield's work) shifted from the plantations theme on the hills to a trees and grazing theme on the flats.

A second study provides indicative support for the Q sort analysis. Wardle et al. (1993) undertook a pilot study that analysed policy preferences in the Rabbit and Land Management Area (part of this study area) and identified three distinctive social orientations: the 'forest greens', who favoured forestry and conservation, 'technocrats' who favoured a mixed use scenario, and 'greens' who favoured conservation and recreation. These match closely to the three main themes identified here, although it must be noted that the sample of respondents in the Wardle study was largely restricted to institutional stakeholders.

In conclusion, the correspondence between these results and those of previous studies, plus the strength of the patterns, suggest that the overall results are robust, despite minor variations and issues of interpretation.

4.5 Development of Scenarios

4.5.1 The Purpose of the Scenarios

The Q sort survey has been based upon thirty-six discrete land use options spread across four land forms. These land uses were all selected as being technically feasible in general terms, but their effects were not necessarily socially acceptable. The Q sorts have identified patterns of preferences among stakeholders. The next step in the overall study design is to develop several composite scenarios for the study area, that combine feasible land uses and acceptable effects for all land forms taken together. These scenarios will then be modelled in detail in terms of both visual and economic respects, and presented back to stakeholders, in later research.

The purpose of the scenarios is thus to identify a range of 'most acceptable' land use

patterns, evaluated in terms of their environmental effects.

4.5.2 Ways to Generate Scenarios

The Q sort data may be used to generate scenarios in two ways. The first develops 'optimum' scenarios based upon the three main themes identified in the Q sorts. This will create three contrasting scenarios that optimise, in turn, plantations, mixed grazing/trees, and conservation. It is clear from the Q sort analysis that optimisation by theme will result in a scenario that will be considered acceptable by the stakeholders who loaded positively on the factors that make up that theme, but that will be considered less acceptable or even unacceptable by the other stakeholders.

An alternative approach is to use the Q sorts to remove from consideration land use options scored negatively by stakeholders (i.e. those unacceptable to them), and to generate a 'compromise' scenario from the remaining options. The resulting scenario (or scenarios) will therefore represent the combination of effects that is to some degree acceptable to most, if not all, stakeholders, even though it may not be the first preference for them.

Both methods have been used. This provides a range of scenarios to which stakeholders can respond.

4.5.3 Optimisation of 'Theme' Scenarios

The discussion earlier in this chapter identified three themes: plantations, grazing/trees, and conservation. Table 28 summarises the factors for the three land forms that significantly contributed to each theme. The following scenarios were generated by selecting the most preferred land use options for each main factor and for each land form. This procedure is straightforward for the hills, lower slopes and higher rainfall flats because the main factors occurred in similar ways for each land form. However, for the lower rainfall flats there were different factors and it is not possible to apply a consistent theme to them. For this reason the preliminary development of scenarios is based only on the first three land forms, and once the results are collated the lower rainfall flats are considered.

Table 28
Themes and Their Constituent Factors

Themes	Hills	Lower Slopes	Higher Rainfall Flats
Plantations	1	2	-2
Grazing/trees	2	1	1
Conservation	3	3	2

In selecting optimum scenarios two sources of data can be used: the individual land form Q sort data, and the overall Q sort data. The former have the advantage of being performed before the latter, and thus have received closer scrutiny from the stakeholders. Further, because the land form Q sorts involved a small number of cards (eight or ten) stakeholders

had more opportunity to integrate all the information, including the economic and soil status effects. The overall Q sort data have the advantage of reflecting stakeholders' preferences while being forced to consider all four land forms together. For this reason they may be a better basis for developing composite theme scenarios. Examination of each data set showed that while there were some differences in the card which was most preferred in some cases the first choice in one data set was the second choice in the other data set. The following tables use the first and second choice for the land form Q sort and the overall Q sort.

Table 29 shows the two most preferred land uses for the plantations theme and presents the selected cards from the land form Q sort and the overall Q sort. Plantations on 70 per cent is the first choice for hills and higher rainfall flats and second choice for the low slopes and this is identified in the table as the first best land use for the land form Q sort. For the overall Q sort data the first best land use is plantations on 70 per cent with wilding management. It is clear that regardless of data source, those stakeholders with preference for the plantations theme find most acceptable plantations on 70 per cent. At issue though is wilding management because it only occurs in two out of the six land form land uses but five out of six overall land uses. Since plantations on 70 per cent with wilding management is the second choice for the hills for the land form data, we take this land use to represent the first best land use using both data sources. This land use constitutes Optimum Scenario A. In addition, the table describes the combined second best land use which acknowledges the interest in shelterbelts and improved pasture. In both cases the land uses are predicted to lead to a significant net increase in income and employment, and a significant net improvement in soil status.

Table 29
The Two Most Preferred Land Uses : Plantations Theme

	Land Form Q Sort		Overall Q Sort	
Land Form	Card No.	Description	Card No.	Description
Hills	42 62	Plant. 70% Plant. 70% W.M.	62 42	Plant. 70% W.M. Plant. 70%
Lower Slopes	34 38	S/B & I.P. 70% W.M. Plant. 70%	63 34	Plant. 70% W.M. S/B & I.P. 70% W.M.
Higher Rainfall Flats	15 39	Plant. 70% Plant. 15%	33 64	S/B & I.P. 70% W.M. Plant. 70% W.M.

First best land use: Plant. 70% Plant. 70% W.M.

Combined first best land use (OPTIMUM SCENARIO A) :
Plant 70% W.M.

Combined second best land use:
Plant 70% W.M. on hills and higher rainfall flats
S/B and I.P. 70% W.M. on lower slopes

Table 30 shows the two most preferred land uses for the grazing/trees theme. Plantations on 70 per cent with wilding management on the hills, and shelterbelts and improved pasture on 70 per cent with wilding management on the lower slopes and higher rainfall flats is the first best land use based on the land form Q sort. For the overall Q sort continued grazing with wilding management displaces plantations on the hills. However, plantations on 15 per cent with wilding management is the second choice for both data sets and this combines with shelterbelts and improved pasture on 70 per cent with wilding management on the other two land forms to make it the combined first best land use. These land uses are predicted to lead to a significant net increase in income and employment, and a significant net improvement in soil status.

It should be noted that the 70 per cent plantations image showed plantations completely covering the hill and it is likely that stakeholders interpret this land use as 100 per cent plantations on 70 per cent of the hills.

Table 30
The Two Most Preferred Land Uses : Grazing/Trees Theme

	Land Form Q sort		Overall Q sort	
Land Form	Card No.	Description	Card No.	Description
Hills	62 66	Plant. 70% W.M. Plant. 15% W.M. C.B.	54 37	Cont. Graz. W.M. Plant. 15% W.M.
Lower Slopes	34 47	S/B & I.P. 70% W.M. A/F & I.P. 15% W.M.	34 50	S/B & I.P. 70% W.M. S/B & I.P. 15% W.M.
Higher Rainfall Flats	33 51	S/B & I.P. 70% W.M. S/B & I.P. 15% W.M.	33 64	S/B & I.P. 70% W.M. Plant. 70% W.M.

First best land use: Plant. 70% W.M. on hills and S/B & I.P. 70% W.M. elsewhere

Cont. Graz. W.M. on hills and S/B & I.P. 70% W.M. elsewhere

Combined first best land use (OPTIMUM SCENARIO B)

Plant. 15% W.M. and on hills S/B & I.P. 70% W.M. elsewhere

Table 31 shows the two most preferred land uses for the conservation theme. Here the pattern is simple and destocking with wilding management is the combined first best land use. This land use is predicted to lead to a net decline in income and employment, and a net improvement in soil status.

Table 31
The Two Most Preferred Land Uses: Conservation Theme

Land Form	Land Form Q sort		Overall Q sort	
	Card No.	Description	Card No.	Description
Hills	37 13	Plant. 15% W.M. Destock. W.M.	13 54	Destock. W.M. Cont. Graz. W.M.
Lower Slopes	63 7	Plant. 70% W.M. Destock. W.M.	7 34	Destock. W.M. S/B & I.P. 70% W.M.
Higher Rainfall Flats	26 58	Destock. W.M. Cont. Graz. W.M.	26 33	Destock. W.M. S/B & I.P. 70% W.M.

First best land use: Destock W.M. Destock. W.M.

Combined first best land use (OPTIMUM SCENARIO C) Destock W.M.

In considering the lower rainfall flats we have given attention to the two most acceptable cards in each of the two main factors (Factor 1 and Factor 2). These are:

Factor 1,	19	S/B & I.P. 70% W.M.
	40	Non-Com. Plant. 70%
Factor 2,	22	Destock. W.M.
	52	S/B & I.P. 15% W.M.

We can choose the land uses that are most consistent with each of the three themes in order to have comprehensive optimum scenarios. Clearly, the plantations theme would require card number 40 (non-commercial plantations on 70 per cent) to give a land use consistent with Optimum Scenario A. The grazing/trees theme would require number 19 (shelterbelts and improved pasture on 70 per cent with wilding management for Optimum Scenario B. Finally, the conservation theme would require number 22 (destocking) for optimum Scenario C.

4.5.4 Development of 'Consensus' Scenarios

So far in this report the emphasis has been on learning about different preferences for land uses based on the distinctive positions of the sorted cards. Factors have been described by virtue of the group of stakeholders who formed the factor, each group putting items in a distinct order. However, not all cards distinguish factors and some cards are perceived in similar ways and share a similar level of preference. These cards are called consensus items and are identified routinely in Q analyses. It must be emphasised that the consensus items

are points of similarity among the stakeholders who loaded onto a factor only. For each land form the number of stakeholders not loading significantly is listed below:

Hills	25	(32%)
Lower slopes	14	(18%)
Higher rainfall flats	13	(17%)
Lower rainfall flats	22	(29%)
Overall	13	(17%)

At the least then the consensus is limited to those who loaded onto the factors. However, it is not the case that the remaining stakeholders necessarily disagree with what is a consensus card: if they were part of a factor structure they may well select the same cards as consensus items.

Consensus items are available for both the land form Q sorts and the overall Q sort. The land form data reflect stakeholders' preference for the particular land forms and these preferences are more likely to vary across land forms. Thus, their land form preferences may be a better basis from which to generate a consensus. In contrast, the overall preferences reflect stakeholders' views or 'policy orientation' to the study area as whole when each stakeholder is forced to consider the area as a whole. Stakeholders working from a collective orientation may apply their preferred land uses across all land forms and, if they do, there is less likelihood of consensus.

Table 32 shows the consensus items for the land form Q sort and the overall Q sort. The table includes the score given to each item, and this is relevant because it is possible that the consensus is one of disagreement, that is, a shared view about lack of acceptability. Of interest are those consensus items that have positive scores. The results show that when stakeholders perform the land form Q sort the best consensus (Scenario D) is:

Hill	18	Plant. 15%
Lower slope	34	S/B & I.P. 70% W.M.
Higher rainfall flat	43	Plant. 15% W.M.

(none for lower rainfall flats).

When stakeholders do the overall Q sort the best consensus (Scenario E) is:

Hill	37	Plant. 15% W.M.
Lower slopes	70	Plant. 15% W.M.
Higher rainfall flats	43	Plant. 15% W.M.

(none for lower rainfall flats).

What appears to be happening is that the land form Q sort encourages more diverse selections and therefore more diverse consensus items, while the overall Q sort gives greater consistency, in this case plantations at 15 per cent with wilding management.

Table 32
Consensus Items

Land Form	Land Form Q sort			Overall Q sort		
	No.	Description	Scores	No.	Description	Scores
Hills	18	Plant. 15%	1 2 0 0	37	Plant.15% W.M.	2 0 1
				66	Plant.15% W.M.	0 -1 0
				55	Cont. Grazing	-2 -3 -2
Lower Slopes	29	Plant. 15%	-2 1 -2 1	70	Plant. 15% W.M.	0 1 1
	34	S/B & I.P.70% W.M.	3 3 1 1			
	47	A/F & I.P.15% W.M.	2 1 1 3			
	50	S/B & I.P.15% W.M.	2 -1 0 2			
Higher Rainfall Flats	39	Plant. 15%	-1 -2 -2 -2	43	Plant. 15% W.M.	1 2 2
	43	Plant. 15% W.M.	1 1 1 -1			
Lower Rainfall Flats		(none)		53	Non.Comm.Plant.	-1 -1 -1
				74	Cont. Grazing	-3 -3 -2

4.6 Summary

These five scenarios (A - E) represent a range of possible outcomes for the Mackenzie/Waitaki Basin. The three optimising scenarios (A - C) favour different overall land use orientations: productive plantations, mixed trees and grazing, or conservation. The two 'consensus' scenarios (D, E) represent combinations of land uses whose effects are viewed either positively or neutrally by the majority of stakeholders. It is a 'least unacceptable' approach.

The scenarios are summarised in Table 33.

Selection of land use options for the lower rainfall flats has been problematic, given the different factors that emerged. For the three optimising scenarios (A, plantations; B, mixed grazing and trees; C, conservation) the option most consistent with the overall scenario has been included. For the consensus scenarios there were either no consensus items or none that were rated as acceptable.

It will be recalled from the earlier discussion that although the Q sort has identified clear patterns of preference for different land use effects, the overall themes do not correspond closely with particular stakeholder groups. These five scenarios do not therefore represent preferred outcomes for particular interest groups, but instead represent coherent patterns of land use and land use effect that have been identified by the population of stakeholders as a whole.

These five scenarios can now provide the basis for more detailed economic modelling and an evaluation of social effects. Each scenario can be used to guide the development of socio-economic analyses that can estimate the implications of the land uses preferred in each scenario. In addition, the visual effects of land use change will be modelled on a broader scale to better represent the preferred land uses. When these future steps are completed the results will be presented to stakeholders and their preferences again assessed in the light of the predicted consequences.

Table 33
Final Scenarios

Scenario	No.	Description
A	62	Plantations 70% wilding management
	63	Plantations 70% wilding management
	64	Plantations 70% wilding management
	40	Non-commercial plantations 70%
B	37	Plantations 15% wilding management
	34	Shelterbelts and improved pasture 70% wilding management
	33	Shelterbelts and improved pasture 70% wilding management
	19	Shelterbelts and improved pasture 70% wilding management
C	13	Destocking; wilding management
	7	Destocking; wilding management
	26	Destocking; wilding management
	22	Destocking; wilding management
D	18	Plantations 15%
	34	Shelterbelts and improved pasture 15% wilding management
	43	Plantations 15% wilding management
E	37	Plantations 15% wilding management
	70	Plantations 15% wilding management
	43	Plantations 15% wilding management

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APPENDIX 1

Text of Instruction Sheet Used by Interviewers

FOREST RESEARCH INSTITUTE/LINCOLN UNIVERSITY

MACKENZIE/WAITAKI STUDY

FRI and Lincoln University are collaborating on a public good research project investigating methods for land planning in the Mackenzie/Waitaki Basins.

Part of the study involves the identification of stakeholder attitudes towards the effects of different land use options. All survey data is completely confidential.

Field research is being undertaken by Lisa Langer (FRI) and Jacky Bowring (Lincoln University).

The contact at FRI (Christchurch) is Mr Bill Dyck, FRI South Island manager, and at Lincoln University Dr Simon Swaffield (Department of Landscape Architecture) and Dr John Fairweather (Agribusiness and Economics Research Unit).

Contacts: Department of Landscape Architecture
Lincoln University
Tel. 325-2811/325-3804

FRI Christchurch
Tel. 351-7099

INTRODUCTORY INFORMATION

1. The study area includes the Mackenzie Basin and part of the Waitaki Basin.

2. The focus of research is on your response to the effects of different land use options, in terms of which options are most acceptable and least acceptable to you.

3. The land use options are portrayed on photographs showing what each land use is estimated to look like in 50 years time. (The photographs are arranged to represent typical scenes in the study area and are not photographs of particular places).

   Socio-economic and biophysical effects are shown for every land use option in terms of the estimated impact of each land use on:

   a) local farm and forestry income and employment (described as income and employment); and
   b) soil status

4. The land use options are shown on four landforms:

   a) hills (with slopes between 15 and 35°)
   b) lower slopes (slopes 7 - 15°)
   c) higher rainfall flats (slopes 0 - 7°, rainfall greater than 800mm)
   d) lower rainfall flats (slopes 0 - 7°, rainfall below 800mm)

5. The land uses considered six options:

   a) destocking
   b) no change
   c) shelterbelts and improved pasture
   d) agroforestry and improved pasture
   e) non-commercial plantation
   f) plantation

6. The land use options are considered for either 15% of the available land or 70% of the available land. In the case of destocking and no change, the land use applies to 100% of the available land.

   'Available land' comprises 40.5% of the total study area after unsuitable land, developed land, and land already identified or designated as priority land for agriculture or conservation is excluded.

7. Other factors are included in some of the land use options; for example:

   a) Wilding management - removal of self-sown trees. It is assumed that there is no systematic management unless explicitly specified.

b) Distance from the road - typically the trees are shown as being planted 1000 metres from the road in accordance with the landscape guidelines recommended by Boffa Miskell Partners.

c) Edge planting. It is assumed that different species are planted on the edges of plantations to break the boundary line.

d) Boundaries. If not specified, plantations follow the line of the landform. However, some options show trees planted up to a cadastral (legal) boundary which runs across the line of the landscape.

8. The four land forms and their location in this study area are shown in Figure 1.

9. The six land use options are described in Table 1.

10. The cards are to be sorted into piles ranging from the one most acceptable to you (for the study area as a whole) to the one least acceptable to you.

For the first four sorts the intermediate piles have 2 cards.

For the final sort the intermediate cards have 2, 3, 4, 5, 6, 5, 4, 3, 2 in each pile.

Option	Description
PLANTATIONS	Commercial plantations using Douglas fir and/or Corsican pine for sawlogs, and Corsican pine for roundwood. Species choice according to site conditions and rainfall.
SHELTERBELTS AND IMPROVED PASTURE	Plantings solely for shelter. No production. Irrigated pasture on the flats. Primary species Corsican pine and some poplar.
AGROFORESTRY AND IMPROVED PASTURE	Planting for timber production, with improved pasture. Primary species Corsican pine.
DESTOCKING	Stock removed to encourage tussock regeneration.
NON-COMMERCIAL PLANTATIONS	Plantations intended for soil conservation with no timber production. Primary species Corsican pine.
NO IMPOSED CHANGE	Continuation of current extensive grazing regimes.

APPENDIX 2

Stakeholder Characteristics and Factors for all Q Sorts

Stakeholder			Hills	Lower Slopes	Higher Rainfall Flats	Lower Rainfall Flats	Over-all
Gender	No.	Type					
M	1	Statutory advisor	3	4 *	1	3	NL
M	2	Recreation/conservation	3	3	2 *	NL	2
M	3	Regional advisor	2	1	1	2 NS	2
M	4	Service provider	M	3 *	2 *	2	2
M	5	Local business	NL	-2	2	-2	NL
M	6	Commercial advisor	4 NS	2	M	1	1
F	7	Service provider	M	-3	-1	2	-2
F	8	Runholder	4 *	3	4 *	2	2
M	9	Statutory advisor		-2	2	2	2
M	10	Runholder	2	1	M	1 NS	1
M	11	Service provider	-2	M	M	2	2
M	12	Runholder	1 *	2 *	2	1	1
M	13	Local business	1 *	3	1	M	M
F	14	Service provider	1 *	2	4 NS	3	1
F	15	Local business	M	M	1	1	1
F	16	Local business	1	2 NS	-2	-2 NS	1
F	17	Service provider	1	2	-3	1	1
M	18	Local business	-1	-2	2	-1	-1
F	19	Recreation/conserv./runholder	-1	1	2	2	3
M	20	Runholder	-4	4	1	1 NS	M
F	21	Runholder	2	1 NS	1 *	1	3
M	22	Runholder	2 NS	1	3 *	-3	3
F	23	Service provider	1	M	1	1	M
M	24	Statutory advisor	4	1 NS	4 *	2	2
F	25	Service provider	1	2	1	1	1
M	26	Local business/runholder	1	2	1	1 *	1
F	27	Runholder	M	3	4 *	2 *	2
M	28	Politician	4 *	3 *	M	2 *	2
F	29	Statutory advisor	M	M	2	2 *	2
M	30	Runholder	4	1	3 *		

M	31	Local business	M	2	-2	NL	M
F	32	Service provider	3 *	4 *	1	M	2
F	33	Local business	M	M	1	1	1
M	34	Local business	1	M	NL	1	1
F	35	Local business	1	2	1	1	1
M	36	Local business	1	2	1	-2 NS	M
F	37	Runholder	-1	NL	-2 *	M	-2
M	38	Runholder	-3 NS	1	1	1	3
F	39	Runholder	2	1	NL	1	1
M	40	Runholder	1	3	-2	M	1
F	41	Runholder	NL	M	1	1	1
M	42	Runholder	1	1	1	M	1
F	43	Runholder	1 NS	1	3 *	2	3
M	44	Runholder	-3	1 *	1	1	3
F	45	Runholder	2 *	1 *	1	1	3
M	46	Runholder	4	1	1	1	M
M	47	Local business	1	1	1	1	1
F	48	Local business	M	2	-2 *	1	1
F	49	Runholder	2	1	1	1	M
M	50	Runholder	2 *	1	1 *	1	3
M	51	Politician	M	M	1	1	1
F	52	Service provider	-4	1	1 *	1	3
M	53	Statutory advisor	M	2	1	1 NS	1
M	54	Runholder	1	2 *	2	1	1
F	55	Local business	M	1	2	NL	1
M	56	Runholder (Manager)	2	1 *	1	NL	3
F	57	Recreation/conservation	M	1	1	NL	1
M	58	Local business	-4 NS	1	2 *	3 *	NL
F	59	Politician/runholder	3 NS	2	NL	[3]	-2
M	60	Politician	-3	2	1	1	1
M	61	Statutory adviser	3	3	M	3 *	2
M	62	Commercial advisor	2	1	1	M	3

M	63	Commercial advisor	3 NS	4 *	1	1	M
M	64	Commercial advisor	1	4	-2	1 *	1
M	65	Service provider	3 *	4	1	1	1
M	66	Recreation/conservation	-2	-1	-1 NS	NL	-3
M	67	Statutory advisor	1	2	-2 *	1	1
M	68	Statutory advisor	3	2 *	M	M	1
F	69	Statutory advisor	3 NS	1	1	NL	M
M	70	Statutory advisor	M	3	2	M	2
F	71	Recreation/conservation	1	2	1	1 *	1
M	72	Local business	1 *	2	-2	1	1
F	73	Statutory advisor	1	4	1	1	1
M	74	Recreation/conservation	M	3 *	2	2	2
M	75	Tangata Whenua	1 *	M	1	M	1
F	76	Tangata Whenua	-3	1	1	-3	3
M	77	Recreation/conservation	-2	1 NS	2	2	2

Notes:

1. NS = not significant, but above 0.5, all other loadings less than 0.4.
2. M = multiple loaders: more than one loading at 0.4, 0.5 or 0.6 and none significant (except for the overall Q sort).
3. NL = no loading: all loadings less than 0.49.
4. Asterisks identify very high loadings. These cases were used in the interpretation of factors.

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