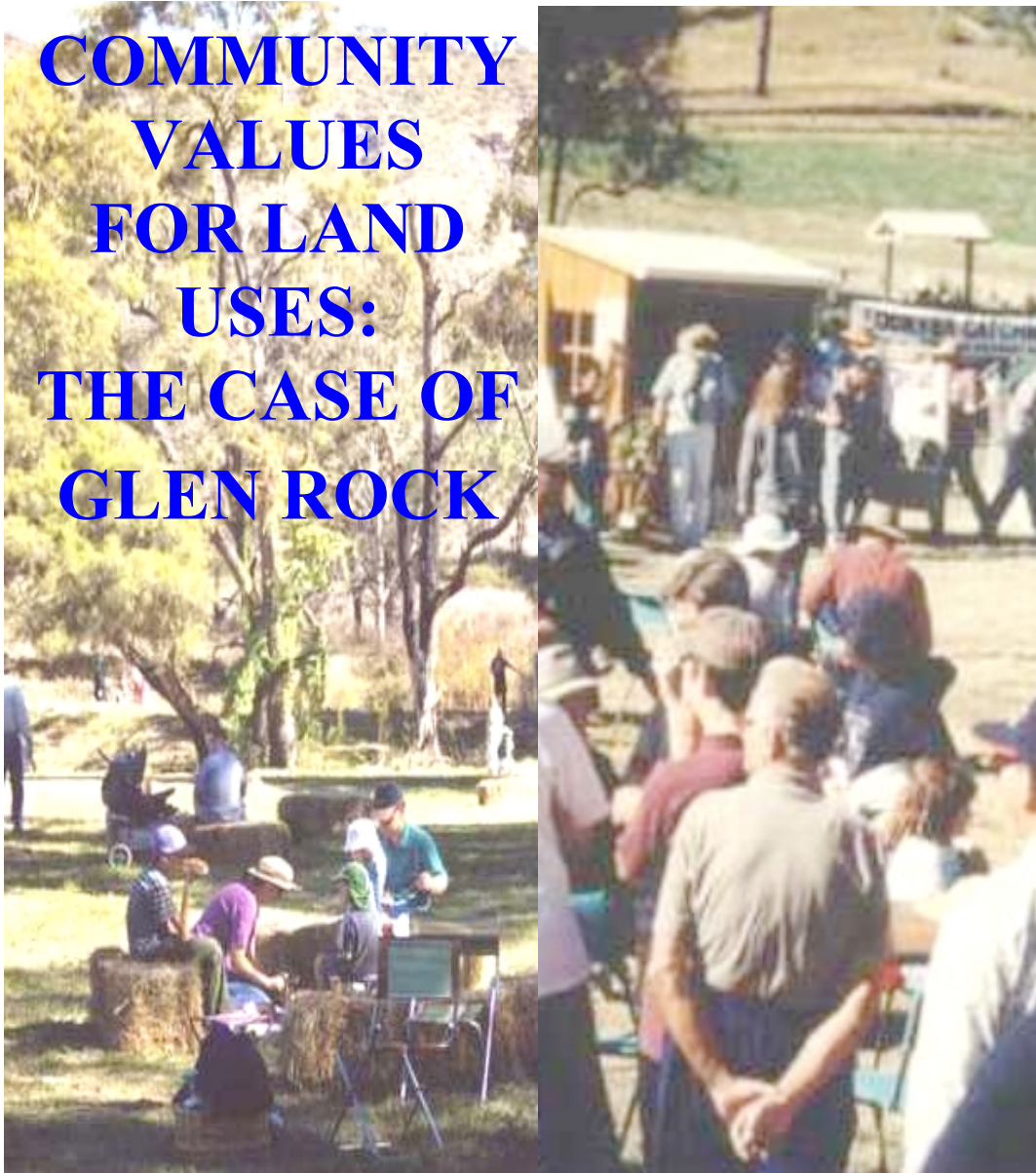


COMMUNITY VALUES FOR LAND USES: THE CASE OF GLEN ROCK



Prepared By

Dr. Tessie Tumaneng-Diete
Department of Natural Resources

In Conjunction With

Dr. Bruce Hooper
Integrated Resource Management Research Pty. Ltd.

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IRMR

For more information contact:
Forest Planning and Sustainable Use Unit
Vegetation Management and Use
Department of Natural Resources
PO BOX 2454
4th Floor, Charlotte Chambers
35 Charlotte Street
BRISBANE, QLD 4001
Ph: 07 3836 0191
Fax: 07 3239 3849

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CONTENTS

ACKNOWLEDGMENT	3
SUMMARY	6
1. INTRODUCTION	9
COMMUNITY VALUES AND FOREST PLANNING: A REVIEW	10
<i>Importance of community values in land use planning</i>	10
<i>Identification of stakeholders and scale of analysis</i>	12
<i>Assessment methods</i>	13
<i>Empirical studies</i>	14
1.2. OBJECTIVES OF THE STUDY	16
2. METHODOLOGY	16
3. RESULTS AND DISCUSSIONS	18
3.1. ASSIGNED VALUES OF THE COMMUNITY	20
3.2. DEMOGRAPHIC CHARACTERISTICS OF INTEREST GROUP AND GENERAL COMMUNITY	23
3.3. PREFERENCES FOR LAND USE ATTRIBUTES	26
3.4. COMMUNITY PERCEPTIONS OF ECONOMIC, ENVIRONMENTAL AND SOCIO-CULTURAL SIGNIFICANCE OF LAND USES	27
3.5. COMMENTS FROM RESPONDENTS ABOUT LAND USES	30
4. EVALUATION OF THE RELEVANCE OF MULTICRITERIA TOOLS IN ASSESSING FOREST VALUES By Dr. Bruce Hooper, Integrated Resource Management Research Pty. Ltd.	33
5. CONCLUSIONS	36
ISSUES/RESEARCH NEEDS	36
6. BIBLIOGRAPHY	39
7. APPENDICES	42
APPENDIX A. PROJECT BRIEF	42
APPENDIX B. SURVEY QUESTIONNAIRE	47
APPENDIX C. COMMUNITY VALUES AND FOREST	56

MANAGEMENT PLANNING

LIST OF TABLES

Table 1.	Area of sample by postcode	20
Table 2.	Previous experience in visiting State owned or managed Forests	24
Table 3.	Frequency of visits to State owned or managed Forests	24
Table 4.	Statistical analysis of the difference between interest group and general community perceptions of forest use attributes	28

LIST OF FIGURES

Figure 1.	Map and population of some Shires/City surrounding Glen Rock	19
Figure 2.	Interest Group Values	22
Figure 3.	General Community Values	22
Figure 4.	Aggregate Community Values	23
Figure 5.	Reasons for visiting State owned or managed Forests	24
Figure 6.	Distribution by educational level	25
Figure 7.	Gender distribution of respondents	25
Figure 8.	Distribution by age	25
Figure 9.	Distribution by income level	26
Figure 10.	Relative preferences of interest group and general community regarding forest use attributes	27
Figure 11.	Community perceptions of forest uses with economic importance	29
Figure 12.	Community perceptions of forest uses with environmental importance	29
Figure 13.	Community perceptions of forest uses with socio-cultural importance	30

SUMMARY

Community involvement in the planning process within State owned and managed lands has progressed beyond traditional inputs such as submissions and comments on draft plans. An evolution of the planning process, presently more participatory and considerate of the interrelationship between human and natural systems, means a new focus on the community as well as on the holistic management of ecosystems. However, involving the community with its diverse interests and characteristics require identification and reconciliation of potential conflicts with respect to the management of such lands.

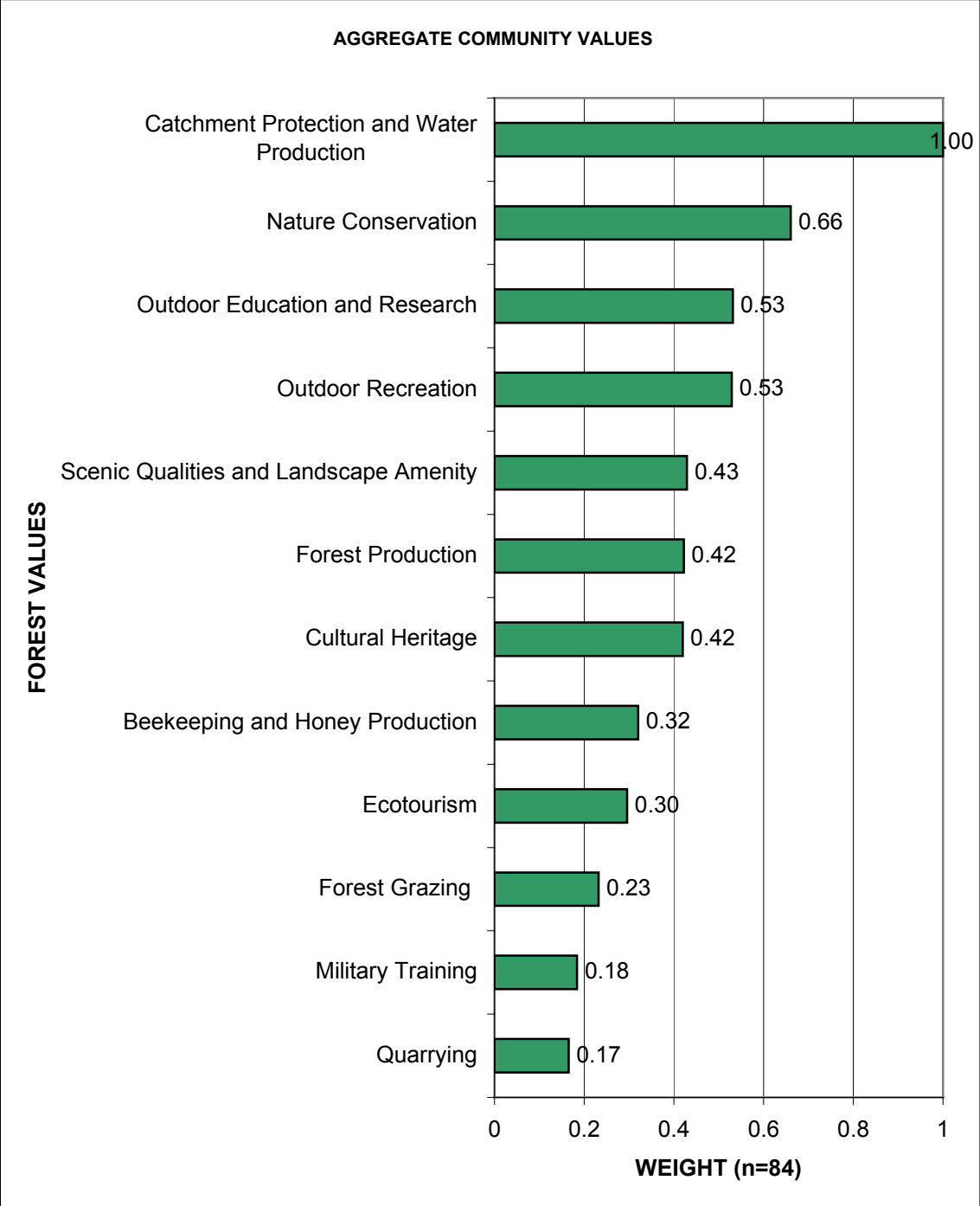
To assist in the determination of land use values which are compatible with both community values and land use capacity for the Glen Rock Property, an assessment of community values was conducted in both the interest group and the general community in the Shires/City in the surrounding area. The interest group consisted of members of the community who directly or indirectly have an interest in the outcomes of the planning process and are involved in the planning process. The general community refers to the random sample in the mail survey, and represent those who may not be involved in the Glen Rock planning process but nevertheless have general aspirations regarding a range of land uses for State owned or managed lands. Using a standard survey, which was designed and tested using a focus group, and used in previous planning processes, the assigned values and aspirations of the aggregate community were estimated from the values indicated by both interest groups and the general community. Such estimates give insights on the types of land uses preferred for inclusion in the management of State owned or managed lands. A Community Values Assessment Model developed by DNR Forest Planning and Sustainable Use was used to assess aggregate community responses. The preferences of the aggregate community with respect to economic, environmental and socio-cultural attributes of these land uses were also estimated using Hierarchical Preferences (HIPRE 3+). A ranking of land uses based on the aggregate community's perceived significance of these land uses was then generated.

Results indicated that the aggregate community ranked Catchment Protection and Water Quality, Nature Conservation, Outdoor Education and Research and Outdoor

Recreation as the four highest assigned values. Quarrying, Military Training and Forest Grazing were the least preferred when optimising community benefits in the management of State owned or managed lands. Among the three attributes (environmental, economic and socio-cultural) of possible land uses, the aggregate community perceived environmental attribute as the highest ranked, with almost similar preference for economic and socio-cultural benefits.

This study also demonstrated the relevance of decision analysis tools such as Multicriteria Analysis in analysing community values with respect to a range of land uses. MCA has tended to use values which can be expressed in numerical forms, using different interpretation and translation procedures of text-based values, such as Likert score which translate a value into a number. The benefit of this approach is that it can allow a range of values to be juxtaposed from different disciplines, perspectives and traditions. MCA can use the results of this project as a method to compare values. It allows multiple values to be recognised in order of increasing, decreasing or similar value, and be used to enhance decision-making. It does not replace decision-making, but adds value to the decision-making process for land use management, by specifying a number of options which result from considering different sets of values.

The findings of this study cannot accurately predict community attitudes and support of management plans for State owned and managed lands. Basic social values need to be assessed in the future and the intricate relationship between social values, land use values and attitudes towards forest management schemes explored. This would provide a more accurate prediction of the support of the community regarding sustainable management of such lands. An appropriate framework for the inclusion of community inputs such as assigned values in the overall planning and management process also needs to be investigated.



1. INTRODUCTION

The assessment of community values regarding multiple uses of State owned or managed lands is a vital part of the planning process since these values may influence land use decisions in these areas. The assessment process may also encourage participation and support from the community for land use management in the area. These public values are not formal evaluations of plans or policies but are statements of long-held preferences associated with land uses. These values, when integrated with expert values (which were done in assessments conducted by various Resource Assessment Teams outside of this study), will help determine preferred and ecologically feasible land use combinations which will provide sustainable community benefits from State owned or managed lands.

The present natural resource paradigm in Queensland encourages efficiency of resource use, intergenerational equity and sustainability of ecosystems in providing community benefits. It is anticipated that there may be conflicts arising from different values and interests from a plural society. An inherent difficulty exists in reconciling different community values about multidimensional land uses and within the context of Sustainable Forest Management. One of the tools applied in environmental planning in recent years to reconcile different interests is Multicriteria Analysis. This study will also evaluate the use of such tool in possibly obtaining in the future a consensus of the community on long held values of land uses in South East Queensland (SEQ).

This study was conducted to determine the assigned values of the community in the surrounding communities of Glen Rock Property, where a current planning process is in place. These assigned values are the values given by the community as an indication of their perceptions or aspirations about the natural resource in general – whether they care about the conservation of the health of the ecosystem, the provision of jobs and other economic benefits and the maintenance of non-economic benefits such as social/cultural and spiritual opportunities.

1.1. Community Values And Forest Planning: A Review

(Most of the reviews in this section refer to planning of State owned or managed lands, with continuous reference to forests. However, most of the theories and empirical evidence in the review can be applied to land use planning in general). The term “value” has different meanings depending on the area of study (Brown, 1984). Its measurement has been the subject of researches in different social science disciplines, with each discipline having its corresponding measurement techniques and methodological concerns (Fischhoff, 1991). The assumptions in measuring values vary. For example, psychologists assume that people can reasonably give meaningful responses to clearly described tasks. On the other hand, economists hold that people, by virtue of their egocentric economic pursuits, can state or reveal their values. Decision analysts work on the basis that people have basic values for most things, and that for more complex issues for which they hold no basic value, an inferential process based on attributes can be a valid substitute, thus forming a constructive value. Fischhoff (1991) cites that basic values, even though may not be well differentiated, can be inferred through the attributes of complex evaluation problems. This is the foundation of Multicriteria Analysis where different criteria are used to define the complex problem or goal and where alternatives are evaluated against these criteria. In the forest planning context, “value” indicates the degree of association of the community about certain forest uses.

According to Brown (1984) there are two kinds of values regardless of concepts - held values and assigned values. While held values are an individual’s desirable values, assigned values refer to what one ascribes to such values. Assigned values can be measured either through the market system or through non-economic research tools.

Importance of community values assessment in land use planning

State owned or managed Lands have the potential to produce multiple benefits for society. These benefits, which can be of economic, environmental or socio-cultural nature, may be unlikely produced in private lands which are devoted for purposes determined by its owner for his own gain. It is therefore imperative for State owned or

managed lands to be managed sustainably, taking into consideration temporal and equitable distribution of these community benefits.

Planning for State owned or managed Lands takes on this view of optimising values from such lands. In order to deliver such outcome, the values of the community with respect to a range of land uses are assessed and used as valuable input in the decision-making process especially when identifying goals and objectives and evaluating alternatives. These values also assist decision makers in enhancing the participation of the community, establishing monitoring criteria, assessing the impacts of decisions and steering strategic thinking (Keeney, 1992). Although there is no universal typology of forest values being used, there have been several attempts to classify forest values that reflect the multiple values of forests (Brown and Reed, 2000) .

The assessment of community values reflects the way in which forest planning in Queensland has evolved:

- a) At present, the public has greater involvement, beyond the traditional inputs in the form of submissions regarding draft plans. The preferences of the public are taken into account through standard surveys of randomly selected members of the general community. Management plans are made more consistent with the values of the public.
- b) There is a current integration of the knowledge of land managers and preferences of the community in determining defensible and replicable models of alternative options for State owned and managed lands consistent with national policy on sustainable forest management (SFM). By determining the final values of each planning unit through an integration of both expert assessment and community preferences the spatial location of these land values are identified. The land uses that will be managed are consistent not only with the values of the public but also with the capacity of the resource to provide different forest uses.
- c) There is greater attention to relationships of the natural and human systems in determining management goals and strategies and a collaborative learning approach between government agencies and the general community.
- d) Emphasis is given on the importance of the decision-making process and adoption of tools such as a Multicriteria Decision Analysis Approach (MCDA) in tackling land use planning complexity and multiple values arising from land uses.

Such a new approach means that land use managers deal with a larger clientele and a wider perspective (ecosystem-based) rather than being focused on working units in the forests (Beckley and Korber, 1995). Under the SFM scenario the multiple uses of State Forests are managed to provide a quality of life consisting of a balance of economic benefits, conservation values of the ecosystem, and maintenance of opportunities for the enhancement of social, cultural and spiritual needs of the community. Instead of simply managing for resource use efficiency, these multiple land uses are to be allocated and managed with due consideration of distribution issues (equity) and time-scale (sustainability for present and future generations) (O'Connor, 1998; Bergstrom and Loomis, 1999; Salwasser, 1999; Brown and Harris, 2000).

Identification of stakeholders and scale of analysis

Who are the stakeholders to be involved in the assessment? The stakeholder theory states that management must account of its moral and social obligations with those who have a stake or interest. In an SFM context, this includes future generations. A broader concept of stakeholders includes not only those determined by management but also those who perceive that they themselves have an interest in the resource (Miles and Lewis, 1999). The level of understanding of the general public about environmental values cannot be underestimated. For example, Schaberg *et al.* (1999) found out that the public, and the landholders in particular, exhibit a level of understanding about the ecological importance of forest resources and that non-market values are highly valued. This implies that the decisions of these sectors can affect landscape management. The challenge, therefore, is quantifying ecological amenities and communicating these to untrained individuals, determining socially desirable levels of non-market environmental amenities, and incorporating them into management decisions.

Another issue in community valuation is the scale of analysis. Should it be on a catchment basis, State Forest basis, regional, State, national or even global basis? Bergstrom and Loomis (1999) recommend the use of entire landscapes such as a national forest; Dale and Cowell, (1999) suggest catchment basis. Others define the boundary as watershed, encompassing socio-economic and biophysical networks (Fight *et al.*, 2000).

Valuation scale may depend on the significance and uniqueness of the resource itself. A sample of users or people who are aware of that particular landscape can be used, or in the case of unique landscapes or those with national or global significance such as World Heritage listed areas, samples are drawn from a broader (national or international) social aggregation. Careful considerations are required since the scale of measurement changes the values (Rothman, 2000). The presence of substitutes also determines the level of commodity values (Freeman, 1993; Rothman, 2000). The scale of analysis, whether local, national or global impacts on whether the commodities in question can be considered valuable or not.

Assessment methods

The choice of preference assessment methodology is itself a subject of debate. Decision makers may need to choose depending on ease of use and trustworthiness among others (Schoemaker and Waid, 1982). Based on the previous discussions, the Queensland Department of Natural Resources (QDNR) has chosen an Analytic Hierarchy Process (AHP) based approach. AHP allows individuals to make pairwise comparisons of alternative uses (Kamenetzky, 1982, Kangas, 1992, Kangas, 1993, Poyhonen and Hamalainen, 1998). There are other means of assessing weights that are versions of the multi-attribute utility approach (see Edwards, 1977; Stillwell, 1987; Keeney, 1990; Edwards, 1994; Russell, 1999) but are not discussed in this report. It is useful to point out that different assessment methods may yield different results. For example, an empirical study by Schoemaker and Waid (1982) found that there are differences in using five methodologies (including AHP and the multi-attribute utility based -direct decomposed tradeoffs) to determine weights in additive value models. However, in a later study, Poyhonen and Hamalainen (1998) found out that although the weights generated vary between five approaches including AHP and SMART, a multi-attribute utility-based approach, there are no fundamental differences since these have the same theoretical backgrounds.

Empirical studies

One of the approaches in assessing community values is the multi-criteria approach that relies on the plurality of motives when evaluating options. It is believed that an exploration of these values may lead to an understanding of the key factors affecting the relative importance of land use values to communities (Bengston, 1994). This valuation process will not eliminate conflicts but may identify the nature of these conflicts leading to a better conflict resolution and management. Munda (1995) suggests that the three types of values that enter into natural resource planning - efficiency, equity, and sustainability - are covered in a multi-criteria type of evaluation. There are also differing views about the relationship of natural and human systems. Such relationship can be either anthropocentric (utilitarian) or biocentric (springing from Aldo Leopold's land ethics) in orientation.

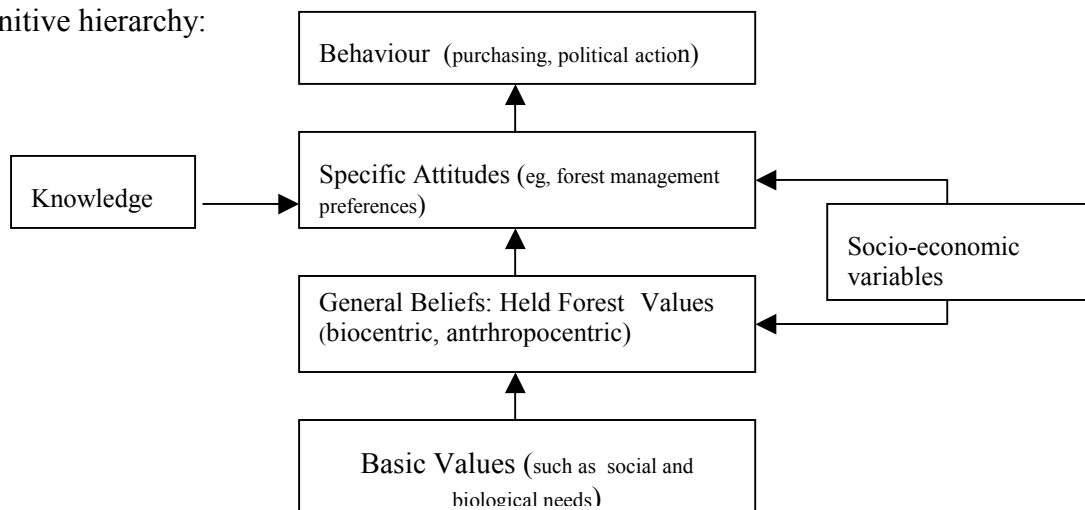
Several studies demonstrate the use of community values as input into the planning process. Brown and Reed (2000) suggested the use of forest values instead of forest uses in forest planning. His survey of Alaskan residents indicates that the community is able to identify different forest values based on the typology of Rolston and Coufal (Rolston and Coufal, 1991). Brown and Reed (2000) demonstrated how publicly held forest values can be incorporated in forest planning using a Values Suitability Analysis (VSA) methodology in the Chugach National Forest in Alaska. The VSA method allows drawing forest management plans that are logically consistent with these forest values.

Stein et al. (1999) also showed that planning and management insights could be obtained from community values in the case of the Red River Basin in Northwest Minnesota and eastern Dakota in the United States. The study showed that the community indicated economic as well as non-economic values for the landscape and preferred management strategies, which has strong focus on community education and cooperative planning.

It is also recognised that relevant forestry knowledge is imperative in fostering effective participation in public debates about forestry issues. Thus, Karppinen and Hanninen (2000) set out to measure attitudes of the Finnish public with respect to

flexibility to issues such as forest utilisation and forest conservation and found out that 36% of Finland’s population supported forest utilisation and about 23% favoured forest conservation. Supporters of multifunctionalism, *i.e.* favouring both forest utilisation and conservation consisted about 24% of the population while the rest of the population opposed any increase in either conservation or utilisation. A demographic analysis revealed that the younger generation and women are more conservation focused which is consistent with previous studies reviewed by Karpinnen and Hanninen (2000). However, contrary to previous empirical findings, a significant portion of formally educated population favoured utilisation instead of conservation.

The importance of held forest values in the planning context is found in the work of McFarlane and Boxall (2000) by giving insights and perspectives on the following cognitive hierarchy:



The authors found out that although the influence of socio-economic factors, social influences and knowledge on forest values and attitudes is little, there is a strong relationship between forest values and attitudes. Such an analysis of forest values and attitude helped determine whether sustainable forest management strategies in the Foothills Model Forest in Alberta, Canada were socially responsive or not. It also gave insights on the importance of communication strategies that may increase the level of awareness of the public about sustainable forest management.

A greater focus on multiple uses of forests on a sustainable basis, environmental concerns and recent changes in technology also elicits a wider focus in measuring community well-being instead of community stability that emanates from stability of forest industry (Parkins, 1999). Indicators presently focus on the inter-relationships of

economic, environmental and social aspects. These indicators comprise baseline information for forest management and policy decisions and serve as benchmark for comparative analysis across time and regions.

1.2. Objectives of the Study

Community values were assessed in order to assist in the determination of socially responsive management plans for the Glen Rock area. These values will be integrated with expert assessments done in other studies conducted for the Glen Rock planning process. These expert assessments deal with the land use capacity of different planning units to determine the best land use or combination of uses that will be managed in such planning units.

Specifically the assessment of land use values in this study was conducted to:

- a) Determine the range of values of several communities within the Shires/City surrounding the Glen Rock Property about the land uses that may influence decisions for State managed or owned lands in the area
- b) Assess the socio-demographic characteristics of the community and
- c) Evaluate the use of Multicriteria Analysis tools in determining community values.

2. METHODOLOGY

This study consisted of three parts:

- a) **CVA model refinement.** The Community Values Assessment Model was developed as part of the overall forest planning process. A review of different values elicitation tools was previously conducted (see Tumaneng-Diete and Waring, 2000 and Tumaneng-Diete and Hill, 2000) and the use of Multicriteria Analysis based method was adopted to suit the planning context.
- b) **Survey of interest group values.** In order to determine the relative importance of a range of forest uses and to understand the trade-offs made relative to the attributes of these uses, a standard survey of values was carried out. There were ten sets of questionnaires, with each set representing a random selection of 7 out of the 12 land use options. This follows the theory of Miller (1994) that an individual can effectively evaluate up to an average of 7 choices (or from 5 to 9 choices).

According to Miller (1994) an individual has limits with the amount of information that can be received, processed and remembered because of limits to span of absolute judgment and the span of immediate memory.

Interest group values were obtained through community meetings and through DNR displays at Agricultural Shows in Gatton and Toowoomba. Members of the community who came to discuss their issues and concerns about the planning and management of Glen Rock property were given the opportunity to participate in the CVA survey. Those interested were given questionnaire to fill up and were assisted by facilitators from DNR. These respondents represent members of the community who are highly involved and interested with the planning outcomes for the Glen Rock Property. Responses through community displays were also elicited from people who were not able to attend those meetings but were informed of the process.

- c) **Mail survey of random sample of the general community.** In addition to the assessment of values of the interest group, a standard survey was also conducted targeting the general community in several Shires close to the Glen Rock Property. These respondents represent the wider community who may or may not be aware of the existence of a planning process for Glen Rock property. They also represent the general community for whom sustainable land use benefits are intended.

Three hundred households were selected from several places with postcodes corresponding to the shires within a fifty kilometre radius of Glen Rock property, with approximately equal numbers of the sample coming from the shires of Boonah, Toowoomba, Gatton, Laidley and Warwick. Using the Dillman Approach, a sample of 300 households was contacted by phone to seek their participation and to gauge their willingness to participate in the survey. A mail out of the 300 households was then undertaken. The response varied for each shire with a total of 75 returns representing a 25% response rate, of which there were 54 useful returns. A \$500 incentive was offered as a lottery prize to respondents. What was surprising was that of the 54 respondents, there was an unenthusiastic interest in participating in the lottery. The intricacy of the questionnaire may have been a stumbling block for response, even though a willingness to participate was given.

- d) **Analysis of Results.** The results of the surveys were analysed using the Community Values Assessment (CVA) Model developed by DNR Forest Planning and Sustainable Unit. Such Model was used to establish the relative worth or ranking of a range of values preferred by the general community. Using the Hierarchical Preferences (HIPRE 3+) software (Hamalainen and Lauri, 1995) the preferences of the respondents with respect to land use attributes were also analysed. This involved pairwise comparisons of the economic, environmental and socio-cultural attributes of the sustainable management goal to determine the respondents' general perceptions of these attributes.

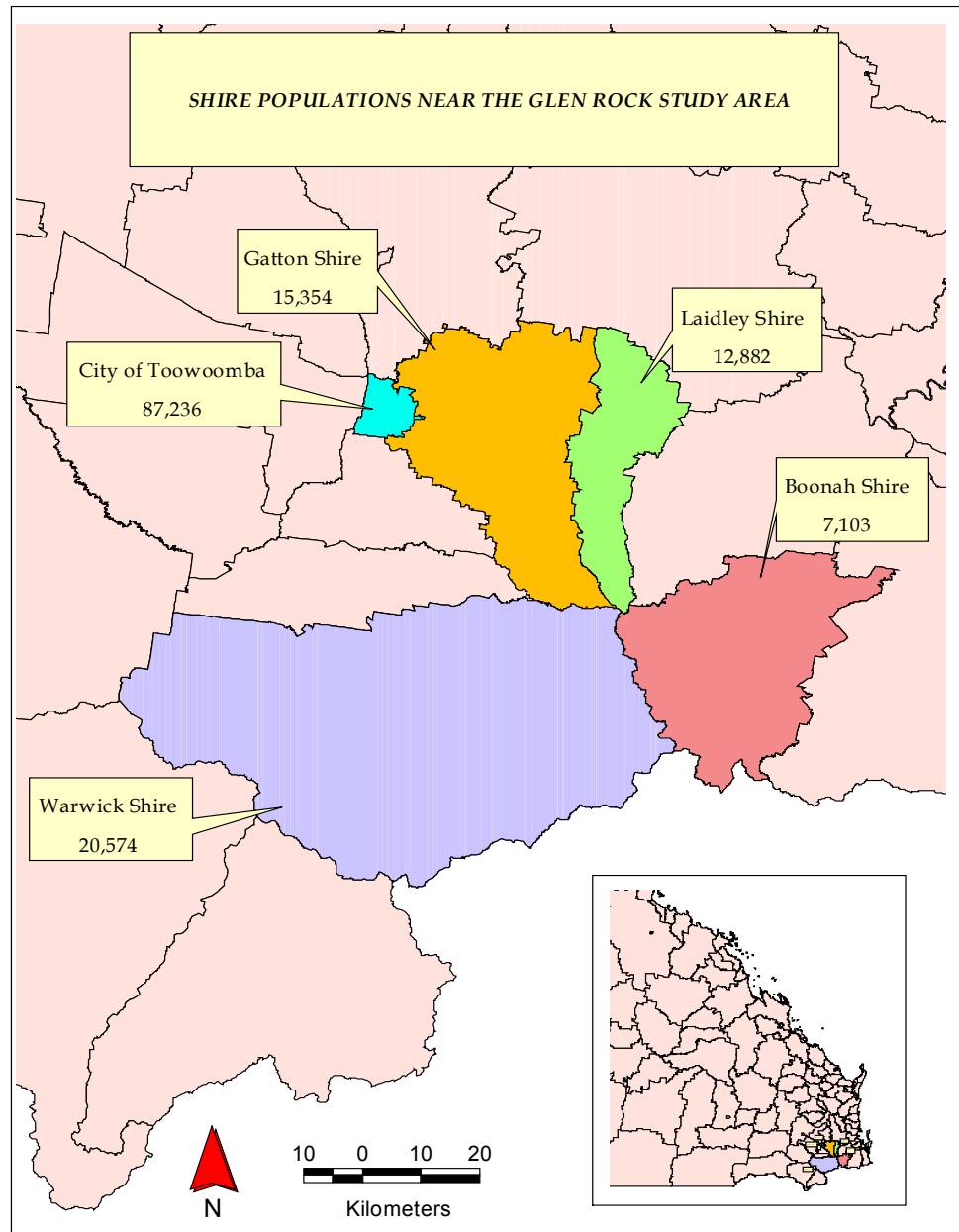
In both surveys, the demographic factors affecting the choices of the respondents were also analysed using statistical methods. This will give insight on factors such as age, gender, income, educational levels, and general activities of the community in State owned or managed Lands which may influence stakeholder and community preferences regarding a range of land uses. Interest group values were also compared with the general community values.

3. RESULTS AND DISCUSSIONS

Assigned values, which indicate the relative worth of long-held values of the community, were assessed within a 50-kilometre radius of the Glen Rock Property using standard survey. Two separate assessments were made – one each for the interest group and the general community. The first assessment involved eliciting values from interest groups attending community meetings, which were called to gather issues and concerns regarding the management of Glen Rock Property. Thus, those who were highly involved in the planning process or who have an interest in the future management of the Property were given the opportunity to indicate the land use values which they prefer to be included as part of an overall management scheme for the area. The second assessment was conducted using standard survey methods and was aimed at the general members of the community in selected Shires close to the Glen Rock Property.

The 1996 population of selected Shires/City in the vicinity of the Glen Rock Property is about 143,149. Majority of the population in the Shires are from Toowoomba City with 61 % located in the area, followed by Warwick (14%), Gatton (11%) and Laidley (9%) Shires (Figure1).

Figure 1. Map and population of some Shires/City surrounding Glen Rock



Source: Figures are from <http://www.statistics.qld.gov.au> (primary source quoted is Australian Bureau of Statistics.

Regional Population Growth, Australia). The Australian population increased by a yearly average of 1.15% since 1996.

There were 36 respondents in the community valuation survey conducted in conjunction with community meetings regarding the gathering of issues and concerns in the area. On the other hand, the general community as referred to in the following discussions refer to the mail survey respondents who were obtained through a randomised block design method. The 75 respondents came from the following areas (Table 1):

Table 1. Area of sample by postcode

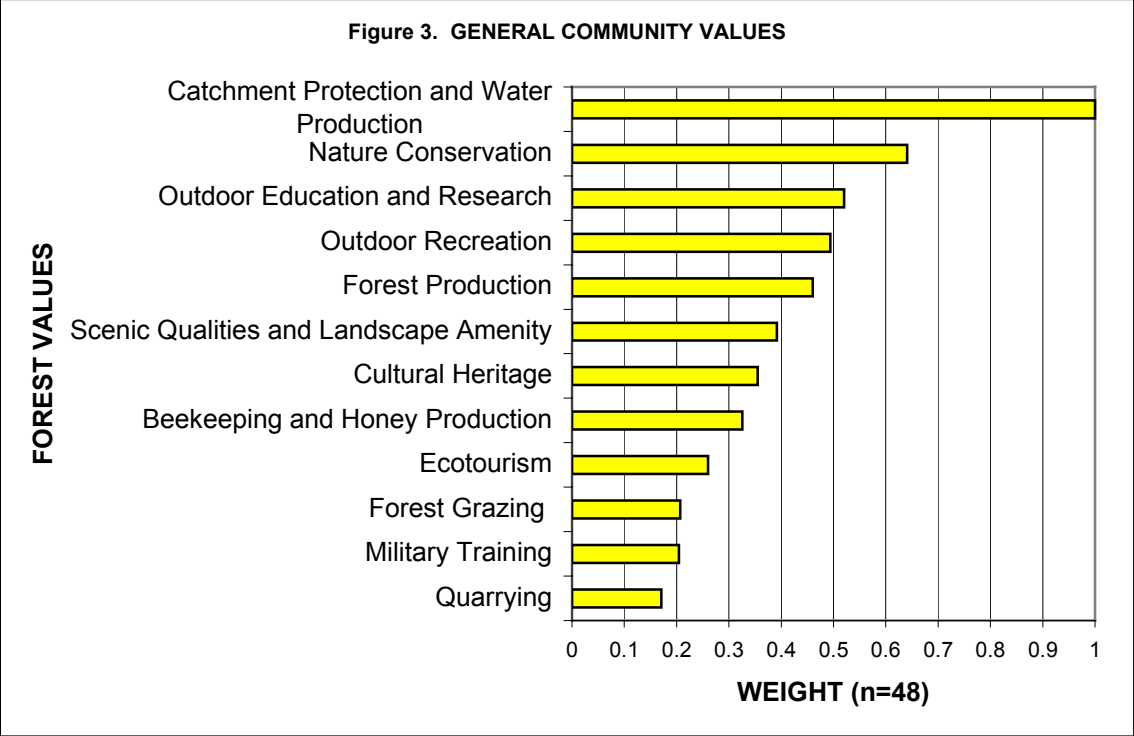
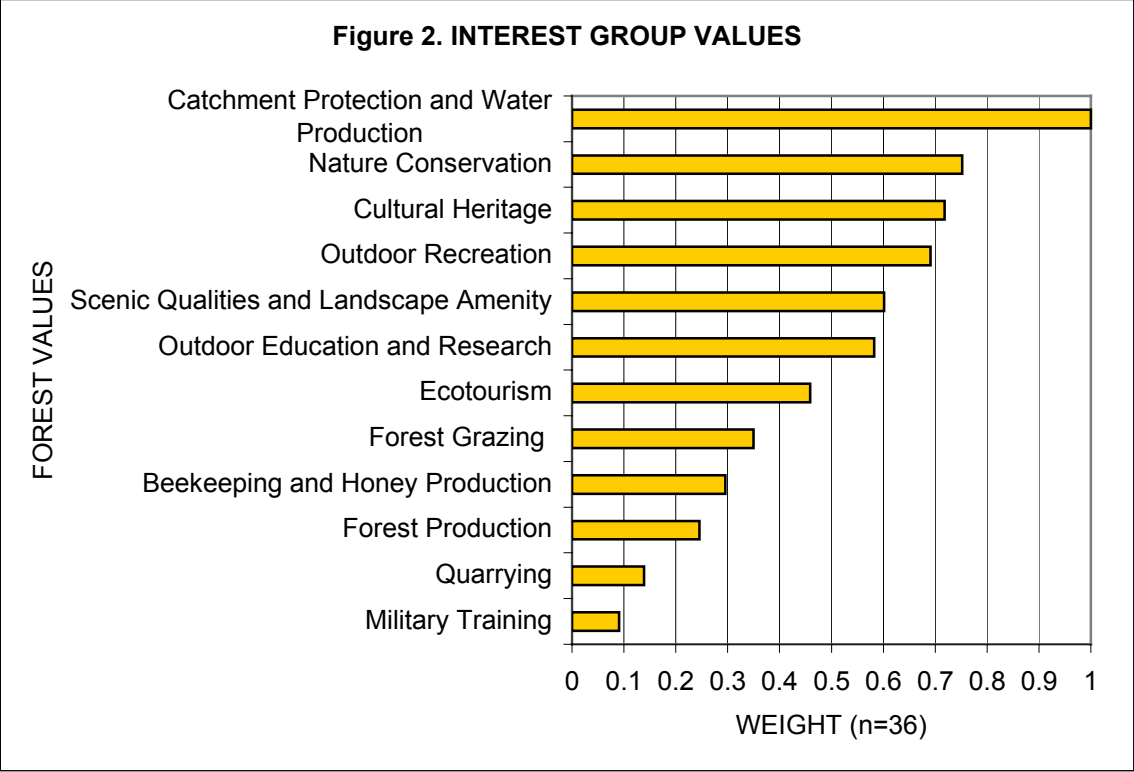
Postcode	Geographical areas	Proportion of sample (%)
4306	Thagoona, Walloon, Amberley	3.7
4307	Harrisville, Warrill View	3.7
4310	Boonah, Maroon, Milbong, Teviot,	11.1
4311	Minden, Lowood	3.7
4340	Rosewood, Mount Walker	3.7
4341	Laidley, Laidley Heights, Hattonvale	3.7
4342	Forest Hill, Lynford	3.7
4343	Gatton, Tenthill, Lower Tenthill	24.1
4350	Toowoomba	22.2
4370	Warwick	20.4
		100

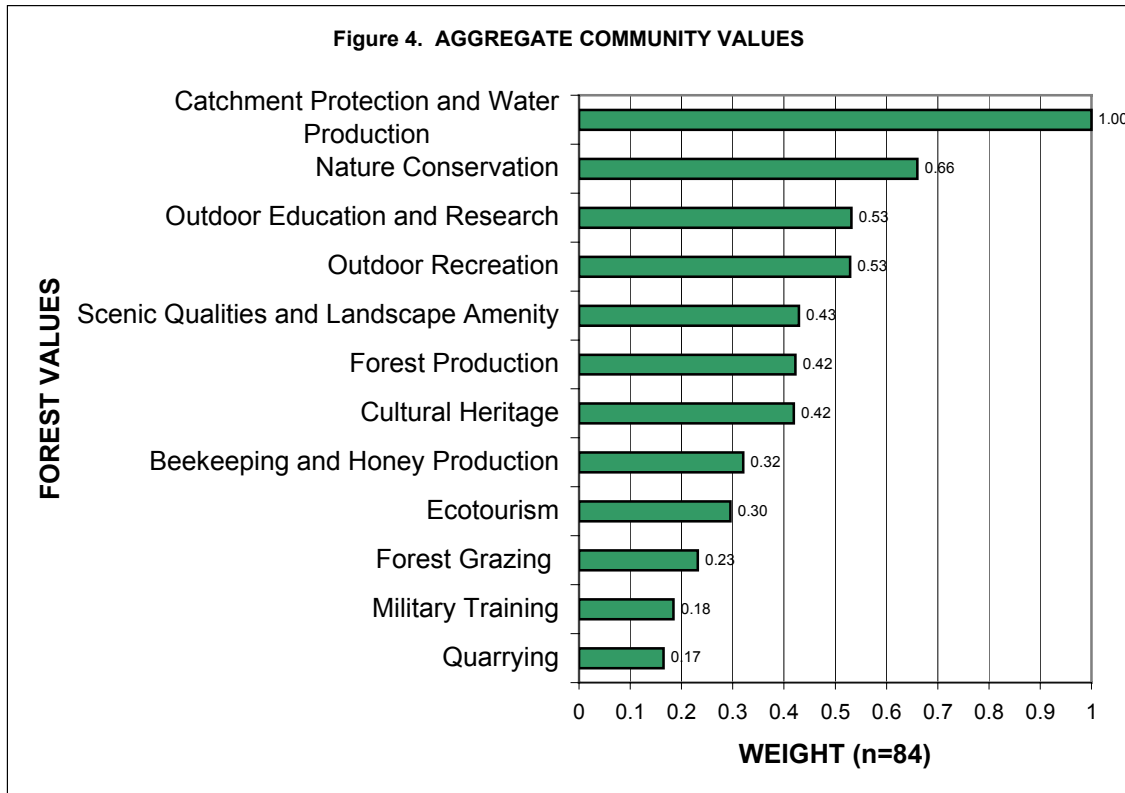
3.1. Assigned Values of the Community

Figure 3 shows the general community values identified from the mail survey of residents in the shires within a 50 km radius of Glen Rock. The order of preference of general community values is dissimilar to that of the interest group values (Figure 2), but the two most important values remain the same, that is, catchment protection and nature conservation. Our analysis did not indicate the reason for this middle order change in order of values, but readers should note the similarity in the highest preferred and lowest preferred values. These similarities indicate overall strong similarity, and suggest that “engaged” community people (interest group) do not differ in their values markedly from the general community. A statistical analysis was also conducted to find out the difference between the interest group and general community scores with respect to the

range of forest values. Such statistical analysis indicated no significant difference between the average scores given by both types of groups. One interesting feature of the community values assessment results was the substantially higher value placed on catchment protection than the next item, nature conservation. The overall strength of catchment protection suggests a strong conservation ethic of the aggregate community in the Glen Rock region.

Figure 4 shows the land use values preferred by the aggregate community, which was estimated as 80% and 20% of the general community and interest group, respectively. Such weighting was determined on the basis that the general community sample is more representative of the community described by Covello, Sandman and Slovic (1988) as consisting of the highly involved, attentive, browsers and the uninterested members of society. Of the 12 land use values the aggregate community considered catchment protection, nature conservation, outdoor education and research and recreation as the four highest assigned values that should be managed for the greatest interest of the community. The three least preferred land use options were quarrying, military training and forest grazing. The interest group and the general community differed with respect to the third most important land use - cultural heritage and outdoor education and research, respectively. Cultural heritage ranked high with the interest group relative to that of the general community. This could be attributed to a greater awareness of cultural heritage as a land use by the interest group respondents who are classified as highly involved as manifested in their participation in community meetings.





3.2. Demographic Characteristics of Interest Group and the General Community

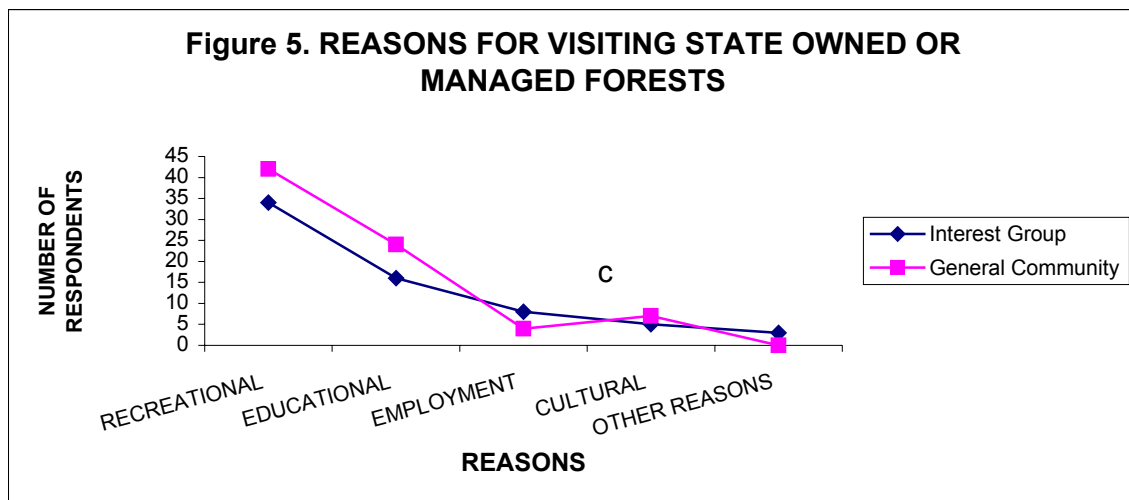
All of the interest group respondents have visited State owned or managed lands compared to just 90% for respondents in the general community (Table 2). Table 3 also shows that 16, or about 46%, of the 36 interest group respondents have also visited these Lands more than 15 times a year. However, 39 respondents or about 89% of the general community respondents have visited these Lands at most 5 times a year. Most of the respondents have visited these types of lands mainly for recreational, educational and employment purposes with the interest group and the general community exhibiting the same trend (Figure 5). While the results reveal similar use patterns, the variation can probably be explained in the relatively small sample sizes used and the specificity of the interest group respondents who were selected on the basis of their interest in the management of Glen Rock. The overall strong recreational use of State owned and managed lands reflects current land use opportunities of these lands in this region and indicates that about 1 in three to 1 in 2 people in this region use these lands, mainly for recreation.

Table 2. Previous experience in visiting State owned or managed lands

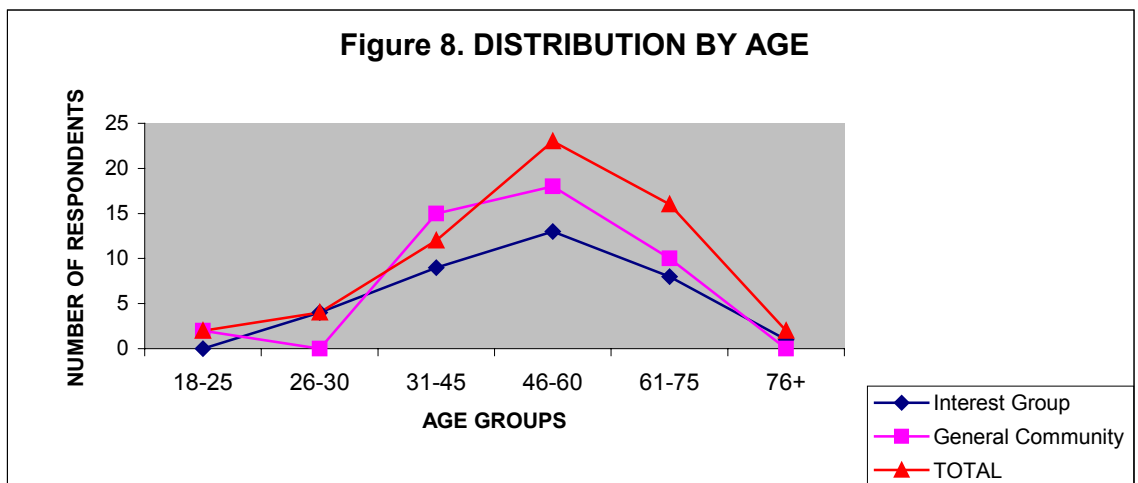
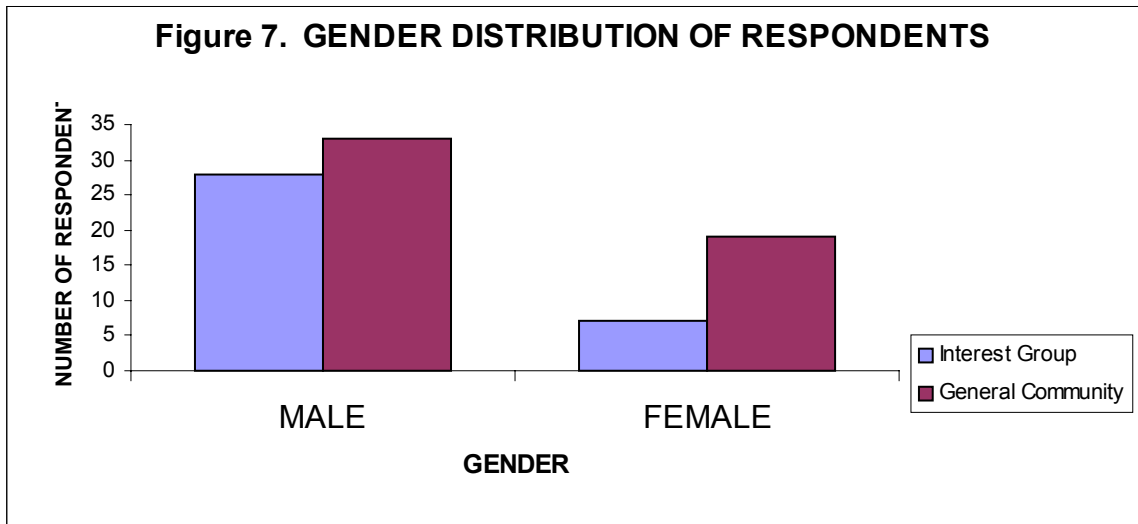
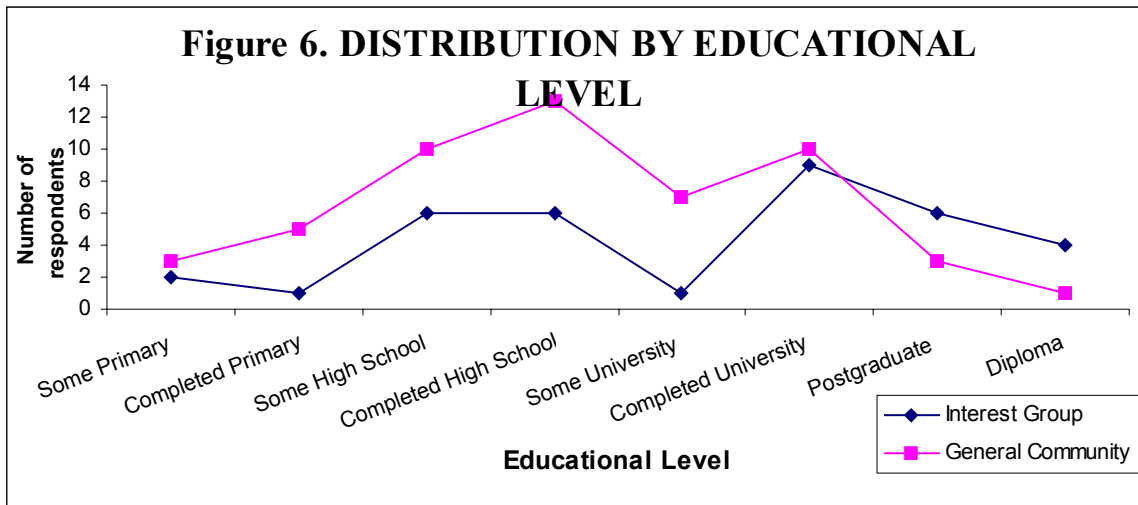
	VISITED	DID NOT VISIT	% VISITED TO TOTAL
Interest Group	37	0	100
General Community	47	5	90.4
TOTAL	84	5	
%	94.4	5.6	

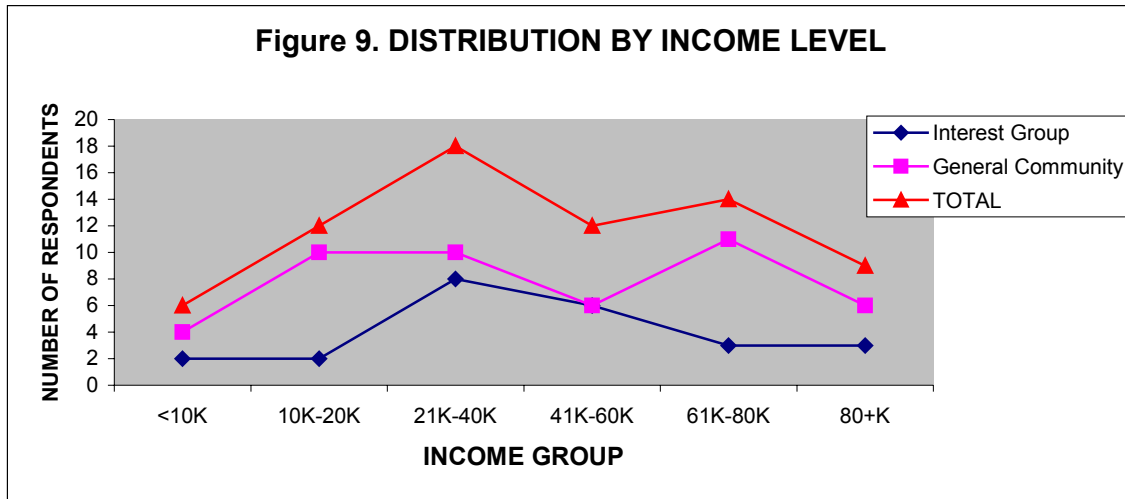
Table 3. Frequency of visits to State owned or managed lands

SHIRE	NO. OF TIMES VISITED			
	1 to 5	6 to 10	11 to 15	More than 15
Interest Group	13	5	1	16
General Community	39	4	1	0
TOTAL	52	9	2	1
%	81.3	14.1	3.1	1.6



Most of the respondents from the general community survey have completed High School education, whereas most of the interest group have completed University (Figure 6). / On the other hand, Figure 7 reveals that there are more male respondents in both and the general community surveys, with a greater participation of women in the latter survey relative to the interest group survey. There was greater participation in the surveys by those aged between 40 to 60 years (Figure 8) and half of total respondents (interest group and general community) are earning less than \$41,000 per year as shown in Figure 9.



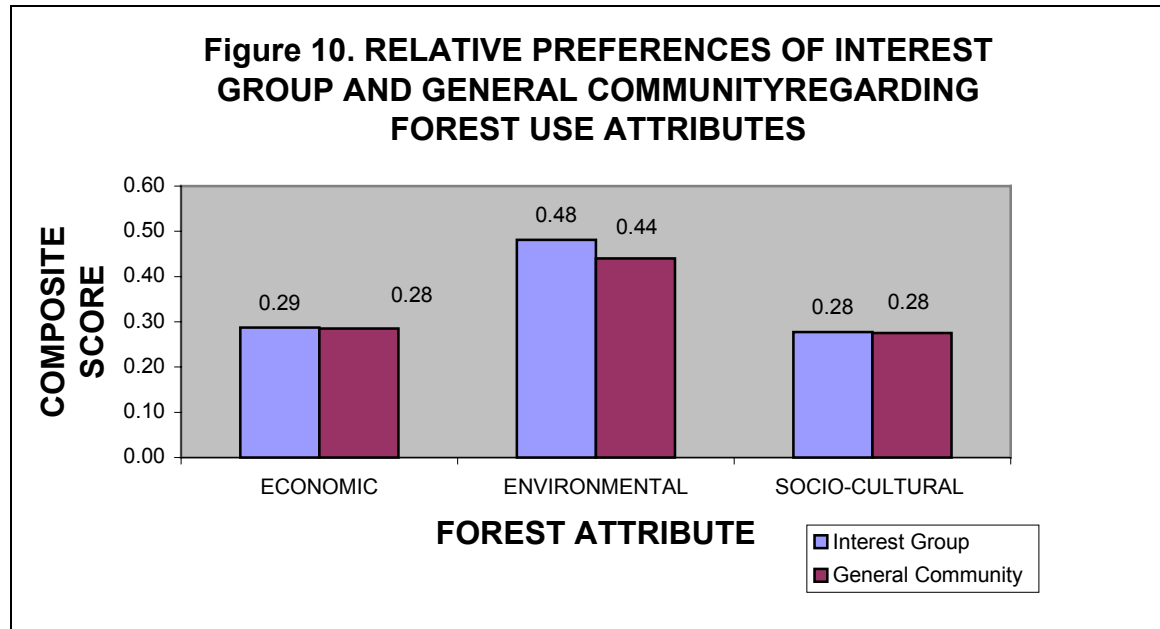


3.3. Preferences for Land Use Attributes

Multicriteria analysis theory indicates that complex subjects can be differentiated in terms of their different attributes to enable respondent to make relative comparisons. The three major attributes –economic, environmental and socio-cultural - are used in this study. Economic attributes refer to the capacity of a certain land use to generate income, employment and investment opportunities. Environmental attributes refer to the capacity of a land use to help maintain a healthy environment and conserve biodiversity of ecological ecosystems among others. On the other hand, socio-cultural attributes provide the community with opportunities to pursue spiritual, social and cultural activities within State owned and managed lands.

Interest group and community preferences about land use attributes were analysed using HIPRE 3+. The three land use attributes were compared using pairwise comparison wherein the composite scores have a total value of 1 (Figure 10). The results show that within both the interest group and the general community, environmental attribute was preferred above that of socio-cultural and economic attributes of the land uses, although there is only a slight difference in relative scores between the last two attributes. This follows Karpinnen and Hanninen’s (2000) review of demographic factors affecting environmental inclinations, which states that people with higher level of education are more environmentally conscious than those who have lesser education. At the same time this study also contradicts the research findings in Karpinnen and Hanninen’s (2000)

review where women and those who are younger and with higher income are more environmentally inclined than their counterparts. Most of the respondents in this study are male, and who are aged 46 years and older.



A statistical analysis was conducted to see if there is a significant difference between the perceptions of the general community and interest group with respect to the three attributes. Table 4 shows that there is no significant difference between the means of the two groups regarding their mean perceptions of an economic significance of land uses with a t-value lesser than the t-critical value. The same can be concluded with respect to environmental significance and socio-cultural significance. There is 95% confidence that the average economic perception of the interest group and the general community lies between 0.30 and 0.26.

3.4. Community Perceptions of Economic, Environmental and Socio-Cultural Significance of Land Uses

The results also show different perceptions of the interest group and the general community regarding the significance of various land uses. In Figure 11 both groups believed that quarrying, forest grazing and forest production are the three most significant land uses when taking economic importance into consideration. On the other hand, the

land uses with the most environmental importance as perceived by the aggregate community were nature conservation, catchment protection and water quality and beekeeping (Figure 12).

Table 4. Statistical analysis of the difference between interest group and general community perceptions of land use attributes

	GENERAL COMMUNITY			INTEREST GROUP			
	ECON	ENVI	SOCIAL	ECON	ENVI	SOCIAL	
n	50	50	50	36	36	36	
MEAN General	0.28	0.45	0.28	Mean Int. Group	0.29	0.47	0.28
VARIANCE (s²)	0.05	0.05	0.03	Var Int. Group	0.06	0.05	0.02
S	0.22	0.22	0.17		0.25	0.22	0.15
F	0.37	0.98	0.38				
FCRITICAL VALUE 35DF and @49DF,)	1.8695		1.88985				
Significant Difference	NO	NO	NO				
Standard Deviation	0.24	0.22	0.16				
2-TAILED TTEST	0.84	0.58	0.91				
SE for 84 DF	0.02	0.02	0.02				
TCRITICAL VALUE @84 DF	1.991333						
Mean + (t *SE)	0.30	0.46	0.29				
Mean - t *SE	0.26	0.43	0.26				

Although both the interest group and the general community regarded nature conservation and catchment protection as the two most significant in terms of environmental importance, the two groups have different views when it comes to the third most important land use which has the capacity to contribute to the maintenance of environmental values. An alternative land use such as scenic quality/landscape amenities was regarded by the interest group as the third most important while the general community chose beekeeping. Both interest group and general community respondents also evaluated the socio-cultural significance of land uses. Both groups regarded cultural heritage as the most significant land use. However, the two groups differed when it comes to the second and third most significant land uses. The interest group indicated

outdoor recreation and outdoor education and research, respectively. On the other hand, the general community indicated military training and outdoor recreation, respectively.

Figure 11. Interest Group and General Community Perceptions of Forest Uses with Economic Importance

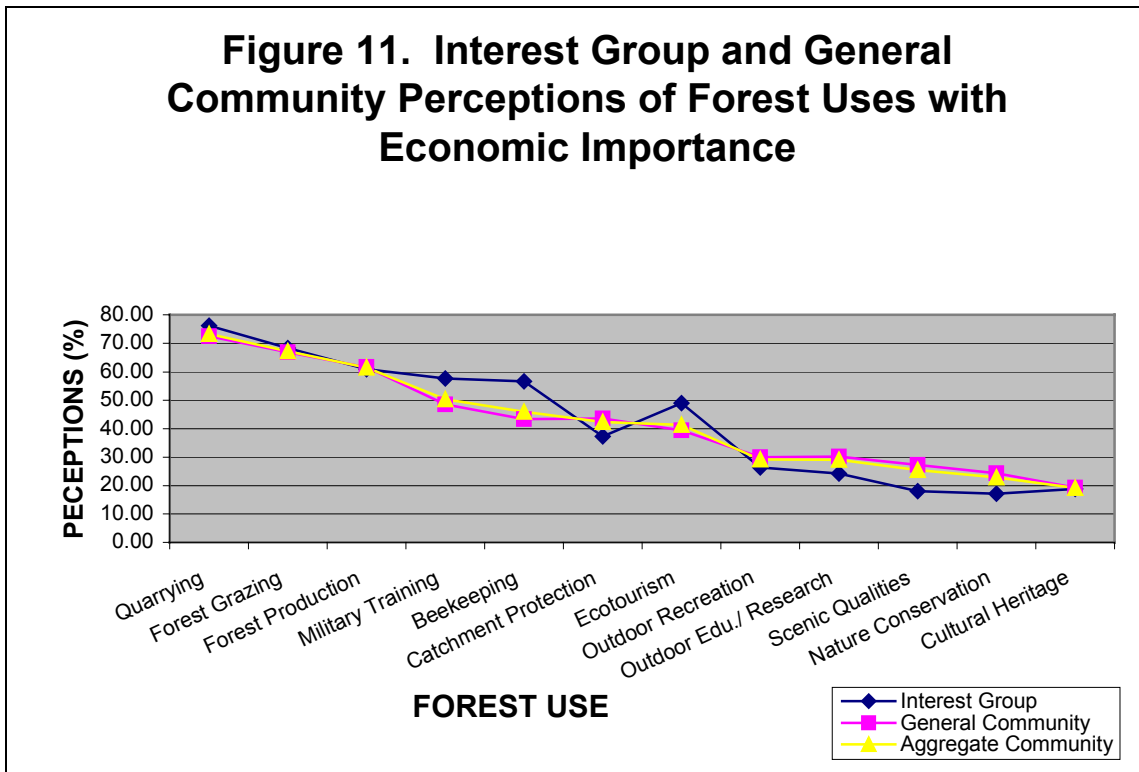


Figure 12. Interest Group and General Community Perceptions of Forest Uses with Environmental Importance

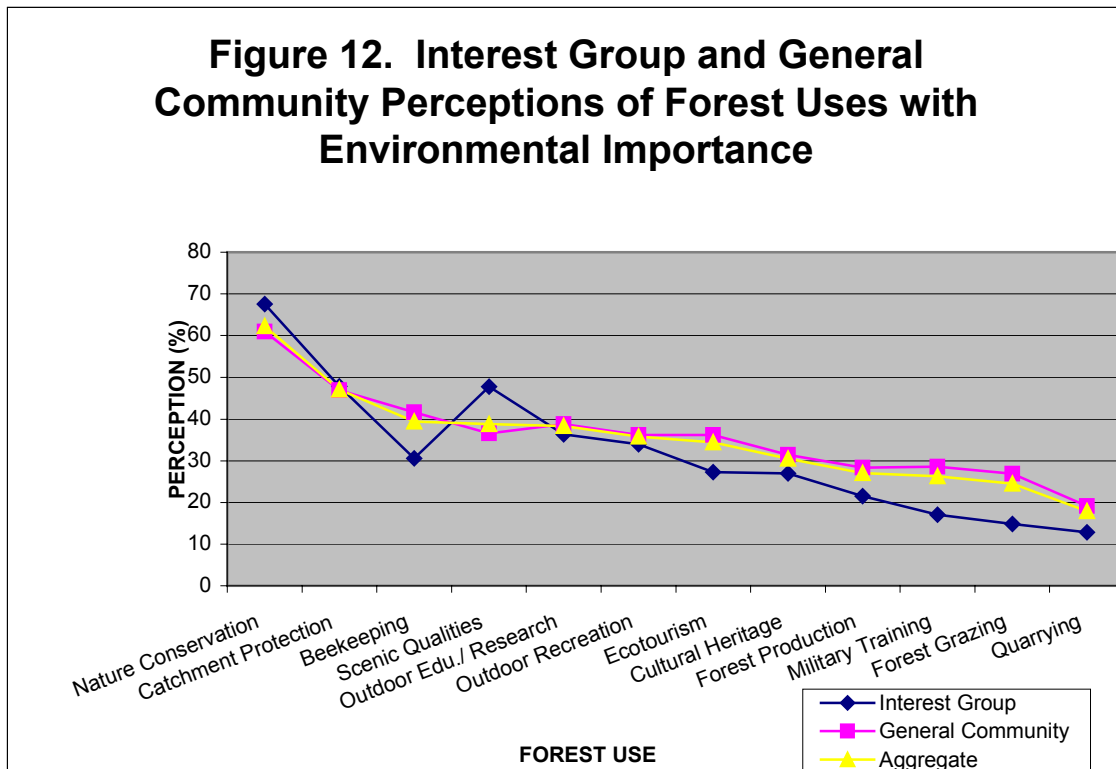
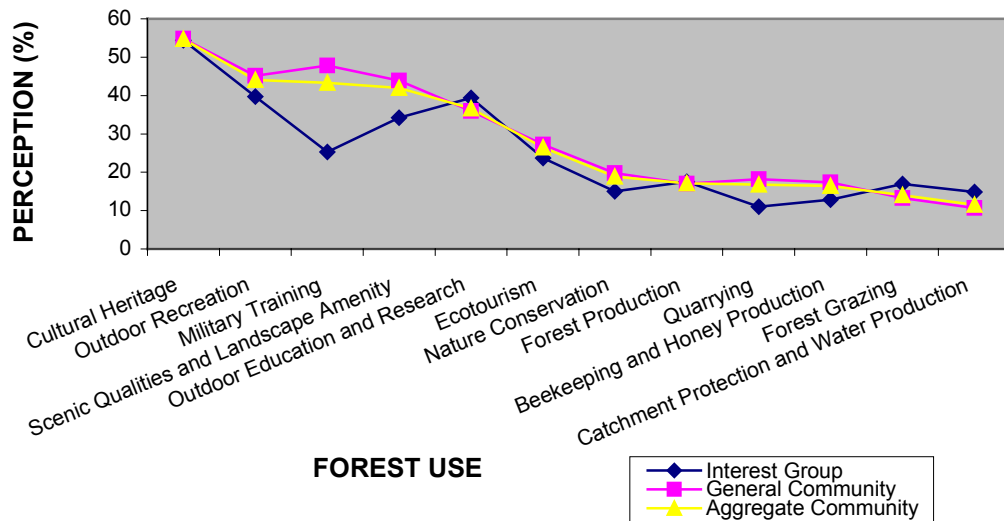


Figure 13. Interest Group and General Community Perceptions of Forest Uses with Socio-Cultural Importance



3.5. Comments from Respondents About Land Uses

The mail survey sought quantitative data through numerical responses, and these have been analysed using an eigenvalue calculator for values assessment, and are reported elsewhere in this document. The survey also sought written responses to the management of State owned and managed lands.

The following comments are a summary of each response. Note there were only 20 written responses, which may indicate the satisfaction respondents have in the quantitative measures of preferences in the survey document:

- 1) Develop Glen Rock for forestry in line with the Australian environmental conditions and allow recreation: camping and 4-wheel driving
- 2) Grazing destroys the soil and should not be allowed in forests
- 3) Land management is an emotive issue: we need to leave a healthy environment as a heritage for our children
- 4) Keep bushland for future generations and charge entry fees; preserve what we have left

- 5) It is important to preserve Glen Rock as the source waters of the Lockyer Valley: economic production from the area comes second
- 6) We must have controlled grazing in State owned and managed lands to minimise fire damage; we must control feral animals as they create problems for landholders downstream
- 7) We need to create more jobs for our young
- 8) This is a well-designed questionnaire. I would not have answered it unless I had been to Glen Rock. Most people won't respond to you because of the intricacies of your survey: so you won't get a broad community response.
- 9) This respondent listed nine experiences Glen Rock could be used for and which s/he had done in the region
- 10) It is important to maintain the requirement of clean drinking water: so catchment protection is priority one
- 11) There is a need for a balanced approach; all uses can be accommodated in 6300 hectares, with a manager appointed to oversee multiple use.
- 12) Develop Glen Rock as a premier equine park, considering limited other areas, land suitability, infrastructure parallels this use, open flexibility will also allow other uses.
- 13) [80 year female respondent provides brief life history of travels around Australia, then says:] State owned lands rarely managed as well as privately owned lands; all land uses in survey have their place; need to put natural resource management as top priority]
- 14) [3 page hand written response:] Never heard of Glen Rock; land use should align with the wishes of the people; need to protect the environment for nature conservation and water protection reasons; we are overcommitted to economic imperatives; governments need to remember we need tranquil bush places; not more subdivisions; not in Landcare nor a greenie. We need to wake up to how we are destroying our land.
- 15) Gatton respondent claims he was of the 'old school' of cut it down, burn it and clean it up. This doesn't work: this has led to declining water tables; we need fines to stop bad land management (tree clearing)
- 16) The public are finding it increasingly difficult to access public land for camping and bushwalking

- 17) I am a widow with 4 kids 11-17 years: I want to have places to go camping: I am horrified to damage in the Rosewood area's environment.
- 18) The people should have a say in State owned land management, not greedy politicians; need to disaffiliate membership of the United Nations; need to recognise the Jewish control of this organisation and return control to Anglo Celtic peoples, including how they manage the lands in this survey
- 19) We need sustainable management of our forests and allow multiple uses
- 20) Keep national parks as pristine as possible; forests should pay attention to long-term environmental management; need far greater resources to manage both.

The responses from the interest group respondents are also indicated below:

- 1) Too many experts; for vote popularity only.
- 2) Conservation should take precedence over any other forms of land use; catchment protection is the result of conservation. The less human exposure to human activity the better; monitoring human activity is almost impossible. Education of the community is a must.
- 3) National Parks are at present inadequately financed by our Qld. Government.
- 4) Complicated survey.
- 5) Would definitely not want to see trail bikes having access to Glen Rock; 4-WD access should be restricted to the Valley Floor
- 6) Military use is not for Glen Rock; recreation is needed as population grows; majority of Australians are not bush people; need to locate and enshrine all Aboriginal relics, sites and legends along with our own heritage; Ecotourism tends to congregate "herd" in select areas.
- 7) An interesting exercise
- 8) Questions on income and education are not necessary unless pushing for class distinction which is alive and well in Australia
- 9) In your management study please examine impacts on community or people in Gatton Shire and costs to the town

These comments revealed a diversity of opinion of preferred uses for State owned and managed lands. There is a very strong, politically conservative comment about the need to reduce government intervention in private management of lands, to feelings of the need to preserve the natural values of bushland for Australians in future generations, to

emotive comments about maintaining places of open space and individual and family enjoyment of ‘the bush’. These comments by individuals are to be prized in our analysis as they add to the rich tapestry of intuitive response to the natural resource management ideas of the community. While there will always be concerns about how representative these individual values are, they do echo the results of the quantitative data analysis reported in Part 3 of the report that recreation pursuits in lands managed for catchment protection and nature conservation are highly valued. These lands are preferred to be kept in a state that reduces fire risk, and feral species invasion and produces high quality water outputs.

4. EVALUATION OF THE RELEVANCE OF MULTICRITERIA TOOLS IN ASSESSING FOREST VALUES

One of the objectives of the study is to test the relevance of Multicriteria Decision Analysis tools in determining community values which are used as inputs in forest land use planning. The following are evaluations of an independent expert, Dr. Bruce Hooper, Director of Integrated Resource Management Research Pty. Ltd. who conducted the mail survey using the questionnaire developed by DNR Forest Planning and Sustainable Use:

- 1) Multi-criteria analysis is one of several methods to assess forest values. Other methods include preference studies using Willingness To Pay (WTP) and Willingness to Compensate (WTC) estimates from choice modelling studies, individual and aggregated individual (community) values surveys and a range of public involvement procedures such as written submissions, individual and corporate interviews and the output of roundtables, community meetings and focus groups. There is thus a range of ways of measuring monetary and non-monetary values, which could be applied to forest management. The non-monetary methods of values measurement include methods to generate values from text based forms of data collection. There is increasing recognition of the validity of these approaches, especially in post modern approaches which recognise the inherent worth of individuals’ values, expressed in any form, without overlaying a constructionist view of what these values represent.

- 2) MCA has tended to use values which can be expressed in numerical forms, using different interpretation and translation procedures of text-based values, such as Likert score which translate a value into a number. The benefit of this approach is that it can allow a range of values to be juxtaposed from different disciplines, perspectives and traditions. Some postmodernist social scientists, however, reject this numerical structuring of the data and recommend a purely non-structured approach which explores the context in which those values were formed, rather than the values themselves.
- 3) MCA can use the results of this project as a method to compare values. It allows multiple values to be recognised in order of increasing, decreasing or similar value, and be used to enhance decision-making. It does not replace decision-making, but adds value to the decision-making process for land use management, by specifying a number of options which result from considering different sets of values.
- 4) There are several principles which must be considered in using MCA and the data from the range of data capture methods discussed about and which can be used as inputs into MCA:
 - a. The data need to be **representative** of a specified group: this principle often creates real problems in assigning values to a specific sociological subgroup, mainly because of the range of values within this group and how the values may overlap with those of another group. Simply stating the 'mean' or 'modal' value tends to be irrelevant, rather a measure of the spread of values is useful. This can be accommodated in MCA, allowing least to most values to be stated, for example on a 0 to 1 range as 0.3 to 0.9 with a median score of 0.6. This gives the user of MCA a better indication of the complexity of values within a group and can allow inter-group and intra-group comparisons.
 - b. The method of operating MCA is best done through **an iterative process with the stakeholders** in a forest planning context. This involves establishing a critical group of key players in forest management decision-

making, their stake being clearly identified and articulated with each stakeholder and the proportionate representation being determined well before their involvement in the process of assigning criteria and the weights of the criteria in the MCA. This requires acceptance of the relative merits of each stakeholder by other stakeholders in the process of running an independent MCA.

- c. MCA is best **run by an independent analyst** to the forest management process. This can be done by assigning an external analyst proficient in the use of MCA to guide stakeholder identification, ensure appropriate, agreed representation, arbitrate conflicts between competing groups and developing processes to maintain ownership of the process. This raises the question not that MCA is a relevant or irrelevant tool for assessing forest values, but rather the application of MCA is done in such a way that ensures transparency, relevance and ownership by participants in the process.
- d. The MCA process should be **imbedded in the forest planning decision-making process** and not an adjunct to it, advising the decision-making process. One of the failures of MCA and decision support systems (in general) is that the decision-making process for forest management is essentially a political process, and is becoming more politicised with increasing public calls for often conflicting uses of forest resources. This suggests that MCA should include those involved in the political processes as key players ‘at the table’ in the MCA application. This requires attendance at MCA workshops, if that is the process being used, and these players being regarded as legitimate stakeholders in the application of MCA.
- e. The assignment of weights in MCA is one of the most critical tasks in applying this tool. The numerical value of weights needs to be **comparable across different data sets**, avoiding skewed weightings. This principle requires the range of value between weights to be agreed on. For example, on a weighting scale of 0 to 1, a value of 0.6 in a community

values study needs to equate to a similar meaning for '0.6' in a scale measuring forest production volumes. It is important in the application of MCA that these issues are clarified and scaling may need to be used prior to data entry. This suggests that expert statistical tools are needed to undertake cross-comparisons between data sets to enhance the value of very different data sets when placed on similar scales.

5. CONCLUSIONS

Assessing preferences of values of interest groups and the general community is only the beginning of an analysis of the effects of these values on preferences for land use management directions. Social values should also be assessed and the relationship between social values, land use values and attitudes toward land use management analysed. This would give a better predictive statement about community attitudes. Unless these land use values are considered as part of the intricate relationship between general social values, land use values and attitudes towards management schemes, one cannot accurately predict the support that the community gives for the sustainable management of land resources. The use of a Multicriteria Analysis tool in assessing community values has also been tested and evaluated in this study and shows great potential in forest land use planning.

Issues/Research Needs

Assessing these values and using them in policy making is not easy. Clark *et al* (1999) point out several problems that include 1) limited ability of decision-making agencies to integrate different types of social values, 2) inadequate understanding of social values regarding natural resources, 3) lack of standards of acceptability for forest management practices and consequences of using new techniques, 4) perceived lack of mechanisms and processes that define public involvement in decision-making, 5) institutional arrangements may limit the inclusion and integration of all relevant social values in decision-making and 6) lack of forum for a healthy debate and discussion on natural resource issues among decision makers, the public and other interest groups. Apart from the need to develop ways of integrating socio-economic and biophysical

information, social values also need to be monitored. The incorporation of social values in forest planning also means developing predictive strategies. These would facilitate designing management plans that accommodate such changes in scenarios. The multiple dimensions and complexity of natural resource management in forestry also means that a limited number of perhaps conflicting solutions may be found.

Problems also exist regarding the aggregation of unit values. Different groups of people may value specific uses differently because of cultural, economic, social, and time variations (Rothman, 2000). Rural and urban values may differ, with urban dwellers being passive use oriented, while the rural counterparts are more active use oriented. However, to decision makers, this divergence becomes significant when there is a substantial portion of the urban dwellers who express their concerns (Luckert, 1999). Another source of conflict will be in the types of recreational activities pursued by urban and rural population. The former may pursue non-consumptive types of recreation while the latter, consumptive-oriented recreation activities. The bottom line is that urban values, regardless of their characteristically lesser dependence on natural resources such as forests, are still legitimate components of the larger community. Thus, it may be helpful for future planning to include an analysis of urban and rural values.

Due to the problems of aggregation of values and the inclusion of subjective judgments in natural resource valuation, several authors (Keeney et al., 1990; Sen, 1995; Gregory and Slovic, 1997; Costanza and Folke in Rothman, 2000) advocate the use of constructed values through public discussions. Sen (Sen, 1995) reiterates that values are formed in the process of decision-making, stating that in contemporary environmental problems, the rational behaviour of the individual is integrated in his choice of social outcomes. However, one cannot presume that individuals are narrowly consumer utility focused when making such choices. In fact our results showed that the community is oriented towards catchment protection and nature conservation because of their orientation towards conservation and recreation.

Although long held values towards the environment have been the subject of various researches, it has not been established that these types of values (or values about the preferred state) are the only determinants in influencing social behaviour (Beckley et al., 1999) . Instead, there is a conglomerate of psychosocial factors that affect the

behaviour of the community such as perceived self-interest, altruistic motives, and social trends among others. At best, the assessment of land use values in this study can only give an indication of assigned values about a range of assigned values for land uses. For purposes of policy analysis, an examination of how these values translate into community action is imperative.

9 Bibliography

- Beckley, T. M., Boxall, P. C., Lust, L. K. and Wellstead, A. M. (1999) Forest Stakeholder Attitudes And Values: Selected Social Science Contributions. Canadian Forest Service Northern Forestry Centre, 24 pp.
- Beckley, T. M. and Korber, D. (1995) Sociology's Potential To Improve Forest Management and Inform Policy Department of Economy, Faculty of Agriculture, Forestry and Home Economics Department of Rural Economy Staff Paper 95-01, pp. 27
- Bengston, D. N. (1994) Changing Forest Values and Ecosystem Management. Society and Natural Resources. 7:515-533.
- Bergstrom, J. C. and Loomis, J. B. (1999) In (Eds, Cordell, H. K. and Bergstrom, J. C.) Integrating Social Sciences with Ecosystem Management: Human Dimensions in Assessment, Policy and Management. Champaign, Illinois: Sagamore Publishing. 346 pp.
- Bradley, D. P. and Lewis, B. J. (1992) Integrating Natural and Social Dimensions. Journal of Forestry. Feb 1992:30-33.
- Brown, G. and Harris, C. C. (2000) The US Forest Service: Whither the New Resource Management Paradigm? Journal of Environmental Management. 58:1-19.
- Brown, G. and Reed, P. (2000) Validation Of A Forest Values Typology For Use In National Forest Planning. Forest Science. 46(2): 240-247.
- Brown, T. (1984) The Concept of Value in Resource Allocation. Land Economics. 60:231-246.
- Clark, R. N., Stankey, G. H. and Kruger, L. E. (1999) In (Aley, Y., Burch, W. R., Conover, B. and Field, D. (Eds)) Ecosystem Management: Adaptive Strategies for Natural Resources Organizations in the Twenty-First Century. Philadelphia: Taylor and Francis. pp.193.
- Dale, A. P. and Cowell, S. (1999) Planning Systems Theory: Building Better Systems of Regional Planning for Sustainable Natural Resource Use In International Symposium for Sustainable Natural Resource Management, Brisbane.
- Edwards, W. (1977) How to Use Multiattribute Utility Measurement for Social Decisionmaking. IEEE Transactions on Systems, Man, and Cybernetics. 7(5): 326-340.
- Edwards, W. and Barron, F. H. (1994) SMARTS and SMARTER: Improved Simple Methods for Multiattribute Utility Measurement. Organizational Behavior and Human Decision Processes. 60:306-325
- Fight, R. D., Hansen-Murray, C., Holden, A. and Bays, D. (2000) Understanding Human Uses and Values in Watershed Analysis USDA Forest Service, 17 pp.

- Fischhoff, B. (1991) Value Elicitation: Is There Anything in There? American Psychologist. 46(8): 835-847.
- Freeman, A. M. I. (1993) The Measurement of Environmental and Resource Values. Theory and Methods. Washington, D.C.: Resources for the Future. 516 pp.
- Gregory, R. and Slovic, P. (1997) A constructive approach to environmental evaluation. Ecological Economics 21:175-181.
- Hamalainen, R. P. and Lauri, H. (1995) Hierarchical Preferences (HIPRE 3+) Systems Analysis Laboratory, Helsinki University of Technology, Finland .
- Kamenetzky, R. D. (1982) The Relationship Between the Analytic Hierarchy Process and the Additive Value Function. Decision Sciences. 13:702-713.
- Kangas, J. (1992) Multiple-Use Planning of Forest Resources by Using the Analytic Hierarchy Process. Scand. J. For. Res. 7: 259-268.
- Kangas, J. (1993) A Multi-attribute Preference Model for Evaluating the Reforestation Chain Alternatives of a Forest Stand. Forest Ecology and Management. 59:271-288.
- Karppinen, H. and Hanninen, H. (2000) Forest Conservation and Economic Utilization: Public Attitudes in Finland. Journal of Forest Economics. 6(1): 55-79.
- Keeney, R. E., von Winterfeldt and Eppel, T. (1990) Eliciting Public Values for Complex Policy Decisions. Management Science. 36(9): 1011-1030.
- Covello, Sandman and Slovic (1988). Outrage Prediction, Management and community consultation program. DMQ Consulting, Melbourne.
- Luckert, M. K. (1999) Are Community Forests the Key to Sustainable Forest Management? Some Economic Considerations. The Forestry Chronicle. 75(5): 789-792.
- Miles, M. P. and Lewis, B. (1999) In (Cordell, H. K. and Bergstrom, J. C. (Eds.) Integrating Social Sciences with Ecosystem Management: Human Dimensions in Assessment, Policy and Management. Champaign, Illinois:Sagamore Publishing.
- Munda, G. (1995) Multicriteria Evaluation in a Fuzzy Environment. Heidelberg, Germany:Physica-Verlag, Heidelberg. 255 pp
- O'Connor, T. (1998) The Valuation For A Sustainable Environment (VALSE) Project Full Final Report. <http://alba.jrc.it/valse/report.htm>
- Parkins, J. (1999) Enhancing Social Indicators Research in a Forest-Dependent Community. The Forestry Chronicle. Sept. 1999:771-780.
- Poyhonen, M. and Hamalainen, R. P. (1998) On the Convergence of Multiattribute Weighting Methods. Systems Analysis Laboratory Working Paper
- Rolston, H. I. and Coufal, J. (1991) A Forest Value Ethic And Multivalued Forest Management. Journal of Forestry. March 1991:35-40.

- Rothman, D. S. (2000) Measuring Environmental Values and Environmental Impacts: Going from the Local to the Global. Climatic Change. 44:351-376.
- Russell, C., Bjorner, T. B., Brisson, I., Clark, C. D., Dubgaard, A. and Jensen, M. H. (1999) Can Expressions of Altruistic Preferences be Triggered in Valuation Surveys. Preliminary Draft prepared for the EAERE 1999, Oslo.
- Salwasser, H. (1999) In (Eds, Aley, Y., Burch, W. R., Conover, B. and Field, D.) Ecosystem Management: Adaptive Strategies for Natural Resources Organizations in the Twenty-First Century. Philadelphia: Taylor and Francis. 193 pp.
- Schaberg, R. H., Holmes, T. P., Lee, K. J. and Abt, R. C. (1999) Ascribing value to ecological processes: An Economic View of Environmental Change. Forest Ecology and Management. 114:329-338.
- Schoemaker, P. J. H. and Waid, C. (1982) An Experimental Comparison of Different Approaches to Determining Weights in Additive Utility Models. Management Science. 28(2): 182-196.
- Sen, A. (1995) Rationality and Social Choice. The American Economic Review. 8(1): 1-24.
- Stein, T. V., Anderson, D. H. and Kelly, T. (1999) Using Stakeholders' Values to Apply Ecosystem Management in an Upper Midwest Landscape. Environmental Management. 24(3): 399-413.
- Stillwell, W. G., Winterfeldt, D. V. and John, R. S. (1987) Comparing Hierarchical and Nonhierarchical Weighting Methods for Eliciting Multiattribute Value Models. Management Science. 33(4): 442-450.
- Beckley, T. M. and Korber, D. (1995) Sociology's Potential To Improve Forest Management and Inform Policy Department of Economy, Faculty of Agriculture, Forestry and Home Economics Department of Rural Economy Staff Paper 95-01, . pp. 27.
- Bradley, D. P. and Lewis, B. J. (1992) Integrating natural and Social Dimensions. Journal of Forestry. Feb 1992:30-33.
- Edwards, W. (1977) How to Use Multiattribute Utility Measurement for Social Decisionmaking. IEEE Transactions on Systems, Man, and Cybernetics. 7(5):326-340.
- Edwards, W. and Barron, F. H. (1994) SMARTS and SMARTER: Improved Simple Methods for Multiattribute Utility Measurement. Organizational Behavior and Human Decision Processes. 60:306-325.
- Karppinen, H. and Hanninen, H. (2000) Forest Conservation and Economic Utilization: Public Attitudes in Finland. Journal of Forest Economics. 6(1):55-79.
- Rolston, H. I. and Coufal, J. (1991) A Forest Value Ethic And Multivalued Forest Management. Journal of Forestry. March 1991:35-40.

- Russel, C., Bjorner, T. B., Brisson, I., Clark, C. D., Dubgaard, A. and Jensen, M. H. (1999) Can Expressions of Altruistic Preferences be Triggered in Valuation Surveys. Preliminary Draft prepared for the EAERE 1999, Oslo.
- Steel, B. S., List, P. and Shindler, B. (1994) Conflicting Values About Federal Forests: A Comparison Of National And Oregon Publics. Society and Natural Resources. 7:137-153.
- Stillwell, W. G., Winterfeldt, D. V. and John, R. S. (1987) Comparing Hierarchical and Nonhierarchical Weighting Methods for Eliciting Multiattribute Value Models. Management Science. 33(4):442-450.
- Tumaneng-Diete, T. and Waring, B. (2000) Sustainable Forest Management: The Case Of The Gold Coast Hinterland State Forests. Paper presented at the International Society of Ecological Economics, Australian National University, 5-8 July 2000.
- Tumaneng-Diete, T. and Hill, S. (2000) Exploring the Use of Multi-Criteria Analysis and Economic Instruments in Multiple Use Forest Management. Report for DNR Forest Planning and Sustainable Use, Brisbane. 47 pp.

(Insert Appendices: Project Brief, Questionnaire, and Community Values and Forest
Mangement Planning brochure)