Perceived Attitude and Marine Protected Areas (MPAs) establishment: Why households' characteristics matters in Coastal resources conservation initiatives in Tanzania.

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Abstract

In recent years, conservation initiatives through Marine Protected Area (MPAs) in many developing countries have been molded to win the support and participation of local communities. Increasingly, studies have been undertaken to enhance the understandings of the characteristics of rural communities. In the case of Tanzania, the level of compliance with marine and coastal resources management is constrained by lack of knowledge regarding coastal communities' behavior and characteristics. Indeed, it is hypothesized that the knowledge about rural coastal communities will lead to an increase in compliance of conservation initiatives. Therefore, this paper provides an empirical assessment of households' perceived attitudes towards proposed MPA establishment in two Tanzanian coastal villages (Mlingotini and Nyamanzi) and their vicinity. Based on survey data, the results indicate that 50.23% of households had favorable attitudes towards the introduction of MPA, out of which 34% belonged to the poor class. Moreover, a majority of households indicate that there is a need of public participation in planning and implementation of MPA.

Subsequently, Probit regression, which featured in the analysis revealed that perceived costs and benefits accruing from MPAs establishment, awareness of MPAs objectives and rules that govern the use of marine and coastal resources, dependency on marine and coastal-based activities, perceived fishery conditions, wealth and location variables have a significant influence on perceived attitudes towards establishing of new MPA. Based on the findings, it can be concluded that conservation initiatives through the establishment of MPAs may be more beneficial and more effective when policy makers understand the characteristics and behavior of coastal communities. In addition, conservation initiatives should be based on the consensus building and participation of all stakeholders.

1. Introduction

Economies of the western Indian Ocean coastal countries states depend on the existence and abundance of marine and coastal resources to satisfy their needs and demands. These include; recreational, aesthetic and economic dimensions (**Ngoile et al, 2001**). At the same time, marine and coastal ecosystems are also paramount for critical life support functions and play a significant role in balancing the extremes of climatic conditions. Therefore, just like in other countries located along the coastal region, Tanzania's marine and coastal resources support the life of about 25% of the country's population for the provision of employment and food (**TCMP, 2003; Francis and Bryceson, 2001**). However, there are significant challenges such as conflict over and competition for limited marine and coastal resources as well as escalating environmental deterioration (**Masalu, 2000**).

According to different studies conducted in Tanzania, human impact is the primary threat of marine and coastal resources. (**Francis and Bryceson, 2001; Masalu, 2000).** In addition, poverty has also emerged as a major problem, particularly in the Tanzanian coastal villages where average yearly income in most of these villages does not exceed US$ 100 (per person) (**TCMP, 2001**). Thus, poverty, human pressure and poor understanding of marine and coastal resource management have lead to a number of problems. These problems include excessive exploitation of fishery resources, careless cutting of mangrove, use of illegal fishing methods, destruction of coral reefs, sand mining, and pollution (**IUCN, 2001**). Consequently, the severity of marine and coastal ecosystem degradation does not only increasingly societies deny the goods and services necessary for life but it also puts the lives of coastal communities at risk. For example diminishing fishery resources entail a risk of mal-nutrition and threaten the source of livelihood for an estimated 25% of Tanzanian coastal population. In addition, it affects the long-term sustainability of any development strategy among coastal communities. It is therefore imperative that measures be undertaken to stop and reverse this negative trend.

Specifically, conserving and sustaining use of marine and coastal resources are among the means by which we can ensure the survival of coastal communities. However, it is therefore necessary to ensure a balance between stimulating economic growth at the coast while maintaining environmental quality. This balance should be made with the sole aim of reducing poverty among the coastal communities.

In response to the growing cumulative threats to marine and coastal resources as well as coastal environmental degradation, the Tanzanian government established Marine Protected Areas (MPAs) in the 1990s (**Levine 2004**). Hence, the implementation of the conservation initiatives through MPAs was designed to protect the marine and coastal resources with the aim of ensuring not only their sustainability but also to improve life of the coastal communities. However, even though the conservation initiatives through MPAs are impressive in terms of their ecological and economical point of view, the successful conservation initiatives need to be acceptable by the communities living near and/or around conservation sites. This is necessary as most of the households in the target areas are poor and rely on marine and coastal resource-based activities. As a result, MPAs must be able to provide benefits through the creation of non-consumptive activities (e.g. tourism and recreation) in order to support rural coastal households' livelihood. In coastal communities, households have different views and react differently to conservation initiatives. For example the socio-economic factors promoting household to support and engage in management, should be involved in planning and implementation process. These factors vary between households, cultures, and will certainly be different whether households utilize these resources in order to meet subsistence or commercial needs. In particular, the acceptance of a certain conservation measure (e.g. MPA) within communities can be severely hindered if some understanding of key factors such as perceived needs and benefits are not realized (**Jeffrey 2000**).

Therefore, to achieve and maintain successful operation of MPAs, arguments have been put forward that the decision-making process should include both social and economic factors in MPAs planning as well as their implementation. (**Sumaila, 1998**). In addition, there was an increased recognition that local communities must be actively involved in conservation and that their needs and aspiration have to be considered in initial establishment process in order to ensure their sustainability (**Howe (2001)).** The overriding reason for local communities inclusion is manifold: (i) local communities influence the stock and trend in marine and coastal resources, important when managing a MPA; (ii) local communities can provide a relative comparison between the state of coast environment between the present and future; and finally communities setups and culture determine largely the possibilities in designing successful management plans (**Brown and Pomeroy 1999; Jentoft 2000; Howe 2001**). In most of the developing countries recognition of local community participation has been resulted to formation of various programs, which promote public participation in planning, decision-making, and management of different conservation initiatives including protected areas. However, the success of individual conservation measure or program depends on its effect to individual households or communities (e.g see **Wapole and Godwin 2001**). Thus, the attitude and perception of communities towards conservation initiatives are important for sustainable management of natural resources.

In Tanzania, despite the importance of societal heterogeneity in rural communities as well as their participation in the conservation process were not taken into account during planning and in implementing of MPAs. In particular, the role of socio-economic and cultural factors in decision-making process of coastal communities regarding marine and coastal resources use and management were neglected. One of the reasons for this is that most of these MPAs were initiated through the efforts of external organizations and they were fully or partially supported and/or managed by external/foreign agencies rather than the government or local communities themselves (**Levine, 2004**). In order to design and implement new MPAs, marine resource managers need to

develop an understanding of coastal communities' values, attitude and behavior. They furthermore need to understand the way coastal communities value and use marine resources; as well as social, economic, and political dimensions of resource use (**Cocklin, et al. 1998**). The failure to take communities' opinion regarding MPAs establishment into account led to poor public relations, less widely accepted decisions and lower levels of compliance (**Wolfenden et al. 1994; Salz and Loomis 2005**). Therefore, the inclusion of socio-economic and cultural factors of coastal communities into all decisions making processes (or by the organs) pertaining MPAs establishment from their design and implementation to everyday management is very crucial.

Although studies considering the heterogeneity in coastal communities and attitudinal surveys could provide guidance for policy and management decision as well as baseline data to access the efficacy of conservation initiatives, they have been lacking in Tanzanian coastal areas. The conservation initiatives such as MPA to perform a dual goal (conserving marine and coastal resources as well as improving the life of coastal communities) requires an understanding of coastal communities' dynamics behavior in terms of their attitudes towards introduction of MPA. Based on this argument, this paper uses household data from Mlingotini and Nyamanzi Village, seeking to address the following questions: what is the pattern of households' perceived attitude towards the establishment of MPAs in the study area? What are the factors that influence this pattern? Therefore, the aim of this analysis lies in understanding the views of coastal households regarding conservation through MPAs establishment as well as identifying factors that facilitate or obstruct households to support MPA by using econometric methods. In addition, it is our hope that this evaluation will shed light on further need for local peoples' involvement in terms of decision-making processes when establishing MPAs and other conservation initiatives in the coastal regions.

2. Conceptual framework and hypotheses

The decisions made in the course of management of natural resources (e.g. marine and coastal resources) cannot be evaluated outside the human context. Thus, the resources-use theory by **Firey's (1960)** indicates that ecological, economic, ethnological or cultural factors play a role in determining local perception towards resources management initiatives as well as their fate. In addition, rural households differ in their needs, perceptions and attitudes towards conservation initiatives. **Ajzen (1988),** using the theory of reasoned action, argued that behavior is best predicted by the intention of a populace, which in turn is affected by the members' attitudes and other's influence on their intentions to act. Hence, different rural coastal households within their own framework of reference view coastal resources differently. They differ in their needs, perceptions, and attitudes towards resource use and management initiatives (for example the existence of Marine Protect Areas).

Socio-economic research has revealed that rural households' behavior regarding natural resource management is influenced by demographic and socio-economic factors (**Pomeroy et al., 1996, Wright and Shindler, 2001**). However, there is growing empirical evidence in support of the thesis that local people's support for natural resource management (especially through establishment of Protected Areas) depends mainly on the tangible benefits and costs of living in or around such areas against the background of socio-economic and demographic consideration (**Ite, 1996; Allendorf, 1999**). Figure 1 provides a simple schematic framework for studying perceived attitudes of households in this study. The framework provided in Figure 1 forms the basis for selecting relevant variables influencing perceived attitudes towards MPAs establishment.

Based on this conceptual framework and socio-economic researches, the factors used in this study to explain variation in perceived attitudes towards MPAs establishment include: perceived costs and benefits associated with MPAs establishment, awareness of MPAs objectives, presence of rules and regulations

governing use of marine and coastal resources, potential of marine and coastal resourced-based activities, perceived condition of marine and coastal resources (in particular fisheries), welfare of coastal communities and location of the community. Our hypotheses about how these factors may influence rural households' perceived attitude towards MPAs introduction are drawn from literature on the attitude of local communities living near, within or around protected areas (see for example, **Mehta and Kellert 1998; McClanahan et al., 2005; Shymsudar and Kramer 1997; Holmes, 2003; Jim and Xu 2002**).

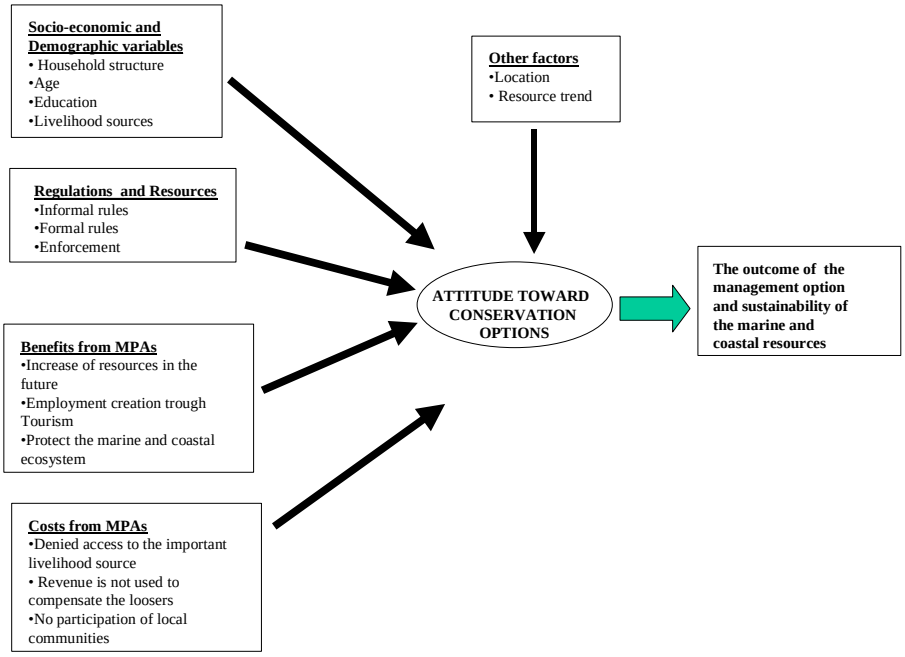

Figure 1 Conceptual relationships among factors that shape the attitude of households towards marine and coastal conservation initiatives (developed based on Mehta (2001); Buer (2003); Holmes (2003); Jim and Xu (2003))

In order to promote the use of MPAs as a conservation initiative there have been repeated efforts to implement policies that will give benefits to the rural households living near or around the protected areas. For instance, **Mehta (2001)** and **Buer (2003)** suggested that provision of direct and indirect benefits would promote incentives for people to perceive conservation positively.

Based on these results, it is expected that households who perceive that introduction of MPA may give some of benefits are more supportive about the introduction of MPAs near or around their local vicinity than households who do not expect any benefits from MPAs.

However, the management of coastal resources through establishment of MPAs most often limit or prohibit extractive activities inside their boundaries in order to regulate users' behavior (see for example **Mehta and Kellert, 1998**) In this case it is hypothesized that the existence of Marine protected areas may pose problems in meetings the resource needs of some rural coastal households and thereby influencing their attitudes toward coastal resource conservation initiatives.

In addition, the awareness of rules and regulations and objectives of MPAs also play a critical role in influencing households' attitude towards establishment of MPAs. The existence of regulations and rules on marine and coastal resources management (informal and formal rules which are enforced) depends on the awareness of rural households regarding resources management. In addition, the households' knowledge about the reasons behind establishing MPAs depends on the understanding of the objectives of MPA. In our context, awareness is what a person thinks and understands about the reality affecting his attitude and decision towards policy and management. We hypothesize that households who are more aware of the existence of rules and regulations, which govern the use of marine and coastal resources at village level, will hold more favorable attitudes towards MPAs establishment than households without such knowledge. In the same way, we hypothesize that households who are aware of the objectives of MPAs will be more supportive to MPAs establishment than households without such awareness.

Moreover, the natural resource condition may influence the rural households' perception towards MPAs establishment. In this study, we consider fisheries trend to follow general trends in marine and coastal resources. The declining

pattern in fisheries resources acts as an incentive for households to support conservation initiative with the aim of improving their livelihood opportunities. We hypothesized that households who believe the fisheries resources are in poor shape (i.e. declining) will hold more favorable attitudes towards MPAs establishment than those households who believe the resources are in good shape (i.e. not declining).

We also examine the influence of socio-economic and demographic factors on local attitudes. Socio-economic and demographic factors such as affluence, age or experience, education and level of dependence on natural resources have previously been defined as influencing attitudes in the literature, although not consistently (e.**g Heinen 1993; Solecki 1997**). For example **Mordi (1987**) proposed that education could make rural households more conscious and less utilitarian in their attitude towards conservation. In this study we hypothesized that educated households will be more favorable attitude towards the introduction of MPAs.

The influence of wealth on conservation attitudes is not straightforward. **Infield (1988) and Hackel (1999)** showed that rural households with more resources in terms of land, labor, and materials at their disposal could better afford conservation. This implies that these households have the ability to absorb short-term costs of conservation as a result of realizing long-term benefits. This stands in contrast to poor households who depend mostly on natural resource-based activity for their survival (see **Ruttan and Borgerhoff Mulder, 1999**). As a result, wealthier households tend to support the conservation initiatives more than poorer households. Conversely, poor households may be highly motivated to support conservation measures since they depend more on common and open access resources than wealthier households.

In addition, the dependency on marine and coastal resource-based activities has mixed effects on the perceived attitude towards MPAs establishment. On one hand, households who rely more on marine and coastal resources for their

livelihood may be more concerned with conservation initiatives (if they hope this will lead to an increase or security of resources for livelihood sustenance) than those households who have other sources of livelihood. Therefore, rural households with higher income share from marine and coastal resources based activities may hold favorable attitudes regarding MPAs establishment. On the other hand, relying more on marine and coastal resources make it difficult to achieve compliance with conservation initiatives as the opportunity cost of following restriction rules is high. As a result, rural households who depend more on marine and coastal resources for their income may hold negative attitudes about MPAs establishment.

3. Methodology

3.1 Data and Descriptive Analysis

Among Tanzanian coastal villages the utilization of marine and coastal resources as well as the attitudes towards conservation of these resources is heterogeneous (For example see **Andersonn and Ngazy, 1998; Sesabo and Tol 2005**). Understanding households' heterogeneity is important in predicting the likely success of any conservation measure. In order to examine the factors, which influence households' perceived attitude, we used data from a survey conducted between January and March 2004 in two coastal villages (see Figure 1). The questionnaire was administered in two districts of Tanzania (Bagamoyo and West). In Bagamoyo district, data was collected from Mlingotini village located close to Bagamoyo district headquarters (12 km) and about 56 km north of the capital city Dar-es-salaam. The village is more affected with migrants from nearby areas and there is no any area within or nearby the village, which is protected so as to ensure sustainable use of marine and coastal resources. In West district, data was collected in Nyamanzi village 16 km from Zanzibar Stone Town. Marine protected areas and an open Forest area (known as Free Economic Zone) are close to Nyamanzi village. Most of the households in this area were reported to have existed as fishing villages more than 30 years ago. Both villages are situated in the tropical humid climate of the coastal belt. They enjoy both

short rains (October-November) and long (March-May) rains, which characterize the East African coast.

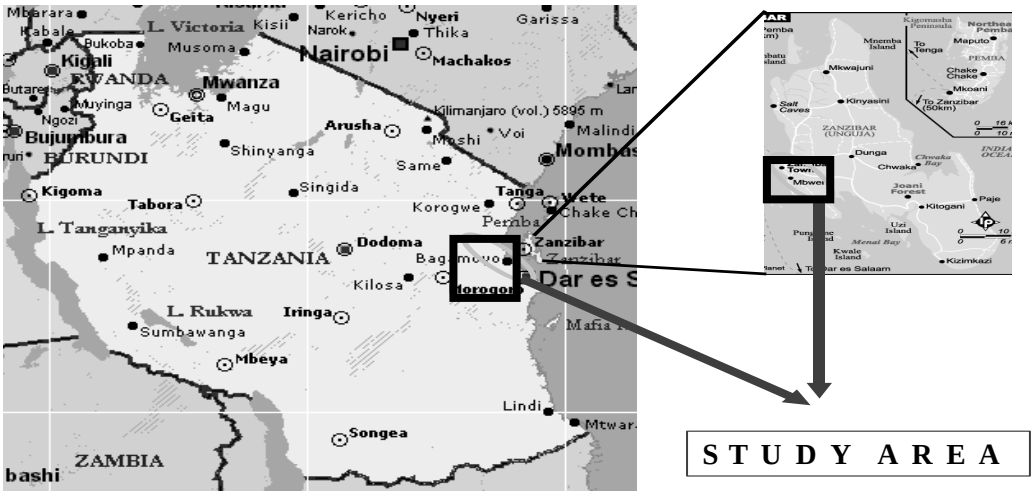

Figure 2. The map of the study area

Important to note is that a total of 250 households were randomly selected from the two villages. Of these around 13% did not answer the background questions and these questionnaires were eliminated from the database (Mlingotini = 117; Nyamanzi=100). In the collection of data, structured interviews were conducted with each of the head of household. The questionnaire was designed to solicit information on households' demographic structure, income sources, sales of outputs, access to markets, problems inherent in coastal resources and attitude towards management of coastal resources. Household income from agriculture, fishing, seaweed-farming, and other activities was estimated according to the reported production (for consumption or sale) at the prices that prevail in the local market. Fishing, transport and other assets were valued subjectively by respondents as equivalent to current resale value.

Table 1 shows the descriptive statistics of the respondents. The respondents were predominantly male (84%) between the ages of 21-69 with an average of 46.01 years. The households' size ranged from 1 member to 12 members with an average of 1.7 dependant members and 4.6 adult members. The average number

of adult members with primary education was 1.7. In terms of their livelihood improvement, half of households (50.60%) reported a worse life than before. The majority of households (73.27%) were directly engaged in coastal resource based activities (shells collection, fishing, and seaweed farming). The others were farmers, traders or participating in other non-farm employment opportunities. On average, the household heads participating in fishing activities had 17.86 years of experience. The majority of households (66.36%) were classified to be poor. This classification was not based on an absolute scale. Consequently, households who reported to own a larger size of agricultural land, a good quality house, endowed with production assets (e.g fishing assets, transport assets etc) were classified as wealthy household whereas those with similar but few assets and of poor quality were classified as poor.

Table 1 Descriptive variables

Variables description	Variable name	Mean or Percent	Standard deviation
Gender of Household Head (1 if male and 0 otherwise)	GENDER	84%	NA
Age of Household head (years)	HHAGE	46.01	12.99
Household head fishing experience	EXPF	17.86	12.85
Number of Adult members	ADULT	2.66	1.21
Number of dependants	DEPEND	1.7	1.41
Average education of adult members	ADULTEDU	1.73	1.15
Size of Household	HHSIZE	4.36	2.08
Income / livelihood condition (1 if worst and 0 otherwise)	CONDITION	50.60%	NA
Welfare index (1 if poor and 0 otherwise)	WEALTH	66.63%	NA
Percent of fishing income in total household income (in US$)	FISH INCOME RATIO	0.48	0.16
Support the MPAs establishment (1 if YES and 0 otherwise)*	ATTITUDE	50.23%	NA
Perceived costs	COSTS	38.71%	NA
Perceived benefits	BENEFITS	47.93%	NA
Perceived Fisheries resources trend	RESOURCE TREND	35.94%	NA
objective of MPAs (1 if aware of objectives and 0 otherwise)	OBJECTIVES	37%	NA
Rules	RULES	41.01%	NA

* Surveyed households were presented with a question, which present a scenario of management of marine and coastal resources, "*If the government/non governmental organization want to establish the MPAs within, near or outside your village, do you support the idea?*" **YES/NO** and followed with the question **WHY**?

3.2 Data analysis

We estimate a Probit model where by the dependent variable ATTITUDE (Households' Perceived attitude towards introduction of MPA) is a function of

several explanatory variables. It can take only two binary values; 1 if household supports the marine and coastal resource conservation through introduction of MPA and 0 if a household does not. Following Greene (2003), we estimate the non-linear maximum livelihood function for the normal probability (Probit) model, using STATA 8. We start with a general function as follows:

$$A_i = f(x_1.....,x_n) \tag{1.1}$$

where A_i denotes ATTITUDE. $x_1.....x_n$ represent soci0-economic and demographic factors leading households' decision to support the introduction of MPA.

Suppose A^*, the decision to support the introduction of MPA is unobservable and it depends on set of observed factors xi, that is

$$A_i^* = \beta x_i + \varepsilon_i \tag{1.2}$$

where β is a new vectors of parameter, and xi is a column vector of the variables that affect A^* and ε_i is normally distributed with zero mean. The observed binary variables is related to A* in the following sense

$$\begin{aligned} A &= 1 \text{ if } A^* > 0 \\ &= 0 \text{ otherwise} \end{aligned} \tag{1.3}$$

Given the normality assumption, the probability that A^* is less than or equal to A can be computed from the standardized normal cumulative distribution function as

$$P_i = pr(A=1) = (A^* \le A) = F(A_i) = \int_{-\infty}^{\beta x_i} f(z)dz \tag{1.4}$$

where $f(z)$ is the density function, z is normally distributed with zero mean and unit variance and P_i is the probability that a household will support the introduction of MPA.

4. Results

4.1. Perceived attitude towards the establishment MPAs and management opinions: Descriptive Statistics

In general, the results indicate that a half of the households had positive attitudes towards establishment of Marine Protected areas nearby or within their villages (50.23%). However, broken down to the village level, 65% of households surveyed in Nyamanzi and 37.61% in Mlingotini supported the idea of introducing the MPAs (see Table 2). The Random error test indicated that the percentage of households who support the establishment of MPA in Nyamanzi village is not significantly different from the percentage of households who did not support the idea in Mlingotini village(± 8.7% in Nyamanzi and ± 9.3% in Mlingotini).

Table 2 Attitude towards the establishment of MPA within the village and across villages.

MPA establishment support	Percent of Households		
	Nyamanzi	Mlingotini	Both villages
YES	65	37.61	50.23
NO	35	62.39	49.77
n (Number of households)	-100	-117	-217

Further, the results indicated that 47.92% of households who supported the MPAs introduction attributed their support because of perceived benefits, which Marine Protected Areas could bring (**Table 1**). Of those supporting the MPAs introduction near their local vicinity, the perceived economic benefits from MPA through job creation and spillover of fish from marine protected areas, which lead to increase in coastal resource over-time was the main reason given (47.70%). Ecological benefits, such as provision of sanctuary for coastal resources ecosystem was the second most important reason provided (**Figure 2a).**

In addition, **Table 1** show that 39.18% of respondents did not support the establishment of MPAs due to the perceived costs, which these areas could bring. The respondents attributed their perception to the restrictions on fishing activities, inequitable distribution of benefits from Marine Protected Areas, and

poor participation in marine and coastal resources management programs. Out of those expressing negative attitudes towards MPAs establishment, nearly a half (48.1%) perceived that poor households would suffer from economic-related costs stemming from the MPAs establishment. About 32.4% of the households who did not support the introduction of MPAs were classified as poor and 65.7% of these households perceived that they would suffer from the costs due to MPAs establishment. This indicates that most of households perceived that utilization of coastal resources is not permitted in MPA areas, and its creation would significantly limit fishing grounds. The second reason given against the new MPA was related to the perceived social costs, which are represented in form of the lack of community participation in the planning process of development-conservation initiatives (27.8%) (**Figure 2b).**

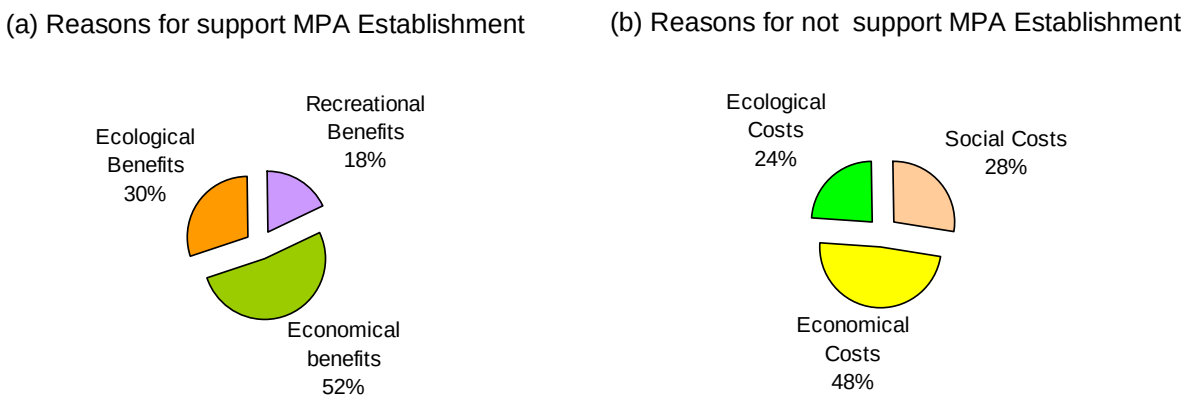

Figure 2 Reasons given by households for MPAs establishment in both villages

Regarding the question of who is responsible for the management of marine and coastal resources, 21% of the respondents thought that the government should be more responsible in taking coastal resources conservation initiatives whereas 50% of the respondents indicated that government and communities living near or within coastal areas have equal responsibility on coastal resources conservation (**Figure 3a**). In addition, 29% of respondents perceived that coastal communities should have more responsibility in taking coastal resources conservation initiatives.

Pertaining to the issue of collective action, 35% of the respondents indicated that only the coastal communities should work together to solve coastal resource degradation problems whereas 44% of the respondents perceived that there is need for collaborative approach by government and non-governmental organizations, communities, and stakeholders to work together and solve coastal resources degradation problems (**Figure 3b).** The remaining (31%) percent of the respondents indicated that only resource users should work together to solve coastal resources degradation problems. Taken together, these responses indicate a desire by the community for greater participation in managing marine and coastal resources. The need for community involvement in management of natural resources has been widely proposed as an important element in sustainable management (**e.g. Lewis, 1997; Sunderlin and Gorospe, 1997**)

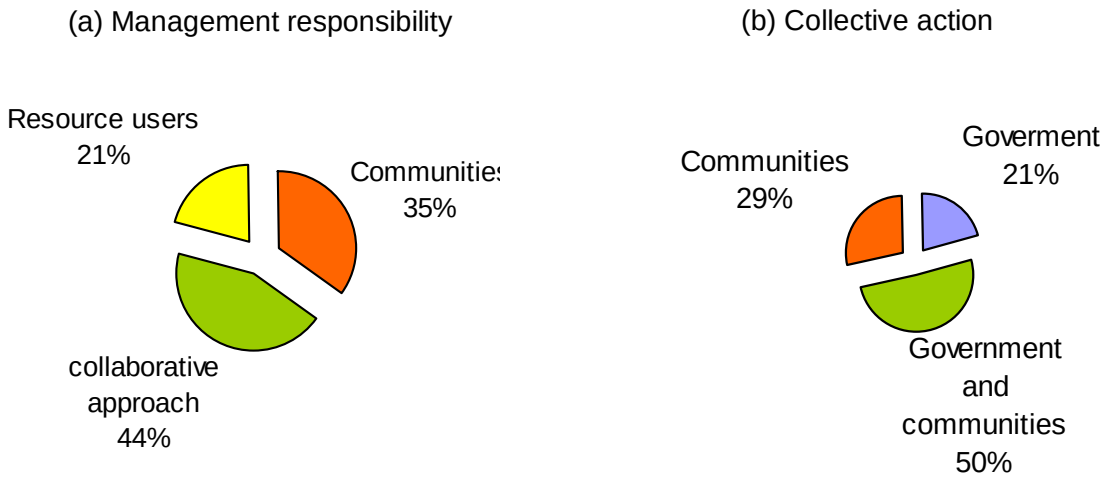

Figure 3 Households opinions regarding the responsibility of marine and coastal resources management in both villages

4.2. Factors affecting the attitude of households towards MPAs establishment: Regression Analysis

Table 3 shows variables that significantly influence the perceived attitude of households towards coastal resource conservation through the establishment of MPAs. The estimated model fits the data well, as shown in the goodness of fit measure. The χ^2 test for the estimated model was significant at 1% level of

significance, and the overall percentage of right prediction was 81%. The analysis suggests that a household's level of perceived benefits and costs associates with conservation, the awareness of the objectives of MPA existence of rules that govern the use of coastal resources, the dependency of coastal-based activities, perceived fishery resources condition, wealth, and the location influenced the conservation attitude (**Table 3**).

Table 3 Probit estimates of the households' attitudes towards the MPAs establishment.[a]

Variable	Estimated Coefficients	Robust Standard Error	P-value	Marginal Effect
COSTANT	-3.076	0.4	0	
BENEFITS	3.7522	0.4269	0	0.8957
COST	-1.24	0.4272	0.004	-0.446
FISH INCOME RATIO	3.3044	0.6309	0	1.1918
RESOURCE TREND	1.3685	0.3962	0.001	0.4246
WEALTH	1.4508	0.4321	0.001	0.4365
OBJECTIVES	0.8364	0.3998	0.032	0.3017
RULES	0.8126	0.4114	0.048	0.2715
NYAMANZI VILLAGE	-1.051	0.6394	0.1	-0.371

[a] Likelihood radio (model chi-square): -28.469 (d.f. = 8, P = 0.0000); percent of right prediction:81

The coefficient of the variable BENEFITS is highly positive (3.75) and is statistically significant at the 1% level (**Table 3**). This means that those thinking they would benefit from conservation of coastal resources support the establishment of a MPA. The probability of supporting is nearly 99% (see **Table 4).** This result also reflects that these households suffer in the present situation from decreases in marine and coastal resources due to unsustainable uses. Therefore, they are willing to support the conservation initiatives. Our findings suggest that perceived benefits are one of the incentives for rural households to have positive attitude towards the establishment of MPAs. Correlation between benefits and positive attitudes has been confirmed by other researchers in various fields of natural resource management such as in marine and coastal resources (e.g **Gelcich et al. (2005); McClanahan et al. (2005);)**, wildlife management (e.g. **Metha and Kellert (1998); Udaya**

Sekhar (2003); Infield and Namara (2001);Gadd (2005)) and forestry (e.g. **Robertson and Lawes (2005)**) conservation studies.

Table 4 Multiple classification table for the effect of different variables on the probability of supporting the establishment of MPA

Predictor Variable	Probability
BENEFITS	
Create Benefits (1)	0.9930
No Benefits (0)	0.0973
COSTS	
Create costs (1)	0.3781
No costs (0)	0.8236
FISH INCOME RATIO	
0	0.3177
0.10-0.30	0.5866
0.31-0.40	0.7772
0.41-0.50	0.8554
0.51-0.60	0.9099
0.61-0.70	0.9442
above 0.70	0.9903
RESOURCE TREND	
Decline (1)	0.9076
Not decline (0)	0.4830
WELFARE	
Poor (1)	0.9210
Rich (0)	0.4845
OBJECTIVES	
well aware(2)	0.9423
aware(1)	0.7698
not aware (0)	0.4609
RULES	
Informal and formal rules (1)	0.3390
No rules (0)	0.5624
NYAMANZI VILLAGE	
residing in Nyamanzi (1)	0.4533
Not residing in Nyamanzi(0)	0.8247

Perceived costs associated with the introduction of MPA influence the attitude of rural coastal households. As expected, the coefficient of COSTS is negative (-1.23) and statistically significant at 1% level (**Table 3).** This implies that the higher the households perceive costs associated with MPA establishment, the greater the unwillingness to support its establishment. The related probability of supporting the introduction of MPA was 35.38% (**Table 4).** At the same time, our findings

also suggests that the closer households are to the MPAs, the higher are the perceived costs, because of restricted access to fishing grounds. This result is consistent with other socio-economic surveys, which indicate that households and other stakeholders living near to the conservation reserves normally bear costs in terms of access to natural resources (**Naughton-Treves 1997**; **Shyamsudar and Kramer 1997).**

The coefficient of the variable that indicates the dependency marine and coastal resources-based activities (FISHYR =3.30) is positive and significant at1% level (**Table 3**). This implies that households who sustain predominantly on fish have a greater interest in fish availability and therefore are more concerned about marine and coastal resources conservation initiatives. The probability of support was about 99.85% (**Table 4**). This is especially important, as the fishery resources have been under severe pressure. This pressure is caused by population growth as well as lack of capital, factors which constrained the improvement of gears efficiency. As a result, most of households are forced to use illegal fishing methods in order to survive. The use of these illegal methods leads to marine and coastal resource degradation. This is also consistent with the descriptive survey results, which indicate that 87.9% of the households claim that coastal resources were under severe pressure and 61% indicated the need for conserving coastal resources through the establishment of effective management initiatives.

With respect to perceived coastal resources condition (RESOURCESTREND), **Table 3** indicates that the coefficient (1.36) is positive and statistically significant at 1% level. This result is not surprising because rural coastal households are likely to support the establishment of MPAs if such initiative could increase the availability of coastal resources. The probability of supporting the idea of establishing MPAs is about 96.5% (**Table 4**). The results confirm that households who are more aware of coastal resource changes - or households who are more affected by changes in coastal resources – are more likely to demand a change in utilization. As a result, households will have positive attitudes towards development of initiatives that will ensure a sustainable use.

The coefficient of WEALTH (1.45), which shows the effect of household affluence on the attitude towards the MPA establishment, is positive and statistically significant at the 1% level (**Table 3**). The result implies that poor households were more likely to hold favorable attitudes toward coastal conservation. The probability of supporting is 92% (**Table 4**). This result reveals that the majority of poor households pursue coastal resources based activities such as fishing because they lack access to capital such as physical (land), financial capital for investment etc. This is consistent with our descriptive analysis, which indicate that there is significant difference in land endowment between rich and poor households (*t-test = 6.77, ρ=0.000*). In addition, **Sesabo and Tol (2005)** showed that poor coastal households in the study area received on average 70% of their total income from fishing. Due to the increased pressure in most of coastal resources, poor households are of the view that conservation initiatives will help to increase marine and coastal resources as well as other income generating activities such as tourism. These results, however, contradict other findings, which indicate that wealthier households are more supportive of conservation effort in general (see for example **Infield and Namara 2001; Holmes 2003)**. The reason for this difference is more elaborated in the discussion section (see section 5).

It is equally important to note that awareness regarding the objectives of MPA (OBJECTIVES) and the awareness of various rules and regulations (RULES) governing the utilization of coastal resources are significant factors in explaining the attitude towards MPA establishment. This variables measure the knowledge of households regarding conservation initiatives**. Table 3** shows that the coefficient variable OBJECTIVES (0.83) is positive and statistically significant at 1%. This indicates that the importance of households' understandings regarding the value and functions of MPA in supporting livelihood and the coastal ecosystem in general. **Table 4** shows that the probability of support increases when households are well aware of the objectives of MPAs (94%). The understanding of the values and the objectives of MPA by households are very

crucial if the MPA wants to achieve its objectives. This was consistent of numerous studies, which indicated that knowledge of conservation issues has been positively correlated with favorable attitude towards conservation. For example **Jim and Xu (2002)** found that knowledge on nature reserves made households residing near the conservation sites more conscious and less utilitarian in their attitude towards nature conservation in China. In the same line, **Fiallo and Jacobson (1995)** found that a positive attitude towards Machalilla National Park in Ecuador correlated with the knowledge of conservation issues and park's management goals.

Concerning the presence of rules and regulations, which govern the use of marine and coastal resources and their enforcement, the variable RULES has a positive relationship with the support of establishing MPAs in the study area (0.81). The coefficient is significant at 5% percent level. The probability of support is about 91.5% (**Table 4**). This implies that effective management through the existence and enforcement of rules is crucial in order to gain support from rural coastal households regarding coastal resource management. These results imply that mere awareness of MPAs objectives as well as rules and regulations that govern coastal resources utilization do provide enough motivation for the households to have a positive attitude towards coastal resources conservation initiatives. However, there is a whole area of research on how to set up rules in order conservation initiatives (e.g protected areas) to function properly (see for example **Ostrom 1990; Baland and Platteau 1996; Behara and Engel 2005**); this is beyond the scope of our study.

Table 3 shows that the location variable NYAMANZI, which depicts the variation of perception in the two investigated villages, is significant and negative (-1.0508). The probability of supporting is lower for the households residing in Nyamanzi (Table 4). The result indicates that households residing within Nyamanzi village have a negative attitude regarding MPA establishment. However, the village is one of 17 villages located around Menai conservation area, which covered 467 km^2. The result reflects the fact that the level of positive

spillovers or benefits received is low due to lack of access to this area, which is far away compared to their counterpart villages. The finding is supported by the descriptive statistics, which showed that 58% of those who supported the MPA establishment near their vicinity perceived to have access to Menai conservation area. Out of those who did not support the MPA establishments, (97%) are perceived to have no access to the conservation area. In addition the households perceived that the Menai conservation area was established in order to increase tourism rather than to improve their welfare. In this case households perceived that the area benefited mostly foreigners. These experiences affect their attitude towards the introduction of MPA, which will be close to their village. The findings are consistent with **Levine (2004)** findings, which showed that communities who did not benefit from the Menai conservation areas through tourism and reduction of illegal fishing hold a negative attitude towards the area.

5. Discussion

Perceived attitudes towards MPA establishment are crucial to the success of marine and coastal resources conservation initiatives in coastal areas in developing countries. Understanding the underlying factors, which influence the attitudes of coastal households, is essential if sound advice is to be provided to policy makers who are attempting both to conserve the coastal ecosystems and promote economic development. In this study, interest to support the establishment of MPA near communities' local vicinity was based on the perceived attitudes. According to our results, it seems that attitudes differ across the households regarding the introduction MPAs.

The results indicate that about half of the households (50.23%) support MPA establishment in the vicinity to their village while 49.77% showed a negative attitude. Since the findings of this study are based on random sample, it can be inferred with a 95% confidence level that the proportion of households who would hold favorable attitudes toward MPAs was between 43.52% and 56.93% (with ±3.4% sampling error). The majority (65%) of households in Nyamanzi

village welcome the idea of establishing MPA, where as in Mlingotini village most of households (62.39%) held a negative attitude. The main reasons for those who support the establishment of MPA were; (1) economically based benefits; (2) ecologically based benefits; (3) social and recreation value (see **Figure 2(a)**). The following costs were perceived with those households who were against the establishment of MPA; (1) economically-based costs; (2) social based costs and (3) ecologically-based costs (see **Figure 2(b))**

The above results show that half of the households across the villages place more concern on economically based benefits and costs because they perceived that these have an immediate effect on their livelihood (see **Figure 2**). These concerns reflect the ongoing tension and differences between conservation and management of coastal resources through MPAs establishment in the study area. The result indicates that households are more often concerned on how to meet their level of subsistence than the conservation of the ecosystem. Indeed, households are not able to change their present resource use pattern because of poverty, dependences on coastal-based activities as well as lack of proper employment opportunities. As a result, they find it difficult to accept resource conservation initiatives, hence sustaining their livelihood.

In the context of the importance of rural households perceived attitude towards MPAs establishment, several socio-economic variables were found to be influencing this attitude. Our results indicate that the households' perceived attitude towards new proposed MPAs in their vicinity is positively correlated with the perceived benefits, which would be obtained. This finding suggests that for the coastal resource conservation initiatives to be more acceptable by local communities, they are required to provide some benefits in addition to the protection of marine and coastal resources. Consequently, for these initiatives to be successful, the linkage between benefits from conservation initiatives as well as to the marine and coastal resources must be clear to the local communities. Previous literature based on empirical evidence indicates that ensured sharing of benefits is also very important in influencing households' attitude towards

conservation initiatives (**see for example Western and Wright, 1994; Ghimire and Pimbert, 1997**). However, the available information in the present study is too limited to adequately access such influences on attitude. Further research is required to formally investigate the relationship between benefits sharing and their associated attitude responses towards marine and coastal resources management and conservation policy.

The analysis also shows that the perceived costs decrease the propensity of households to support proposed new MPA. This result indicates that protected areas impose costs for rural households in the form of access restriction to natural capital such as fisheries, forestry resources, which are very crucial in shaping households livelihood pathways. Most households indicated that if MPA will be established near their local vicinity, they would suffer from economic related costs (see **Figure 2b**). In addition, the households indicated that fishing activity is not permitted in the sanctuary created by MPA and that its creation will involve an establishment of limited fishing ground. This is a considerable economic obstacle, counting the lack of capital to access more distant fishing ground. These results suggest that MPAs establishment may not constitute appropriate conservation measures in areas where marine and coastal resource-based activities are the main source of livelihood unless such initiatives are designed along with various forms of compensation and benefit sharing.

The support of MPA establishment and its effectiveness depend on various forms of compensation and benefit sharing. In coastal settings, the establishment of MPAs must be accompanied by the development of additional income-generating community-based projects so as to improve their socio-economic well being, while at the same time allowing for the recovery of coastal ecosystem. In addition, the revenue streams from tourist activities in MPA should be shared with the local communities for instance providing infrastructures (e.g. schools, health care facilities) and investment support (e.g. capital for fishing gear allowing fishermen to reach different fishing grounds). All these efforts will allow mitigating the potential costs from the MPA establishment. **Bruner et al. (2001)** showed that

various forms of compensation and benefit sharing contribute to park effectiveness in protecting tropical biodiversity. In addition, there is need to increase community participation in management process, as it ultimately touches on the acceptability and sustainability of MPA that rests upon such action.

The level of dependency on coastal resource-based activity (in this case fishing activity) is positively correlated with the overall positive perceived attitude towards the introduction of MPA. These results indicate that those households who depend on marine and coastal resource based activities were more affected with the degradation of these resources. Our descriptive analysis therefore shows that most of the households (61%) who participated in fishing activities indicated that there is need to protect the resources from overexploitation. Thus, understanding the complexities in the livelihood of coastal rural households is crucial in elucidating factors, which influence their behavior. This indicates the importance of considering the extent of communities' differentiation as well as degree of their dependence on natural resources. **Allison and Ellis (2001)** have emphasized the use of livelihood approach so as to improve rural development policy and practice by recognizing the complexities of livelihood strategies. For the MPA to be accepted there is a need to consider the conditions that creates economic niches for coastal rural households and that relate to a specific life style (**Allison and Ellis 2001**). The consideration of different livelihood opportunities and their importance in households' well being enables for example the management of marine ecosystem rather than management of fishery resources alone (**Jorgen and Muller 2000**). Knowledge on how households in coastal areas operate in different activities, help to understand how the system works, which is very crucial for the MPA to be effective.

We expected a significant association between the condition of coastal resources and perceived attitude towards MPA establishment. Our survey results indicate that those households, who perceived that coastal resources were decreasing overtime, were very supportive of the proposal to establish MPA. Households

participating in marine and coastal resource-based activities reported that coastal resources were under severe pressure due to population growth, leading to illegal fishing methods in both villages (87.9%). The analysis provides evidence that households that are aware of the trend as well as the availability of specific resources are more concerned about how MPAs should be managed. This finding suggests that awareness of a decline in coastal resources, particularly fish, can act as an incentive to protect them. This is in some respect a replication of Scherr's adaptation of Boserup's theory (1965) on the relationship between population growth and agricultural intensification (**Scherr, 1999**).

The inequality in household affluence in terms of wealth shapes the perceived attitude towards MPA establishment. The findings that poor households were more likely to hold positive attitude towards a MPA proposal than rich households was unexpected, given the prominent role of wealth in households' behavior (see for example **Infield and Namara 2001; Holmes 2003**). According to empirical evidence, wealthy households are generally more supportive towards conservation initiatives because they have sufficient means at their disposal (such as capital, land etc), which allows them to participate in other income generating activities (**Hackle, 1999**). This means that rich households can more easily adjust to the economic loss from a formation of MPAs in form of access restriction than poor households. Hence, one would assume that rich households might hold a positive attitude about MPA establishment in their vicinity. A possible explanation for these results could be that poor households have been affected more with degradation of coastal resources over-time. This position may have made poor household more interested in conservation initiatives which may ensure an increase in future coastal resource. Therefore, this interest may result in a positive attitude towards introduction of MPAs. This provides support for the arguments that sometimes-poorer households of society, who are most dependent on open and free environmental resources are more interested about the conditions of these resources (**Infield, 1988**)

Another significant result was the impact of knowledge level concerned MPA objectives in influencing local attitude towards introduction of MPA. Households with more understanding about the value and function of MPA were more likely to hold favorable attitudes towards its introduction. This trend is partly attributed to households accessing social networks. Through social networks in terms of group and/or association activities, households are able to benefit from improvement of knowledge through sharing of information. The descriptive statistics indicate that the households with groups or associations affiliations had more knowledge about MPA objectives compared with those households without group or associations affiliation ($\chi^2(1)=10.82$; $p=0.001$). The results indicate that the importance of social network in knowledge sharing has an influence on the attitude towards MPA establishment. Hence, our findings suggest that prior to establishment of conservation area programs for conservation education are needed. Further, the creation of environmental education programs also should consider community members values. It is therefore contended that environmental education (formal or informal) can be very instrumental in affecting positive environmental attitudes among households (**Jacob, 1995; Kellert, 1996**) and by extension, their support of protected areas (**Fiallo and Jacobson, 1995**). In addition, there is a need to have a better understanding of the role of social capital in terms of their working mechanisms (for example the role of social networks in information dissemination). This could offer more insights and lead to groups or networks improvement in order to have acceptable and effective conservation initiatives.

Regarding rules and regulation, the results showed that the variable has a significantly positive relationship with the attitude towards a MPA establishment. The result implies that those households who perceived that marine and coastal resources are managed by rules and regulations supported the establishment of an MPA. This result necessitates the need for the government and conservation bodies to have rules and regulations and use them effectively. This finding substantiates **Kuperan and Sutinen (1998)** position that effective

enforcement of rules and regulations is an essential element of compliance policy. Accordingly the absence of effective rules and regulations weakens the moral obligations to comply and the moral basis on which social influence is exercised, results in defiance of regulations. In addition, rules and regulations have higher compliance if local communities participate in the formulation and implementation of laws. **Nkonya et al., (2005)** showed that the involvement of local authorities in enacting and enforcing community based natural resources management requirements in Uganda appears critical for the success of such regulation.

The spatial inequality in the expectation of rural households presents a significant influence on perceived attitude towards MPA establishment. The results indicate that households residing in Nyamanzi village were more likely to be unfavorable towards MPA establishment than those residing in Mlingotini village. This was unexpected given the prominent location of the Nyamanzi village. This village is one of the villages situated near Menai conservation area. Consequently it was expected that they would be more positive because of the spillover from the conservation area. However, households in this village perceived that the Menai conservation area did not bring in supplementary income and employment opportunities to the community. For a long time coastal communities have been intensively and extensively relied on marine and coastal resource-based activities due to lack of other viable alternatives for their livelihood. A previous study by **Sesabo and Tol (2005)** indicated that the contribution of fishing income in total household' income on average was about 61.4% in Nyamanzi while 43.6% in Mlingotini. Another explanation for positive attitude in Mlingotioni is that, households wanted to have the MPA probably due to the high rate of the exploitation of marine and coastal resources. According to the group discussions with elders, migrants from nearby areas seem to create pressure on resources in the area as well as lack of management initiatives for resources management. These reasons placed the households tot have positive response towards introduction of the MPA with the perception that its establishment will rescue the marine and coastal resources.

Our results indicate that the future of tomorrow's coastal resources largely depends on the attitude and practices of today's coastal resource users. The ad hoc and intensive management approach of prohibiting coastal resources based activities such as fishing without providing alternative may lead not only to bitterness, but also to conflicts. There is a need, therefore to address those initiatives, which will improve life of households, whose income emanates mostly from marine and coastal-based activities. By taking this into consideration the substantive conservation initiatives targeted each village will make households to be more willing and support conservation efforts.

In the overview, the results present a strong case for recognizing the behaviors of rural coastal households in assessing the impacts of establishing MPAs. The conservation of coastal resources through MPA establishment involves not only the management of these resources, but also the management of communities living near and/or surrounding these resources. In addition, the acceptability and effectiveness of MPAs could be improved through increased involvement of rural coastal households in day-to-day management. By including them in general management processes, they become more informed and consequently supportive to the MPA. This implies that acknowledging the importance of heterogeneity of households and community involvement is essential to obtain local support to the MPA establishment. Finding a management strategy that acknowledges and builds upon local ethic values and beliefs would be advantageous for future conservation initiatives.

However, whether the improved MPA-local communities' relation translates into long-term biodiversity conservation and sustainable utilization of coastal resources is another question, and cannot be covered in this study. Studies that have attempted to evaluate sociological and/or biophysical aspects of MPAs are an important contribution in understanding this important issue.

6. Concluding Remarks

Significant heterogeneity in coastal resources utilization and attitude towards conservation of these resources exist among surveyed households in Tanzanian coastal villages, as in many other countries (**Perez-Sanchez 2003; Hampshire 2004; Gelcich, et al. 2005**). This imposes the complexity in conservation of coastal resources through MPA establishment because of diverse behaviors of rural coastal households. Studies on the attitude of households (or groups or individuals) seem to be one of the numbers of logical steps towards making informed assessment about households' perceived attitude towards the establishment of MPAs. However, as this study shows, while households heterogeneity can be effective in shaping attitudes towards conservation, to relate such heterogeneity changes in coastal resources management through attitude assessment is a challenge that requires a clear understanding of the relative influence of various social, spatial, economic and cultural factors. Thus, understanding the circumstances under which attitudes accurately reflect behavior is necessary if conservation-development initiatives are to be anything more than provisional. For any resource conservation initiative to be effective, it should understand and work within the existing social environment (**Jim and Xu 2002; Cinner and Pollnac 2004)**. In addition, there is a need to go beyond the characterization of conservation attitudes to identify local-level variation in interests regarding resource utilization and management, and how this variation manifests itself in resource use and conservation decisions.

However, identifying perceived attitudes towards conservation initiatives may not directly result in a quantifiable outcome of conservation. Nevertheless it offers a tool for better understanding why and how members of local communities perceive resource conservations initiatives. This is a critical step in designing effective conservation policies.

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