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Local Communities and Sustainable Management in Maladumba Lake and Forest Reserve Nigeria

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ABSTRACT

Common failures in resolving multiple use conflicts are attributed to the inability of institutions to recognize and incorporate people's perceptions towards the resource. This study aims to determine the local communities' perceptions and factors influencing their perceptions towards Maladumba Lake and Forest Reserve and its sustainable management. One hundred questionnaires were distributed to systematically selected householders situated near the MLFR. Correlation analysis determined the factors influencing the householder's perception. Results showed that attitudes, income and willingness to manage resources affect the local communities' perception ($p < 0.5$). Results also showed that most respondents recognized that the condition of the MLFR is deteriorating due to anthropogenic activities and each individual can play a role to sustainably manage the environment.

Key words: Environment, perception, resource, conflict, anthropogenic

INTRODUCTION

Maladumba Lake and forest reserve is located in the Maladumba area, approximately 18 km SW of Misau and 2 km east of Shelon village, an immigrant fishing community, in the Misau Local Government Area of Bauchi State (Abdullahi and Ibrahim, 2008). It is approximately 120 km northeast of Bauchi town. The Lake is a natural, shallow (≈ 2 m) depression lake, situated in a structurally-guided long, counter clockwise and clockwise semi-circular channel occupied by the River Kuka that drains into the lake and River Kari that partially drains the lake during high water. The lake is undergoing accelerated siltation (Ayeni, 2007). MLFR lies on sedimentary rocks of the Kerri Kerri Formation. The Formation comprises lacustrine and deltaic-type sediments of Paleocene age deposited on the Basement Complex to a thickness of up to 200 m. The formation is predominantly arenaceous, consisting of loosely cemented sands and grits, clayey sandstones, massive clays and silts. Bands of ironstone and conglomerate occur locally. The Formation thins towards its surface unconformity with the Basement Complex in the area west of the lake. In this area, the River Jimin, the main tributary of the Kari, has incised through the formation to flow on crystalline rocks of the Basement Complex. The soils in the area are deep sandy clay and loamy sands (Ayeni, 2007).

The climate is the Sudan type, with two distinct seasons, a short (May-September) wet season and a longer (October-April) dry season. Mean annual rainfall is 800 mm with a unimodal distribution during the rainy season. The peak of the season is between July and August. Rainfall is usually stormy and with high intensity. Mean temperatures range from 26°C during the harmattan to 34°C during the hot month of April and May. The dry season is dominated by dusty, north easterly Harmattan winds.

The MLFR is endowed in natural resources providing numerous uses and benefits for multiple users (Abdullahi and Ibrahim, 2008). At present, it is continuously meeting the needs of numerous sectors of society particularly as a source of animal watering point, fishing and fuel wood supply (Abdullahi *et al.*, 2010). Studies have stressed that conflicts arising from multiple users contribute to the diminishing of the resources and the deterioration of the environment worldwide (Hough, 1988). There is a widespread awareness on the continuous deterioration of the quality of MLFR and this has created a crucial interest to protect and sustainably manage the resource not just for the benefits that we derived from it but on the benefits it provides us in maintaining the integrity of the ecological processes of the environment (Abdullahi and Ibrahim, 2008). The various levels of government have continuously introduced programs and legislative measures to protect the lake but the situation brought about by the conflicts of multiple uses has virtually created daunting challenges towards the success of the measures and in the protection of the lake's condition. Studsrod and Wegge (1995) have identified that the common failure in most legislative approaches have been brought about by the inability of institutions to recognize and incorporate the perspectives and insights of the users themselves like the local communities depending on the resource. The success of resolving the issues and concerns governing the environment depends on how well the local communities themselves view the environment and its complex processes and on how greatly they are involved in managing it (McNeely, 1994). The conflicts arising from multiple users have always been a principal management problem faced by most communities (Hough, 1988; Heinen, 1993). Studies have indicated that the evident causes resulting to these conflicts starts from the actual use and attitudes of people particularly towards the environment (Nepal and Weber, 1995; Abdullahi *et al.*, 2007). People commonly engage in activities that threaten the environment because of the want of maximizing the immediate economic benefits withstanding the potential costs it may incur to the environment (McNeely, 1994). This study provides benchmark information on the perceptions of the local community particularly the users depending on the resources of the protected area. The study also aims to assess the possible influences that may affect the local communities' perception towards the sustainable use of the resources of the protected area. The findings from this work may be useful to decision makers particularly in developing policies and programs that will help meet and be responsive to the changing times and needs of the users.

MATERIALS AND METHODS

Five out of the ten Local Empowerment and Environmental Management Project (LEEMP) communities were randomly selected through the use of rolling identical pieces of paper with the name of each community in it and then drawing the names after the pieces of paper had been thoroughly mixed (Oтите and Ogionwo, 2006). A survey instrument, utilizing structured and open ended questions was developed and pre-tested. The use of the structured and combined open-ended questions helps to explore the demographic profile of the respondents, the perceptions and pertinent issues and new insights from the local community pertaining to the MLFR. The self-administered questionnaire is used to preserve anonymity and ease in convincing the local community to answer the questions. The respondents' answers cannot be validated and the limited questions in the survey instrument are the identified limitations to the study. The pre-tested questionnaire was administered in a systematic fashion from one household to every 5th household thereafter (Abdullahi *et al.*, 2007). The factors (age, gender, location of community, income, attitude towards the lake and the willingness to be involved in conservation efforts) were identified as the

independent factors and the perception towards MLFR was identified as the dependent factor (Shrestha and Alavalapati, 2006). A correlation analysis was used to determine the factors correlated with the perceptions of the local community towards the MLFR. The Spearman's correlation analysis was used for the nonparametric data and the Pearson correlation analysis for the parametric data. Results yielding a p value of 0.10 were significant (Causton, 1988). All statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) software. The required data and information were collected from a direct field study based on the results of 100 questionnaires that were administered in the selected communities. Information collected for this study is generally qualitative, based on field observation, household survey and informal discussion with key informants conducted in December 2008.

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents: The main socio-economic variables of the sampled households are summarized in Table 1. The farm sizes in the study area are small in scale given the average size of 2.4 acres per household. It should also be noted that the main method of acquisition of land in the study area is through inheritance from the parents. Over 90% of the household heads indicated that they inherited their land from their parents. Therefore, land sizes are bound to continue declining in the foreseen future and given that most of the people (over 90%) are involved in farming as their main occupation (Table 1) then it can be argued that there will be increased pressure on land to meet food needs of the people. The increasing pressure on land does not augur well with the conservation efforts of the forest because forest will definitely be one of the immediate alternatives for the people.

An average of less than one years of formal education means that most farmers do not have any education beyond the elementary level while some do not have any formal education at all. Therefore they have limited opportunities to get employed in the non-farm sector or to successfully run commercial enterprises. This is clearly supported by the observation that over 90% of the respondents are involved in farming as their main occupation (Table 2). On average, the sampled farmers reside within 2 km radius of the reserve which is a walking distance. The closer to the reserve the people are the more the likelihood that they extract from it. This has significant implication on the ease with which the local people can access the reserve and consequently extract or over-extract from it.

All the questionnaires for the present study were returned. The householders surveyed were males (99%) than females (1%). The age of the respondents ranged from 18-98 years. The mean

Table 1: Socio-economic characteristics of the households

Variable	Min.	Max.	Mean	STD
Total land size (ha)	0.1	6	2.30	51.96
Age of the household head (years)	18	98	51.02	15.01
Total years of formal education	0.00	9	0.27	5.83
Total years of farming experience	5.00	66.00	21.63	12.44
Average resident family size	4	17	6.77	2.10
Shortest distance to MLFR (km)	0.2	5.5	2.18	2.30
Distance to the nearest market (km)	0.00	10	1.37	2.23
Annual income of household head (N 000)	50	200	125.00	40.45

The average number of years of education for the household heads in the area was relatively low

Table 2: Respondents questionnaire responses

Questions	Percent response
Method of farm acquisition	
Inherited	92
Bought	6
Gift	1
Membership to social group	
Yes	19
No	81
Gender of head of household	
Male	99
Female	1
Marital status of respondents	
Married	97
Single	3
Main occupation of head of household	
Farming	90
Others	10
Main source of fuel wood of household	
Own Farm	11
Forest	82
Market	7
Protected area condition	
Deteriorating	54
Improving	2
Good source of livelihood	40
Indifferent	1
Role of the protected area	
Source of livelihood, water, food and fuel wood	29
Source of livelihood and water	30
Source of livelihood and protein	21
Different consumption purposes	16
Livelihood only	4

(\pm SD) age of respondents was 33 ± 17 years. A number of the respondents (30.1%) have annual incomes ranging from a minimum of N50, 000 to a maximum of N200, 000. Only about 8% of respondents had annual incomes more than N200, 000. Almost all of the respondents were married (97%) than singles (3%) in the study. The survey indicated that a good number of the local community (41%) perceived that the condition of the MLFR is deteriorating, while 34% perceived it to have historic and aesthetic value, 22% perceived it to be a good source of livelihood by supporting human and livestock development and 3% gave no perceptions towards the MLFR. The majority of the local community (86.2%) surveyed stated that they viewed the MLFR to be an important resource and felt positively on the numerous benefits it provides to the local livelihood. These respondents identified that there are multiple uses provided by it. The common uses viewed by the respondents towards MLFR include a good source of livelihood, water supply and fuel wood (29%), for different consumption uses (21%), for livelihood only (4%) and source of livelihood and protein (21%). Among those respondents who had negative views towards MLFR, 13.8% had indicated that its condition is deteriorating and hence it poses a threat to local livelihood. All the respondents of the study recognized that the MLFR is deteriorating because of anthropogenic

activities. Majority (52%) acknowledged that the condition of the MLFR is deteriorating due to irrigation activities associated with dry season farming. About 36% of respondents specified that the problem is contributed by the activities of Fulani herders and commercial fuel wood collectors (22%). All the respondents have indicated that their perception towards the lake is shaped by influences. A number (36.4%) of respondents had indicated that the physical condition of the reserve that includes the water discoloration, felling of trees, particularly juveniles and restriction on fishing permits influence their perception towards the reserve. Respondents were asked regarding their views towards the forest if it was deteriorating. A number of respondents (51%) viewed that the indiscriminate felling of trees contributes to the deterioration of the environment. About 31% of respondents perceived that if the forest were deteriorating, a number of individuals would suffer, as it can no longer provide the general public's basic necessities. About 18% of respondents sights that the worsening condition of the lake will result to a decline on the fishes and aquatic organisms. Majority of the respondents (94.2%) specified that the continuous deterioration of the forest and the lake creates an immense problem and there is a need to protect and manage it. Respondents (34%) indicated that there is a need for government agencies to be actively involved particularly in monitoring and implementing the laws and ordinances and the imposition of a support to provide programs for the sustainable utilization of the resource (31%). Respondents (27%) likewise indicated that instituting and implementing environmental management measures could help in sustainably managing the forest reserve and the lake. Respondents (6%) also stated that they themselves could help contribute in the protection of the resource by donating money and paying their appropriate taxes to help conserve, manage and protect the resource for the succeeding years. The factors influencing the frame of reference of the perceptions of the respondents towards the reserve is significantly correlated by their attitudes towards the resource, respondents' income and their willingness to be involved in environmental efforts ($p < 0.5$) (Table 3). This study does not negate the possibility that other factors may significantly influence the perceptions of respondents towards the resources of the area. This study was cross-sectional and its scope was limited to householders living near and away from the reserve.

The findings of the study showed that majority of the householders surveyed recognize the importance of the reserve because of the multiple uses it provides however, it is constantly threatened by anthropogenic activities. Result of the study did indicate that the householders perceived the reserve as continuously deteriorating due to human activities brought about by both indiscriminate wood felling and unlawful fishing activity. Similar findings support the results of this study as Ayeni (2007) indicates that the condition of the reserve is greatly deteriorating due the activities of Man. Results of the study showed that generally the perceptions of the respondents are shaped by their experience over the years and is influenced by various factors as shown

Table 3: Factors related to the public perceptions of the local communities towards Maladumba Lake and Forest Reserve

Factors	R	p-values
Age	0.119	0.119 ^{NS}
Gender	-0.097	0.100 ^{NS}
Location of community	0.065	0.396 ^{NS}
Income	0.148	0.066*
Attitude towards the resource	-0.163	0.032*
Willingness to be involved in environmental efforts and decisions	-0.143	0.060*

*Significant at $p < 0.5$, NS: Not significant

elsewhere (Shrestha and Alavalapati, 2006; Gadd, 2005; Abdullahi *et al.*, 2008). This study also presents that the factors: attitudes, income and the willingness to be involved in environmental efforts and decisions were significantly correlated to the respondents' perception towards the MLFR. This study does not foreclose the possibility that other factors may significantly shape peoples' perception. Their willingness to be involved in environmental efforts has shown varying influences in the perception of the MLFR. In a similar study by Abdullahi *et al.* (2008), it discusses how people's value of a resource can have significant implications on their perceptions and on how they want the resources managed. The positive attitudes towards MLFR exhibited by the respondents surveyed also helped shaped the local community's perception. Grob (1995) indicated that attitudes encompass the affective, behavioral and cognitive responses that may influence the frame of references of what people's perceptions are and the concerns people give. Material affluence was also demonstrated to influence the perception of the respondents (Shrestha and Alavalapati, 2006). People with higher incomes showed better understanding of the activities surrounding the MLFR. A similar study (Gadd, 2005) presented that people's perception regarding the environment are highly differentiated among the community members based on their socioeconomic status. Studies (Shrestha and Alavalapati, 2006; Abdullahi *et al.*, 2008), suggested that wealthier people are more likely to be understandable and amenable to the holistic approach of resource management.

CONCLUSION

This study presents that MLFR is an important resource providing numerous uses for the local community. Common benefits recognized by the respondents include a source of livelihood, water supply and animal watering point, protein supplement and food source. The multiple uses of the reserve recognize an immense threat that continuously deteriorates the condition of the resource. The study indicated that majority of the respondents presented that the reason for the deteriorating condition of the MLFR is brought about by indiscriminate felling of trees; un regulated fishing and irrigation activities. A number of respondents recognized that their physical experience with the reserve influence their perceptions towards it. The study also presented that there is a need to protect and manage the reserve for the benefit of present and future generations. The study recognizes that the government and the community need to be involved particularly in safeguarding the fragile ecosystem because numerous individuals and organisms depend on it. The study indicates that each one of us can partake or contribute in improving and mitigating the present conditions of the reserve. The study also acknowledges that local people's perceptions towards reserve are shaped by significant influences like attitudes, income and the willingness to be involved in policies about the general environmental condition of the area. The conflict arising from the multiple uses of the environment is an immense problem that needs to be resolved because of its impacts towards the environment and on people's lives. Considerable approaches are introduced to mitigate the impacts arising from these conflicts, for example, the governments at all levels spend to implement measures to protect and manage the environment, yet these measures remain unsuccessful in remedying the problem raised by these conflicts and in the attainment of sustainability. There is therefore, the need to look into interventions that integrates the perspectives of the local stakeholders particularly in resolving issues arising from the conflict use of the environment. These measures must recognize and build on what the local people find important. The value of creating a shared understanding of what is important and what they value from their environment creates an important foundation for future researches, programs and policies that scientists, policy makers and even resource managers need consider. Surveys that integrate resource inventories with information on how people view and value these resources and the environment can help improve the conservation efforts being advocated and implemented.

There is also a need to develop longitudinal studies that will anticipate what policies might achieve sustainability particularly in managing the local environment. There is further a need to consider what possible factors may significantly shape local peoples relations on the environment, perception and on how these may all affect the status and the sustainability of resource use and management. This calls for moving from substance to process in environmental management where local people would be involved in decision making process on matters of resource conservation in their areas.

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