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VALUES RURAL HOUSEHOLDS IN KWAZULU-NATAL HOLD TOWARDS FORESTS AND THEIR PARTICIPATION IN COMMUNITY-BASED FOREST MANAGEMENT

S. Sharaunga¹, M. Mudhara² and E. Wale³

ABSTRACT

Community-based forest management (CBFM) is the internationally recognised model in which sustainable use of communal forest resources is assured. However, some authors have asserted that policy makers should understand the values communities hold towards forests before recommending strategies for CBFM. This study used Principal Component Analysis to identify the values rural households in KwaZulu-Natal hold towards forests. The Multinomial Logit Model was then used to investigate whether the values households hold towards forests, among other socio-economic and institutional factors, influence households' decisions to participate in self-initiated CBFM programmes. The study found that households' decisions to participate in community forest management depend, not only on the values they hold towards forests, but also on the forest management strategy being pursued. If a protection-oriented management strategy is pursued, households that hold more bio-centric values are more likely to participate, while households that hold more anthropocentric values towards forests are more likely to participate in managing forests when a utilisation-oriented strategy is pursued. Since rural households in KwaZulu-Natal are poor and overwhelmingly hold anthropocentric values towards forests, it was recommended that following the utilisation-oriented forests management strategy to meet the utilitarian needs of the communities would improve household participation, while reducing poverty and ensuring sustainable forest management.

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1 INTRODUCTION

In recent years, deforestation has become a serious global problem (Thoai & Ranola, 2010). In response, community-based forest management (CBFM) has become a widely used strategy with calls from international agencies, such as the Food and Agriculture Organisation (FAO) of the United Nations, the World Bank and others for governments to foster community participation in forest management (Obua, 2002). However, in South Africa, difficulties continue to be encountered in sustaining community forest management programmes. Some authors, including Borrie *et al.* (2002) and Kumar and Kant (2007), have asserted that the identification of the values communities hold towards forests (i.e. forest value orientations) is crucial for framing inclusive forest management policies aimed at achieving sustainable forest management.

In South Africa the values households hold towards forests are poorly understood and recognised by policy makers at national, provincial and local levels (DWAF, 2005). Moreover, several previous studies have not included the values that households hold towards forest resources in models to explain the factors influencing households' decisions to participate in community forest management programmes. Therefore, the objective of this study was to investigate whether the values households hold towards forest resources, among other socio-economic and institutional factors, influence households' decisions to participate in community forest management programmes in some selected rural areas of KwaZulu-Natal. In addition, the study sought to define strategies and actions appropriate for the sustainable management of forest resources in South Africa.

2 VALUES HOUSEHOLDS HOLD AND PARTICIPATION IN COMMUNITY FOREST MANAGEMENT

The term "forest value" can be used in several distinct ways (Gamborg & Rune, 2004). However, two most important value categories are "held values" and "assigned values" (Owen *et al.*, 2009). According to Owen *et al.* (2009), the assigned value of a forest product or service (e.g. firewood) refers to the relative worth of that product. On the other hand, held forest values or forest value orientations are patterns of basic beliefs that strengthen and give meaning to fundamental values. They are the aggregate scores of the assigned forest values and are an expression of basic beliefs that provide a foundation for higher order cognitions, such as attitudes and norms (Li *et al.*, 2010).

Categories of held values often include two divisions (instrumental and non-instrumental, material and non-material, and anthropocentric and bio-centric) (Bengston *et al.*, 2004). According to Vaske *et al.* (2001), value orientations towards natural resources, including forests, can be arrayed along a continuum scale ranging from anthropocentric to material to instrumental, on one end, to bio-centric to non-material to non-instrumental on the other, with the midpoint of this scale representing a mixture of the two extremes. Thus, anthropocentric, material, instrumental, and bio-centric, non-material, non-instrumental value orientations are not mutually exclusive (Vaske *et al.*, 2001). An anthropocentric-material-instrumental value orientation represents a human-centred view that assumes that providing for human uses and benefits is the primary aim of natural resource allocation and management (Vaske *et al.*, 2001). Values frequently associated with human-oriented use and sustenance categories (instrumental, material and anthropocentric) include economic, ecological and recreational values (Vaske *et al.*, 2001). In contrast, a bio-centric/non-material/non-instrumental value orientation is a nature-centred view (Bengston *et al.*, 2004). This approach recognises that environmental objects have inherent as well as instrumental worth and that economic uses and benefits are not necessarily the most important uses of natural resources. It also recognises that other species and shared habitats have intrinsic worth or value similar to that of humans (Bengston *et al.*, 2004). Values typically associated with non-use/bio-centric categories (non-instrumental, non-material and bio-centric) include aesthetic, cultural, spiritual, educational and ethical values (Owen *et al.*, 2009). A more bio-centric world view accepts intrinsic values in the natural world, independent of utilitarian or direct human value endowment. Spiritual, aesthetic, and non-consumptive nature values (e.g. non-use and option values) are important at this (more bio-centric) end of the value spectrum (Bengston *et al.*, 2004).

Several studies on forest values in developed countries (e.g. Bright & Stinchfield, 2005; Tarrant *et al.*, 2003) have overwhelmingly shown that the public values non-commodity benefits of forests more than economic benefits. However, in rural South Africa, several studies (e.g. Dovie *et al.*, 2002; Dovie, 2003; Shackleton & Shackleton, 2006; Shackleton *et al.*, 2007; Twine *et al.*, 2003) have reported that indigenous forests and savannahs, along with plantation forests, are mainly appreciated for the commodity/use benefits to rural communities and society at large. This has been attributed to the fact that in some provinces, for example in Limpopo, the use and dependency on natural forest resources, is extensive (Twine *et al.*, 2003).

With the advancement of the community-based natural resource management (CBNRM) approach, it has been realised that most technical aspects of a natural resource have great relevance to the resource values as perceived by local

communities (Kumar & Kant, 2007). Contemporary exchange theory stresses that farmers seek the “best value” they can get in participating in forest management programmes (Napier *et al.*, 1986). Thus, understanding the values households hold towards forests is a critical foundation for decision-making. A better knowledge of divergent public values can help environmental managers understand the range of perspectives they should expect among the public, as well as identify possible shared values they can build upon in forging consensus (Borrie *et al.*, 2002). Because forests can be used in a variety of ways, users hold different values towards them and, thus, conflicts concerning the way they should be used are expected. Some may feel that a forest should predominantly be used for timber production, while others may believe that preservation is most important (Nordlund & Westin, 2011). Forest managers have traditionally viewed forest values through the economic and political systems. However, neither system is effective in expressing all values society might have. To be socially sustainable, traditional forest management needs to move from its narrow focus on economic/commodity values and incorporate a wider range of values and needs (Robson *et al.*, 2000).

3 FACTORS INFLUENCING HOUSEHOLD DECISIONS TO PARTICIPATE IN COMMUNITY FOREST MANAGEMENT

Apart from the values households hold towards forests, local people’s decisions to participate in a community-based forest management programme are also influenced by other socio-economic (perceived economic benefits, household income levels) and demographic attributes of the members, institutional background, social networks and other external factors (e.g. technical assistance) (Coulibaly-Lingani *et al.*, 2011).

3.1 Perceived economic benefits

Individuals’ decisions to participate in any programme depend upon how they perceive the economic benefits from the programme (Chhetri *et al.*, 1998). The level of the population’s dependence on forest, either for food or as a source of income, their perception of the forest and the systems of appropriation used to extract forest resources are the main factors affecting the participation of local forest resource users (Obua, 2002). In communities that receive little benefit, households may not have incentives to participate in community forest management activities and to engage in sustainable resource management (Poteete & Welch, 2004). Availability of resources with a high revenue potential is likely to

attract the interest of community members, together with other actors, such as the state or the private sector (Maskey *et al.*, 2006).

3.2 Institutional factors

The management of local natural resources by communities is widely accepted as an institutional imperative (Agarwal, 2001). The presence of monitoring and sanctioning has been shown to be a key element in explaining successful common pool resource (CPR) management (Coleman, 2009). Institutions limit the effects of population pressure and of variable proximity to forest resources. Institutions also direct the evolution of heterogeneity that affects levels of trust, the predictability of interactions and interests in collective action (Poteete & Welch, 2004). Moreover, property rights and their security (confidence that rights and benefits to forests will not be denied) also influence whether community members will invest time and effort in the sustainable management of forests (Mwangi *et al.*, 2011). Findings on institutional arrangements for community forestry indicate that rules that are easy to understand and enforce, locally designed and overall accepted, take into account different types of violations, help manage conflict and hold users and officials accountable are most likely to lead to effective individual participation in managing community forest (Ostrom, 1990).

3.3 Forest resource-based conflicts

Conflicts over the appropriation, management and use of forest resources can pose significant constraints to participation in community forest management (Ostrom & Wertime, 2000). Conflicts can exist both within and between communities (Obua, 2002). The major forest conflicts are those relating to utilisation and management rights. According to Kaboggoza (2000, cited by Obua, 2002), conflicts often arise over resource use and control between governments, their agencies, the private sector and local communities. However, according to Nordlund and Westin (2011), much of the conflicts in environmental management are as a result of different valuations of specific forest functions. Forest resource-based conflicts can also be a product of poor or unclear natural resource policies and unresolved socio-economic problems. They can also arise over the type, quantity and frequency of product harvesting and may lead to users' lack of interest to participate in managing community forests (Obua, 2002) (see Figure 1 below).

3.4 Socio-economic factors

Socio-economic factors are essentially measures of a household's productive capacity, which can be expected to influence the household's choices and preferences over use of different forest resources (Agrawal & Angelsen, 2010). Social factors,

such as poverty, livelihood profile, cultural beliefs, status of weaker social groups and rights of minority and ethnic groups have an effect on a household's decision to participate (Agarwal, 2001). Other socio-economic factors affecting people's participation in natural resource management include easy availability of grants and subsidies, prejudices and discrimination against women, illiteracy and lack of awareness, factionalism and heterogeneity of population, disparities in wealth and social status, interference by politicians and misunderstanding about the motivation and objectives of people's organisation (Degeti, 2003). The number of male adults of working age can also affect households' capacities to allocate labour between community forest management and other activities, such as crop production (Ur-Rehman & Chisholm, 2007).

The gender disparity in decision-making power within households adversely affects the participation of women, thereby minimising women's potential both in human resource and knowledge in managing community forest (Maskey *et al.*, 2006). Women are often excluded from participation for reasons such as the rules governing the community forestry groups, social barriers stemming from cultural constructions of gender roles, logistical barriers relating to the timings and length of organisational meetings, and male bias in the attitudes of those promoting community forestry initiatives (Mwangi *et al.*, 2011). Empirical studies on women's participation often cite the social context as one of the important factors affecting women's participation (Kalpana, 2009). The fact that women bear the main responsibility for childcare and housework, in addition to their share of agricultural work, cattle care, means that they have high work burdens and logistical constraints. This seriously restricts women's ability to attend lengthy meetings held at inconvenient times (Agarwal, 2001).

Social capital is recognised as an important resource for shaping individuals' participation in community programmes (Coulibaly-Lingani *et al.*, 2011). While the technical aspects of community-based forest management are important, it is the cooperation between, and active participation by local beneficiaries through their community institutions that determine successful outcomes. This is dependent on the existence of trust, norms and networks, which over a period of time tend to be self-reinforcing and cumulative. It can also depend on the intervention of external agencies such as non-governmental organisations (NGOs) or forestry departments (D'Silva & Pai, 2003).

Heterogeneity in different dimensions of social, political and economic factors can have varying effects on a household's decision to participate in managing communal forest (Larson, 2003). There is a distinct relationship between ethnic homogeneity and social capital, mainly in the form of trust and participation. Ethnically diverse localities are poor in networks and low in participation. Individuals living in more racially fragmented areas participate less (Maskey *et*

al., 2006). Political and cultural differences within the community can also create problems at the user group level (Agrawal & Angelsen, 2010). Like ethnicity, there is fairly strong evidence that rates of civic participation are higher in societies with higher and similar income groups. It appears that the economic homogeneity of a community is conducive to the development of trust and participation, and makes organisation of community activities easier (Agarwal, 2001). Thus, addressing vulnerability and poverty reduction as part of forest management strategy is necessary for the success of activities for community forest management (Maskey *et al.*, 2006). Concerning the effect of family income on participation in environmental development programmes, several studies (e.g. Bright & Stinchfield, 2005; Maskey *et al.*, 2003; Salam *et al.*, 2006) have shown that households with higher income levels are more likely to engage in environmental development programmes as a result of increased awareness about the environment. However, other studies (e.g. Sapkota & Oden, 2008; Chhetri, 2005) have found that lower income households are more dependent on forests and more likely to invest their time in managing forests (Figure 1).

Gibson (2001) argues that perceptions of resource salience and scarcity affect collective management of forest resources. In his study, two villages in Guatemala had several characteristics frequently asserted to be associated with successful collective action. However, there was a poor level of participation in community forest management because members of both communities did not perceive scarcity in forest resources as sufficient to warrant conservation measures. In contrast, recognition of the link between the depletion of trees and the scarcity of water did lead one of these villages to create rules to protect a portion of their forest that was in the relevant watershed (Gibson, 2001). Local perceptions about dependency on indirect forest services strongly affect decisions about protecting forest resources (Potete & Welch, 2004).

4 RESEARCH METHODOLOGY

4.1 Conceptual framework

In this study, it is argued that household characteristics, institutional factors, forest value orientations as well as perceived economic gains simultaneously influence households' decisions to participate in managing communal forests. The various ways these factors can influence participation have been elaborated in Figure 1.

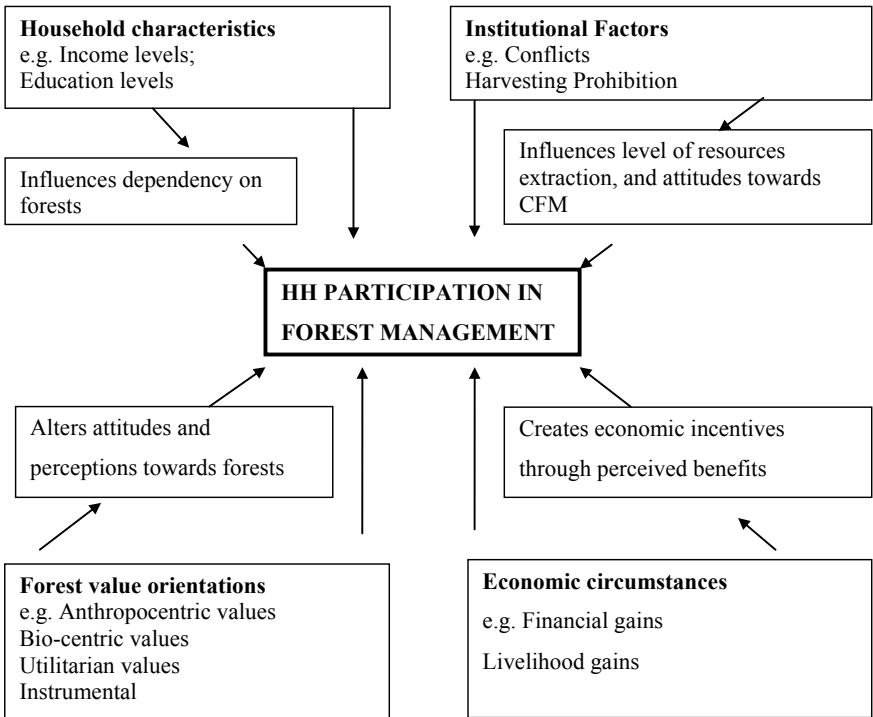


Figure 1: Factors influencing household decision to participate in forest management

4.2 Empirical approach

The values households or the community at large hold towards forest resources reflect their commitment to sustain forest ecosystems. Apart from the values households hold towards forests resources, a household's decision to participate in community forest management programmes may also be influenced by other socio-economic and institutional factors. Therefore, Principal Component Analysis (PCA) was used to determine the values households hold towards forests while the Multinomial Logit (MNL) model was used to explain and predict a household's participation status. The participation decision is explained using the values households hold towards forest resources, socio-economic and institutional factors that describe the characteristics of each household.

Using PCA, the scores of relative importance for each forest product and services were grouped into factors or principal components that represent

quantitative measures for the values household hold towards forests (value orientations). In this study, the identification of all possible forest values relevant to the three communities of KwaZulu-Natal was done following other studies (e.g. Cocks *et al.*, 2003; Dovie *et al.*, 2002; Dovie, 2003; Shackleton & Shackleton, 2006; Shackleton *et al.*, 2007; Twine *et al.*, 2003) and the SCI-SLM (2010) preliminary survey. One hundred and fifty-three household heads were asked to rate the importance of these forest products and services on a five point Likert Scale. Each PC was named according to the dominant PC loadings. Absolute PC loadings greater than 0.50 were considered dominating.

4.3 Sampling

The study was based on primary cross-sectional data collected using stratified random sampling from three communities. Households from each community were further stratified into participating and non-participating households and two separate lists (i.e. for participating and non-participating households) were compiled. To obtain equal representation across the three communities, equal numbers of households (51) were targeted from each community instead of proportional sampling. Proportional sampling was not used in this study because more households would have been selected from KwaSobabili (with a total of 526 households) and very few from Gudwini (which had only 77 households) (see Table 1).

Table 1: Distribution of participating and non-participating households in the three communities studied

Area	Participating households	Non-participating households	Total number of households
KwaSobabili	22	502	524
New Reserve B	15	103	118
Gudwini	16	59	75

Source: Survey data (2011)

A preliminary survey in the three communities had established that households were either participating, willing to join and participate, or unwilling to participate. Thus, the study also aimed to get an even distribution of households across the three categories. Since the proportion of participating households was very small, all participating households were targeted in the sample. The number of participating households was almost the same across the three communities despite the large

differences in the total population entitled to derive benefits from the forests. The average number of participating households in the three study communities was seventeen. The average number of participating households was multiplied by three (i.e. number of categories) to give the number of households sampled in each community (i.e. total of 51 households from each community). Since 51 households were required from each community, the remaining households were randomly selected from the non-participating list of households. This procedure also allowed an even distribution of households across the three participation categories (Table 2). However, thirteen (24 %) of the participating household heads were not included in the sample because they were not available during the time of the interviews (Table 2).

Table 2: Distribution of participating and non-participating households sampled

Community	Participating households	Non-participating		Total
		Willing to join and participate	Unwilling to join and participate	
KwaSobabili	17	19	15	51
New Reserve B	11	15	25	51
Gudwini	12	19	20	51

Source: Survey data (2011)

Participating households were defined as those involved in any activity linked to the community forest management programmes. Such households had one or more household member(s) who were involved in either decision making, needs assessment, resource mobilisation and implementation activities. Participating households were those who were voluntarily involved in doing different activities without payment or direct compensation. During the survey, sampled households were identified from the two lists of participating and non-participating households with the help of two committee members, from each community, who knew the households well.

4.4 Empirical model

The multinomial logit model was used to identify the factors that influence a household's decision to participate in community-based forest management programmes. The dependent variable was the participation status

(i.e. 1 = participating; 2 = not participating but willing to join; 3 = not participating and not willing to join).

Letting P_j ($j = 1,2,3$) be the probabilities of a household being in each participation category and assuming that $j = 1$ is the reference category, the multinomial logit model showing the relative probabilities of being in the three participation categories as a linear function of X_{ki} for the i^{th} household, according to Greene (2003), is estimated as:

$$\ln (P_j/P_1) = \log_e (P_j/P_1) = \beta_{0j} + \beta_{1j}X_{1i} + \dots + \beta_{kj}X_{ki} + u_{ji} \quad (1)$$

For $j = 2,3$ and $i = 1,2 \dots n$ households where:

- \ln = the natural logarithm (or \log_e)
- P_1 = the probability of the household being in the reference category (the household is already participating);
- P_2 = the probability that the household is not participating but willing to join the community-based forest management programme.
- P_3 = the probability that the household is not participating and is not willing to join and participate in community forest management.
- β_{kj} are the MNL coefficients to be estimated and,
- X_{ki} is the k^{th} explanatory variable explaining the i^{th} household

Following Carter-Hill *et al.* (2008), the conditional probability of the i^{th} household being in the three alternative categories ($j = 1, 2$ or 3) is estimated by equations 2 to 4 as a function of the estimated β_{kj} and the X_{ki} as:

$$P_i (j = 1) = \frac{1}{1 + \exp(\beta_{02} + \beta_{12}X_{1i} + \dots + \beta_{k2}X_{ki}) + \exp(\beta_{03} + \beta_{13}X_{1i} + \dots + \beta_{k3}X_{ki})} \quad (2)$$

$$P_i (j = 2) = \frac{\exp(\beta_{02} + \beta_{12}X_{1i} + \dots + \beta_{k2}X_{ki})}{1 + \exp(\beta_{02} + \beta_{12}X_{1i} + \dots + \beta_{k2}X_{ki}) + \exp(\beta_{03} + \beta_{13}X_{1i} + \dots + \beta_{k3}X_{ki})} \quad (3)$$

$$P_i (j = 3) = \frac{\exp(\beta_{03} + \beta_{13}X_{1i} + \dots + \beta_{k3}X_{ki})}{1 + \exp(\beta_{02} + \beta_{12}X_{1i} + \dots + \beta_{k2}X_{ki}) + \exp(\beta_{03} + \beta_{13}X_{1i} + \dots + \beta_{k3}X_{ki})} \quad (4)$$

In this study, the category “not willing to participate” in community forest management was used as the reference category. This is because the study was interested in comparing households not willing to participate with those willing to participate. A brief description of the explanatory variables used in

the multinomial logit model is provided in Table 3. Sample size guidelines for multinomial logistic regression indicate a minimum of ten cases per independent variable (Schwab, 2002; Hosmer & Lemeshow, 2000). Since the sample size was 153, only 15 explanatory variables were used for the sample. The Akaike's Information Criterion (AIC) was used for selecting variables in the multinomial logistic regression model. The overall model was run using only the most powerful predictors of participation status that were obtained from separate models for each of the underlying drivers of participation in the conceptual framework (Figure 1).

Table 3: Variables used in the multinomial logit model to explain participation status

Explanatory variable	Description
AGE	Continuous variable for household head's age
MALE_D	Dichotomous; 1 if individual is male and 0 otherwise
MARITAL_STAT	Dichotomous; 1 if individual is married and 0 otherwise
EDUCATION	The number of years of household head's formal education
HHOLD_SIZE	The number of members that are in each household
EMPLYNT_STAT	Dummy; 1 if household head is employed and 0 otherwise
TOT_SOC_GRANT	Continuous variable for the total amount of money received from child grants, disability grants and pensions in a year
DIST_TO_FOREST	Distance from household to the forest. This distance was measured as time taken to walk and get to the forest, in minutes.
ALTRNTIVE_SRCS	Dichotomous: 1 if household used alternative forests where they get the most important forest products and 0 otherwise
ENVIRONT_AWA	Level of environmental awareness of the household head: Measured by the environmental awareness test with a maximum score of 6
ANTHROPCNTRIC_VAL	The cultural values households hold towards forests. (Composite index or factor from PCA)
CULTURAL_VAL	The non-use values households hold towards forests. (Composite index or factor from PCA)
NON_USE_VAL	The anthropocentric value households hold towards forests. (Composite index or factor from PCA)
D1	Area dummy: 1 for households in KwaSobabili and 0 otherwise
D2	Area dummy: 1 for households in New Reserve B and 0 otherwise
Intercept	Area dummy: 1 for households in Gudwini and 0 otherwise. D3 was left out from the regression to avoid a dummy variable trap.

5 RESULTS AND DISCUSSIONS

5.1 Demographic characteristics of the communities studied

The demographic details of the communities studied are given in Table 4. Two of the communities (KwaSobabili and New Reserve B) were managing wattle plantations while the community in Gudwini was managing a natural forest. Out of the 156 sampled households, 43 (27.6%) were male-headed and 113 (72.4%) were female-headed. There were more female-headed than male-headed households because the *de facto* household heads (i.e. those women who stayed in the household for at least four days in a week but had spouses not residing with the rest of the household) were considered as the household heads. In such cases, the men were the “lawful” household heads but worked elsewhere (e.g. in towns, mines, farms and cities), and were not with their households for more than four days in a week. The average family size for the sample was 6.6 and was almost the same across the three communities. Social grants were the major source of household income in the three communities.

Table 4: Key characteristics of the communities in the study (n = 153)

Characteristics of communities	Community			Overall sample
	KwaSobabili	New Reserve B	Gudwini	
Type of forest managed	Plantation	Plantation	Natural	
Main source of household income	Social grants (61.6%)	Social grants (76.9%)	Social grants (77.0%)	Social grants (72.3%)
Number of unemployed household heads	(81.8%)	(83.6%)	(90.1%)	(84.8%)
Number of households with electricity	50 (96.2%)	52 (100%)	0 (0.0%)	105 (67.3%)
Male-headed households	17 (32.7%)	16 (30.8%)	10 (19.2%)	43 (27.6%)
Female-headed households	35 (67.3%)	36 (69.2%)	42 (80.8%)	113 (72.4%)
Important crops grown	Maize (59.6%)	Vegetables (64.2%)	Vegetables (57.7%)	Maize (39.2%)

Main product from community managed forests	Burial logs (69.2%)	Burial logs (63.5%)	Firewood (58.8%)	Firewood (39.9%)
Average household size	6.6	6.3	6.8	6.6
Households selling forest products	0	0	11 (21.2%)	11 (7.1%)

Source: Survey data (2011)

Table 5 shows the distribution of households and the results of the independent t-test for the differences in sample means for the key continuous variables explaining household participation status. The average household size (HH_SIZE) was significantly larger for households that were already participating in CBFM than for those that were in the “willing to join and participate” category. The mean household size (HH_SIZE) was also statistically significantly higher for households that were already participating than those that were not willing to join and participate.

Table 5: Comparisons of variables affecting household participation status (n = 153)

Explanatory variable	n	Mean	SD	t-test (p-value)
AGE				0.227
'Already participating'	40	54.63	16.78	
'Not willing to participate'	54	50.22	17.75	
AGE				0.869
'Willing to participate'	40	54.63	16.78	
'Not willing to participate'	62	53.98	20.56	
EDUCATION				0.514
'Already participating'	40	5.30	4.64	
'Not willing to participate'	54	5.94	4.78	
EDUCATION				0.386
'Willing to participate'	40	5.30	4.64	
'Not willing to participate'	62	4.48	4.62	
HH_SIZE				0.031
'Already participating'	40	7.68	3.68	
'Not willing to participate'	54	6.22	2.77	

HH_SIZE				0.036
'Willing to participate'	40	7.68	3.68	
'Not willing to participate'	62	6.24	3.07	
TOT_SOC_GRANT				0.535
'Already participating'	40	14598.00	11220.72	
'Not willing to participate'	54	13317.04	8719.03	
TOT_SOC_GRANT				0.885
'Willing to participate'	40	14598.00	11220.72	
'Not willing to participate'	62	14873.55	8012.34	
DIST_TO_FOREST				0.473
'Already participating'	40	24.08	21.51	
'Not willing to participate'	54	21.09	18.51	
DIST_TO_FOREST				0.287
'Willing to participate'	40	24.08	21.51	
'Not willing to participate'	62	19.68	19.43	

Source: Survey data (2011)

The chi-square test was used to determine whether all the frequencies for each dichotomous variable used to explain household participation status were equal in each of the three categories (Sharp, 1979). Table 6 shows that there were significant differences among the three categories with respect to the gender of the household head, marital status, income levels, perception of degradation, as well as the number of households that were selling forestry products.

Table 6: Differences in frequencies between dichotomous variables explaining household participation status (n = 153)

Household characteristics	Household participation status			Overall	χ^2 (p-value)
	Participating	Willing to participate	Not willing to participate		
Gender					
Male	19(47.5)	8(14.8)	16(25.8)	43(27.2)	0.002
Female	21(52.5)	46(85.2)	46(74.2)	113(71.5)	

Marital status					
Married	25(62.5)	26(48.1)	43 (69.4)	94(59.2)	0.060
Not married	15(37.5)	28(51.9)	19(30.6)	62(39.2)	
Employment status					
Employed	4(10.0)	10(18.5)	8(12.9)	22(13.9)	0.473
Unemployed	36(90.0)	44(81.5)	54(87.1)	134(84.8)	
Income status					
Above average	13(32.5)	10(18.5)	53(85.5)	32(20.3)	0.081
Below average	27(67.5)	44(81.5)	9(14.5)	124(78.5)	
Access to electricity					
Has electricity	29(72.5)	34(63)	42(67.7)	51(32.3)	0.357
No electricity	11(27.5)	20(37.0)	20(32.3)	105(66.3)	
Alternative forests					
Alternative forests	31(77.5)	11(20.4)	55(88.7)	129(81.9)	0.262
No alternative forests	9(22.5)	43(79.6)	7(11.3)	27(17.1)	
Selling forest products					
Selling	7(17.5)	2(3.7)	5(8.1)	14(9.0)	0.065
Not selling	33(82.5)	52(96.3)	57(91.9)	142(91.0)	

Source: Survey data (2011)

Notes: Numbers in brackets are percentages

5.2 Values households attach to forest resources

Six principal components or factors representing the different dimensions of the values households in KwaSobabili, New Reserve B and Gudwini rural communities of KwaZulu-Natal attach to forest resources were extracted from the covariance matrix since all the scales were measured in the same units. The first six principal components explained 25.2%, 12.1%, 10.2%, 7.7%, 6.4% and 5.8% of the variation, respectively. Table 7 presents the six principal components (PCs) that were extracted using the Kaiser criterion (i.e. with eigen values greater than one) and explained 67.2% of the total variation in the variables used. From these six PCs, the first three PCs were retained because they had eigen values greater than one and also allowed for meaningful and distinct interpretation of the PCs.

Table 7: Dimensions of the values households in the study area hold towards forest resources

Forest function	Principal component (Eigen value)					
	1	2	3	4	5	6
Burial logs	-0.015	0.016	0.006	-0.034	-0.015	-0.004
Firewood	0.246	0.159	0.029	0.074	-0.023	-0.006
Constr poles	0.508	0.342	0.052	0.026	0.044	-0.252
Electr poles	0.212	0.144	-0.836	0.461	0.073	0.316
Craftwork	0.735	0.236	-0.472	0.142	-0.045	0.155
Medicine	0.804	0.437	-0.261	-0.87	0.569	-0.033
Mushroom	0.557	0.342	-0.209	0.047	-0.236	0.006
Edible fruits	0.551	0.455	-0.234	0.296	-0.262	0.044
Hunting	0.622	-0.16	0.055	-0.517	-0.859	0.143
Recreation	0.517	0.018	0.452	-0.147	-0.075	0.271
Bio-prospecting	0.413	-0.039	0.514	0.098	0.053	0.039
Habitat	0.489	0.072	0.21	0.187	-0.123	-0.096
Biodiversity	0.4	0.15	0.181	0.163	-0.055	-0.295
CO ₂ seq	0.416	0.001	0.509	0.366	0.164	0.208
Soil cons	0.386	0.133	0.106	0.189	0.11	-0.058
Water quality	0.485	0.182	0.313	0.161	0.137	-0.14
Natural beauty	0.32	0.081	0.155	0.112	0.08	-0.031
Sanctuary	0.967	-1.189	-0.363	0.073	0.083	-0.457
Wildlife apprec	0.374	0.02	0.151	0.182	0.073	-0.086
Heritage	0.454	0.114	0.177	0.02	0.061	-0.041
Burial sites	0.487	-0.565	0.104	-0.021	0.234	0.766
% of variation	25.2	12.1	10.2	7.7	6.4	5.8
Cumulative %	25.2	37.3	47.5	55.2	61.7	67.4

Source: November 2011 survey

Notes: Item scale: 1= opposed to my values; 2 = unimportant; 3 = neutral; 4 = important; 5 = very important

Based on the dominant component loadings, the first PC shows that households that assigned high values on construction poles also assigned high values on craftwork, traditional medicine, mushrooms, edible fruits, hunting, recreation and the fact that forests are sanctuaries or sacred places (Table 7). These values are all associated with the utilisation of forests for products and services that satisfy human wants and needs. Such values are referred to as anthropocentric values (as opposed to bio-centric) values where households attach values based on the worth of something as an end in itself, regardless of its usefulness to humans (McFarlane & Boxall, 2000). Thus, the first PC represented the anthropocentric values households hold towards forest resources. It explained 25.1% of the variation in the variables included in the model. The results indicate that the households regard their most important values to the forest by interpreting the forest in terms of human-centred values.

The dominating variables in the second factor were sanctuary (-1.189) and burial sites (-0.565) (Table 7). The negative sign on these variables suggests that households that assigned high values on forests for their function as burial sites and as sanctuaries or sacred places assign lower values to most other instrumental forest functions. This component represented the cultural, moral or spiritual values households hold towards forest functions. Thus, this PC was named cultural/moral/spiritual values.

The third component was dominated by electricity poles, bio-prospecting or research as well as carbon dioxide sequestration. It explained 10.2% of the variation in the variables. The negative sign on electricity poles suggests that households that assigned high values to bio-prospecting and carbon dioxide sequestration assigned less value to electricity poles (Table 7). Although electricity pole lines were provided by the South African power utility company (Eskom), households held future existence values to forests reflecting a sense of well-being of simply knowing that forests exist for the continued supply of electricity pole lines even in the future. They also attached values on forests since they would provide the potential for further research in the future. This reflects that households also held bequest values on forests. Both existence and bequests forest values are non-use values. Non-use values are connected with the prolonged existence of goods, without any kind of contemporary or planned use (Bengston *et al.*, 2004). Moreover, households also valued forests for the continued supply of clean air (i.e. carbon sequestration). Option values refer to potential direct and indirect use values that might be realised in the future (Bishop, 1999). According to this view, households in the study areas of KwaZulu-Natal realise that there might be a premium on preserving forest ecosystems for future uses. Thus, this PC showed that households hold “option/non-use values” towards forest resources.

The fourth component was dominated by hunting only. The fifth PC was dominated by traditional medicine and hunting. The sixth PC was dominated by burial logs only (Table 5). No distinct economic meaning could be attached to the last three PCs. In addition, these PCs combined, explained only 19.9% of the total variation in the variables used and were, thus, not used for further regression analysis.

5.3 Factors influencing household decision to participate in community forest management

Table 8 presents the multinomial logit model analytical results for estimating the factors influencing the participation status as a function of the values households hold towards forests and other socio-economic and institutional factors. The respective signs of the coefficients in the multinomial logit model do not necessarily coincide with the signs of the marginal effects (Greene, 2003). Thus, in the case of the multinomial logit model, one cannot tell the sign of the relationship based on the coefficients until the marginal effects are computed. The parameters provide the change in the log of odds ratio (the ratio P_i to $1 - P_i$) per unit change in the explanatory variable, not the change in the probability itself. For this reason, both the coefficients and the marginal effects are presented in Table 8.

Table 8: Coefficient estimates for the multinomial logit model to identify the factors influencing household participation status (n=151)

Variable	Odds contrast							
	ln(P1/P3) /Contrast 1				ln(P2/P3)/ Contrast 2			
	Coeff.	Std. Error	p-value	dy/dx	Coeff.	Std. Error	p-value	dy/dx
AGE	0.03*	0.02	0.09	-0.01	0.01	0.02	0.79	0.01
GENDER	-1.3**	0.56	0.01	-0.26	-0.73	0.63	0.25	0.35
MARITAL_STAT	-0.5	0.59	0.40	-0.21	-1.1**	0.56	0.04	-0.01
EDUCATION	0.09	0.08	0.25	0.01	0.12*	0.07	0.09	0.01
EMPLOYNT_STAT	-1.45*	0.84	0.08	-0.01	0.02	0.7	0.97	0.04
HH_SIZE	0.25**	0.1	0.01	0.10	0.10	0.1	0.31	-0.21
TOT_SOC_GRANT	-7.1E-5*	0	0.05	-2.E-6	-4.1E-6	0	0.22	-1E-5

DIST_TO_FOREST	0	0.01	0.98	0.00	-0.01	0.01	0.38	0.01
ALTRNTIVE_SRC	-1.5**	0.74	0.03	-0.16	-1.4**	0.68	0.03	-0.15
ENVIRONT_AWA	0.15	0.17	0.37	-0.03	-0.1	0.16	0.54	0.04
ANTHRPCNTRIC_VAL	-0.54	0.33	0.1	-0.10	-0.65**	0.32	0.04	-0.05
CULTURAL_VAL	0.8**	0.32	0.01	0.14	0.95**	0.32	0.001	0.08
NON_USE_VAL	0.72**	0.31	0.02	0.06	0.57**	0.29	0.05	0.09
D2	-1.9**	0.79	0.01	-0.29	-2.15**	0.78	0.01	-0.18
D3	-1.29	1	0.19	-0.16	-1.2	0.95	0.21	-0.14
_cons	-1.19	1.95	0.54		2.66	1.82	0.15	
Number of obs.	151			Pseudo R ²				0.26
Prob > Chi ²	0.0001			AI				315.08
Goodness-of-Fit								
Measure	Chi-Square			df		Sig.		
Chi-squared (χ^2)	91.1			50		0.001		
Pearson χ^2	290.6			250		0.051		
Deviance χ^2	290.6			250		0.348		
Classification accuracy								
Observed	Predicted							
	Participating	Willing to participate	Not willing to participate	% Correct				
Participating	18	17	5	45.00%				
Willing to participate	8	26	17	51.00%				
Not willing to participate	5	13	43	70.50%				
Overall Percentage	20.40%	36.80%	42.80%	57.20%				

Source: November 2011 survey

Notes: ***, **, * refer to 1%, 5% and 10% levels of significance, respectively.

NB: Contrast 1 = (Participating vs Not willing to participate).

Contrast 2 = (Willing to participate vs Not willing to participate).

P1 = the probability that the i^{th} household is already participating in managing forests

P2 = the probability that the i^{th} household is willing to join and participate

P3 = the probability that the i^{th} household is not willing to join and participate

5.3.1 Justification of the multinomial logit model estimated

One of the main assumptions of the multinomial logit model is that it is correctly specified and that there is no multicollinearity between the explanatory variables. The overall goodness of fit of the model to the data was assessed using the Pearson χ^2 or Deviance χ^2 statistic with the associated degrees of freedom. Both the estimated Pearson χ^2 and Deviance χ^2 with 290 degrees of freedom were statistically significant at below 5 % level (Table 8), indicating that the multinomial logit model fit the data well. Moreover, the estimated χ^2 statistic of 74.1 with 30 degrees of freedom was statistically significant below the 1 % level, further indicating that the model fit the data well. The overall classification accuracy (i.e. the percentage of correct and incorrect household participation status) of this model was 57.2%. Specifically, the model correctly classified the three categories of participating, willing to join and participate, and not willing to join and participate at 45.0%, 51.0% and 70.5%, respectively (Table 8). Analysis used in the model indicated no multicollinearity (Table 9). The estimated standard errors for the estimated parameter estimates were all below two, indicating that micronumerosity (small sample size) was not a problem in this study (Pedhazur (1997) cited by Garson, 2009).

Table 9: Degree of multicollinearity among explanatory variables (n=153)

Variable	VIF	1/VIF
D3	3.68	0.271
EDUCATION	2.39	0.417
D2	2.08	0.481
AGE	1.86	0.536
TOT_SOC_GRANT	1.65	0.607
HH_SIZE	1.48	0.677
DIST_TO_FOREST	1.43	0.697
CULTURAL_VAL	1.40	0.712
MARITAL_STAT	1.40	0.713
ANTHRPCNTRIC_VAL	1.36	0.734
NON_USE_VAL	1.36	0.735
ALTRNTIVE_SRCS	1.25	0.797

ENVIRONT_AWA	1.22	0.817
EMPLOYNT_STAT	1.22	0.819
GENDER	1.14	0.879
Mean VIF	1.66	

Source: November 2011 survey

5.3.2 *Values households hold towards forests and participation in forest management*

The main objective of this study was to determine if the values households hold towards forest resources influence their decision to participate in managing community forests. The coefficient estimates for the variables cultural/moral/spiritual values (CULTURAL_VAL) and non-use/option values (NON_USE_VAL) (composite indices from PCA) in both the second and first contrast were positive and statistically significant. This indicates that the cultural/moral/spiritual and non-use/option values that households in the study areas hold towards forest resources influenced their decision to participate in managing community forests. A household was more likely to participate (i.e. “willing to participate” or “already participating”) if it held high cultural/moral/spiritual and non-use/optional values towards forests. On the other hand, households in the study areas that attached high anthropocentric values (ANTHRPCNTRIC_VAL) were less likely to participate. According to McFarlane & Boxall (2000), the influence that forest value orientations can have on household decision to participate in community forest management also depends on the forest management strategy that is followed. Bio-centric oriented individuals are more likely to support protection-oriented management strategies while anthropocentric-oriented individuals are more likely to support traditional timber management (McFarlane & Boxall, 2000). This is because households/individuals who view forests as a means to enhance their survival expect to derive utilitarian benefits from forests while those who hold bio-centric forest values can only derive their utility from forests if they are conserved or protected. Cultural/moral/spiritual (CULTURAL_VAL) and non-use/option values (NON_USE_VAL) are on the bio-centric end of the forest orientation continuum. Hence, the fact that households who held higher cultural/moral/spiritual and non-use/option values were more likely to participate supports Bourke & Luloff (1994), who found that people with stronger bio-centric forest values (such as women, people with high levels of education, younger individuals, urban residents, residents of non-timber dependent regions and people of liberal political orientation) support principles of sustainable protection-oriented forest management (Bourke & Luloff, 1994).

Following the contemporary exchange theory, which stresses that farmers seek the “best value” they can get in participating in forest management programmes (Napier *et al.*, 1986), the studied participating households were getting the best value in conservation programmes (Dolisca *et al.*, 2006) by choosing forestry activities that offered them at least as much, in terms of cultural/moral/spiritual and non-use values, as they get from alternate activities. The fact that households that held higher anthropocentric values towards forest were less likely to participate could thus be explained by the fact that all the three community forest management programmes were following protection-oriented management strategies rather than a utilisation-oriented management strategy. It means that community forest management did not offer as much as they could get from other activities (Napier *et al.*, 1986). As a result, households that held higher anthropocentric values towards forests were dissatisfied with the outcomes of forest management since they expected to derive more anthropocentric benefits from them. In fact, at the time of the survey, no significant income was generated, even from the two plantations (KwaSobabili and New Reserve), which had been established specifically for traditional timber production. Overall, only a few households (7.1 %), acknowledged that they were getting some income from selling forest products, but the income was very low (Table 4). These findings, therefore, are consistent with the cognitive hierarchy model since they show that values individuals hold towards forest resources are closely associated with higher order cognitions that reflect forest management and policy preferences (Dolisca *et al.*, 2006). The majority (60.2%) of those who were not participating in managing plantations in KwaSobabili and New Reserve B wished that the plantations could be expanded into viable timber production enterprises for them to join the forest management programmes. Thus, while Robson *et al.* (2000) have argued that local people who attach more value on the products and services provided by forests will be motivated to modify their resource and land use practices and to invest time and effort in forest conservation activities, this study shows that households’ decisions to participate in community forest management depend, not just on the values households hold towards forests, but also on the forest management strategy being pursued. Hence, the values households hold towards forests should be aligned with the community forest management strategy being followed.

Using PCA, Dolisca *et al.* (2006) found that participation could also be categorised into social participation, ecological participation or economic participation, depending on the main incentives behind participation. The reason for rural households’ participation in protected area management may differ because of their socio-economic backgrounds. Some forest users might be concerned about the welfare of the environment, while others are concerned about economic benefits. Rural residents may be more concerned about the social

participation of the forest and prefer that the state pursue forestry programmes that will stabilise and strengthen local communities (Dolisca *et al.*, 2006). Similarly, in this study, cultural/moral/spiritual and non-use/option values households hold towards forests were influencing households' decisions to participate in managing community forests. Thus, participation was mainly for non-market benefits since only eleven households (7.1 %) indicated that they were selling products from the community managed forests. The fact that the parameter estimate for cultural/moral/spiritual was positive and statistically significant in both the first and second contrast also supports the argument, for instance, by Nasi *et al.* (2002), that cultural/moral/spiritual values influence the way people react and behave in relation to woodland access and management. According to Infiel & Mugisha (2010), cultural values are at the centre of the relationships between nature and communities. It is precisely these cultural/moral/spiritual values, rooted in intuitive and emotional experiences, that have even motivated many people to take legal and political action against forest managers (Bengston *et al.*, 1999). Thus, these results support Infiel & Mugisha (2010) who argued that protected areas are best understood as cultural rather than just economic entities and that policy makers should recognise such non-market values in defining strategies to improve community-based forest management programmes. The results of the study also agree with Borrie *et al.* (2002) who argued that the religious significance of the forest to local groups reveals the degree of commitment they may have in sustaining these threatened ecosystems through local participation. The statistically significant parameter for cultural/moral/spiritual values, in this study, could be attributed to the fact that the majority of households in KwaSobabili and New Reserve B were mainly obtaining burial logs from the community managed forests (Table 4). In Gudwini, where the community was managing a natural forest, most households indicated that forests were their heritage and some cultural objects, such as graveyards, were situated within forests. They also regarded these forests as sacred and hence support the need to protect them. Some species of trees were very important for making dancing sticks for the Zulu traditional dance, while some were believed to offer protection from being struck by lightning. Therefore, these findings illustrate the need to consider all possible forest values, not just market-related forest values, before making recommendations on community forest management, since some households could be participating for social reasons and not just financial benefits.

5.3.3 *Socio-economic and institutional factors affecting household's participation status*

The age of the household head was among the demographic factors influencing the participation status of the household. The positive and statistically significant coefficient in the second contrast means that a household was more likely to

participate as the age of household head increases. This is consistent with the findings of Maskey *et al.* (2003) who observed that older people in Nepal tended to participate more in community forestry programmes than younger people. This was attributed to the fact that older people were retired and had free time to participate in community forest management. The results are, however, different from Dolisca *et al.* (2006) who found that older people were mainly interested in collecting forest resources, while young people were willing to contribute to the process of decision-making in forestry programmes. In this study, older household heads were more likely to participate because their opportunities to be employed in towns and cities were more limited than younger people who tend to have more employment opportunities. Thus, the opportunity cost of their time to participate in community forest management was very low (Thoai & Ranola, 2010).

In the communities studied, the household participation status was also influenced by the gender of the household head. The parameter estimate for the gender of household head in the first contrast was negative and statistically significant. This implies that the male-headed households in the study area were less likely to participate, while female-headed households were more likely to participate in community forest management. However, the results in this study are different from other empirical studies on women's participation (e.g. Kalpana, 2009; Agarwal, 2001) that cited the social context as one of the important factors affecting women's participation. Most studies on community management of forests have been done in the Nepal province of India. Unlike this male-dominated society, the South African rural societies have a democratic working environment. As a result, women were largely not excluded from the participatory decision-making process in rural development programmes. Moreover, social hierarchies in the form of religion and caste are among the most significant factors affecting women's participation in managing community forests (Shackleton *et al.*, 2002). These social hierarchies are not so expressed in the South African context. As a result, the proportion of participating female-headed households in all three studied areas was higher, at 52.1%, compared with 27.6% for participating male-headed households. Moreover, owing to male outmigration for wage labour in towns and cities, the majority of people in most rural areas of South Africa are women (Baiphethi & Jacobs, 2009). Hence, more women are expected to participate in these forest management programmes than men.

Unlike most other studies that indicated women's exclusion in the initial stages of community forest management programmes, in the communities studied, more women (68.7%) than men (31.3%), attended the initial meetings on community forest management planning as part of the ongoing day-to-day community development meetings. Owing to efforts by the government and other women's rights groups to eliminate discrimination against women in South Africa, the

gender disparity in decision-making power within homes that undermines the participation of women (Maskey *et al.*, 2006) could have been very low in the studied communities. In addition, women in these communities were more likely to participate in managing communal forests than men because they usually see the forest as a means of meeting basic needs and as a support mechanism for increasing self-reliance, while men are more likely to view the forest as a source of revenue-creation and earning power (Newmark *et al.*, 1993). Since there was little income opportunities from the forests, men were thus less interested to participate. Moreover, women were more likely to participate than men because of the pre-existing gender division of labour wherein firewood collection and cooking are usually a woman's work. In the communities studied, women bear the main burden of firewood collection stemming from this gender division of labour.

The sign of the estimated coefficient for size of household (HH_SIZE) in the first contrast was positive and statistically significantly different from zero, implying that larger households were more likely to participate in forest management programmes. Household size influences participation in two ways. Firstly, it influences household demand for forest resources and, hence, increases dependency on forests (Agrawal & Angelsen, 2010). Secondly, it influences the quantity of labour available to participate in managing community forests (Ur-Rehman & Chisholm, 2007). According to Ur-Rehman and Chisholm (2007), the availability of household labour can affect households' capacities to allocate labour between community forest management and other activities, such as crop production, and may again influence the decision to participate in community forest management. Thus, the positive and statistically significant parameter estimate for HH_SIZE supports the results reported by Agrawal & Angelsen (2010) who found that household size could influence household demand for different resources. For example, demand for fuel wood varies directly with household size and might influence the incentive to manage forest resources (Agrawal & Angelsen, 2010). It could also be because firewood gathering activities are labour-intensive. A larger household, therefore, has more labour to spread across various collecting and gathering activities, and such households may derive more resources from using the forest (Ur-Rehman & Chisholm, 2007).

In a study by Thoai and Ranola (2010), household labour endowment showed the greatest effect on decisions of farmers to participate. A 10.25% increase in the probability of participating was noted with each additional unit increase in family labour supply, *ceteris paribus*. In this study, a 10% increase in the probability of a household participating was noted for each additional household member. However, in the study areas, gender and not household size had the greatest effect on household decision to participate. Household size did not have the greatest effect on participation probably because the community forest management

programmes in the studied areas of KwaZulu-Natal were not that labour intensive. Unlike the timber production programmes studied by Thoai and Ranola (2010), the main forestry activities were coppicing, attending meetings, forest protection/guarding, but reforestation and harvesting for income purposes had not been initiated. Although labour availability is usually the major determinant, especially in traditional production, it is not the major determinant of participation in forestry programmes following the protection-oriented management strategy. Such differences in labour requirements can account for the differences in the factors having the greatest effect on participation (Thoai & Ranola, 2010).

The total amount of social grants (child grants, pensions and disability grants) received by the household was also found to influence the participation status of the household. A household was less likely to participate as the value of social grants received annually by the household increases. Degeti (2003) also found that the easy availability of grants and subsidies was one of the socio-economic factors negatively affecting people's participation in natural resource management. Evidence by Keswell (2004) in South Africa suggests that the receipt of social grants is associated with increased labour force participation, possibly because cash makes job seeking easier. However, the effect of social grants on household participation in community programmes is different. The results of this study suggest that households receiving more income from social grants were less likely to participate. Therefore, social grants could have acted as a disincentive for households to participate.

The statistically positive and significant coefficient for the level of formal education (EDUCATION) shows that households whose heads had higher levels of formal education were statistically more "willing to join and participate". The results of the study agree with the findings of Obua *et al.* (1998) that education tends to increase one's awareness of the importance of the environment and of natural resources, and hence participation in managing communal forests. Dunlap *et al.* (2000) and Steel (1996) also noted that increases in education are associated with increased concern about the environment. In the communities studied, household heads with higher levels of education were more likely to participate because they were probably more exposed to more information about the environment, and hence they had a more nuanced understanding of complex environmental issues (Dunlap *et al.*, 2000). Another possibility is that people are socialised to higher levels of environmentalism via secular public education (Ignatow, 2006). Thus, more education has led to more pro-environmental socialisation and participation in environmental protection activities. Education is a significant and large determinant of environmental activism and support for environmental policies, including willingness to pay for environmental amenities. Education, thus, alters attitudes and behaviour towards pro-environmental conservation and protection (Steel, 1996).

The results of the study, however, disagree with Adhikari *et al.* (2004) who found that a higher education level had a tendency to reduce forest dependency, and hence there was no need to participate in managing forests. This is because a higher level of education provides a wider range of job options, hence making participation in forest management unprofitable owing to the greater opportunity costs of collection (Adhikari *et al.*, 2004). According to Adhikari *et al.* (2004), educational level and per capita income are likely to be positively correlated since education influences individuals to get better job opportunities. The situation in the communities studied was different because 90 % of the households in these communities had not studied beyond the matric level. Thus, education in the studied communities could not have significantly reduced dependency on forests because the majority of the household heads (84.8%) were unemployed (Table 4). Thus, better educated people in the studied communities were more likely to participate in community forest management than less educated ones because they were more aware of potential benefits to be derived from the forest management than individuals who are illiterate (Dolisca *et al.*, 2000).

While education levels increased the likelihood of a household participating in managing communal forests, the employment status (EMPLOYNT_STAT = 1) of the household head decreased the likelihood of a household to participate. A household's employment status is likely to influence the household's decision to participate in community managed forests in two ways. Firstly, the household head's employment status increases household income and hence reduces the dependency on forest resources. Secondly, the household head's employment status increases the opportunity cost of time in managing communal forests. According to Maskey *et al.* (2003), higher income individuals/households are more likely to participate in forest management than lower income individuals/households only if forest management activities generate high incomes. Since the income opportunities from forest management in the study areas were limited, the opportunity cost of households with more stable income sources would have been very low. As a result, those who were employed, and with more stable sources of income, were less likely to participate. Farmers surveyed in the study area were mostly resource poor with little variation in poverty status. Thus, household income had no significant influence on the level of participation, and was thus removed from the regression analysis. Most studies on participation (e.g. Bright & Stinchfield, 2005; Maskey *et al.*; 2003; Salam *et al.*, 2006) have found high levels of participation among high income households, probably because income is closely linked with and related to values, attitudes towards nature and increase households' responsibility towards the environment. However, the situation in the study areas was found to be different. In the study areas, high incomes meant a high opportunity cost for households to invest time in managing forest resources that had limited income opportunities.

In this study, households that had alternative sources of forest products were less likely to participate in community forest management. The coefficient estimate for household use of alternative forests (ALTRNTIVE_SRCS) in both the first and second contrast was negative and statistically significant. Alternative sources other than the communal managed forests offered opportunities to households to free-ride without taking the responsibility of taking care of the forests. It also reduced household dependence on the managed forests for products and services. As a result, households were not obliged to manage forests as they could use alternative forests. Since the perception of resource salience or scarcity is necessary for households to decide to participate in collective management of forest resources (Gibson, 2001), inferences can be made that households that had alternative sources of extracting forest products did not perceive that the resources were scarce. Hence, such households did not realise the need to conserve forest resources.

A portion of the variance in the households' participation status might be explained by variables related to community or area features (Shindler & Cramer, 1999). The parameter estimates for the area dummy (D2) was negative and statistically significant in both the first and second contrasts. The main difference between New Reserve 1 (i.e. $D2 = 1$) and the other two communities was that there were serious conflicts over the ownership, appropriation and management of the forests. Thus, these conflicts significantly and negatively influenced household decisions to participate in communal management of forests. This agrees with the theory of reasoned action which suggests that behaviours are also influenced by more subjective societal norms and social pressures. Thus, the presence of conflicts in New Reserve B resulted in dissatisfaction, a negative attitude towards forests and a lack of interest to participate (Shindler & Cramer, 1999). It could also have affected household participation through lack of trust among members and on benefits and benefit distribution (Poteete & Welch, 2004).

6 CONCLUSIONS AND POLICY RECOMMENDATIONS

6.1 Conclusions

This study was motivated by the need to consider the values households hold towards forest resources before recommending policies to foster participation in community forest management programmes. Thus, the objective of the study was to investigate whether the values households hold towards forests, among other socio-economic and institutional factors, influence household decisions to participate in community forest management. It was established that households in rural communities of KwaZulu-Natal predominantly hold anthropocentric values

towards forests. In addition, they also hold cultural/moral/spiritual and non-use/option values towards forests. Among other factors, the values that households hold towards forest resources influence their decision to participate in managing forests. However, the effect of these forest value orientations on the decision to participate also depends on the forest management strategy that the community adopts. If the community adopts a protection-oriented management strategy, rather than the utilisation-oriented management strategy, households that hold bio-centric values (e.g. cultural/moral/spiritual and non-use/option values) to forests are more likely to participate. Under such circumstances, households that hold anthropocentric values towards forests are less likely to participate.

In South Africa, households in most rural areas are poor and hence predominantly hold values that are associated with the utilisation of forest products and services that satisfy human needs (anthropocentric), as opposed to those value orientations that view the worth of forests as an end in themselves, regardless of their usefulness to humans (bio-centric). Thus, the low levels of participation in managing forests that were observed in the study areas could possibly have been caused by the fact that forest management strategies were not in line with the forest value orientations of the majority of people/households and their expectations. Aligning the forest management strategy to the values households hold towards forests has the potential to increase participation in managing community forests. In the study areas this could be done by shifting from a protection-oriented strategy to a utilisation-oriented management strategy. This would enable poor households in most rural areas to realise the anthropocentric values from forest resources, which would enhance participation in managing forests. In addition to the values households hold towards forests, households' decisions to participate in community-based forest management programmes also depend on socio-economic and institutional backgrounds. Thus, certain socio-economic factors can be used to directly predict households that are more likely to participate in managing community forests. In South Africa, the democratic working environment found in most rural areas has the potential to make women the drivers of community-based forest management programmes. Thus, stakeholders (e.g. NGOs) involved in such forest management programmes in South Africa should involve women to ensure the sustainability of these programmes. In addition to women, older household heads, larger households, those with higher levels of education and those who attach high cultural/moral/spiritual and non-use/option values to forest resources are likely to partake in community-based forest management programmes that follow the protection/conservation-oriented strategy. On the other hand, younger household heads, men, married people, those who receive high levels of social grants and those who are employed are less likely to participate in programmes that follow protection/conservation-oriented strategy.

6.2 Policy recommendations

Since most of the rural households in KwaZulu-Natal and most other provinces in South Africa are poor and predominantly hold anthropocentric values towards forests, forest management programmes should be aligned so that they can make a significant contribution to the alleviation of poverty among rural South Africans. Thus, forest management strategies in rural South Africa should move away from exclusive protection/conservation orientation to sustainable rural livelihoods oriented management strategies so that they focus on meeting the anthropocentric values of the local people.

In order to increase household participation in forest management, policy makers and the relevant government departments should replace social grants with public works programmes, such as food/cash for work, as a means of addressing forest resource degradation and, at the same time, alleviating poverty. Improving education and environmental awareness can also be instrumental in stimulating local participation in community forest management. Empowering women to be the drivers of community forest management can enhance the success and sustainability of such programmes. There is a need, however, for policy makers to continue to monitor the dynamics in demography and affluence and the values that societies hold towards forest resources.

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