Collaboration and partnership in forest conservation: The role of communities in the management of the Gbele Reserve in north-western Ghana

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Abstract

Since the promulgation of the 1994 Forest and Wildlife Policy, community participation in forest resource management has become the norm throughout Ghana. This study assessed the role of fringe communities in the management of the Gbele Resource Reserve in north-western Ghana. The study uses a mixed method approach, with a structured questionnaire survey, key informant interviews, and focus group discussions covering 240 local residents of fringe communities and 12 key informants. The findings revealed that fringe communities are involved in implanting activities, such as seedling planting and fire prevention and fighting, as well as in monitoring activities, including guarding the reserve against illegal activities. The results of a logit estimation model indicates that six factors (gender, occupation, community role, belief in local taboos, perceived ownership of the reserve by a community, and playing a managerial role) were positively significant in determining participation in the reserve's management. Surprisingly, perceptions of economic and environmental benefits emerged as negatively significant. This leads to the conclusion that the economic and environmental benefits of the reserve are not appreciated by fringe communities. This situation poses a threat to sustainability of the reserve and calls for the design and propagation of awareness creation programmes by forest reserve authorities.

Keywords: conservation, forest resources, fringe communities, participation, stakeholders

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Introduction

The failures of traditional conservation approaches to achieve desired objectives have led advocates to champion new approaches to forest resource management. These failures are largely attributed to the inability of conventional approaches to provide for the needs of fringe communities (Ashley & Roe, 1998) who depend on resources from forest reserves for their livelihood. While recognizing that communities' dependence on forest resources is closely associated with several ecological costs—including reduction in the forest ecosystem services, disruption of ecosystem services, and changes in the population dynamics and demography of harvested species (Mensah & Amoah, 2013)—it must be noted that the socio-economic and cultural life of fringe communities is closely associated with forests to a greater extent (Choudhury et al., 2004). However, in addition to the forest fringe communities' dependence, the Convention on Biological Diversity (2007) points out that they unwittingly become responsible for the degradation of the resources without realizing the consequences of their interactions with the resource.

Advocates of sustainable forest resource management, including conservation organizations and multi-national organizations, have championed new approaches to resource conservation, approaches that are premised on building fringe communities' support through collaboration, partnership, and sharing of the social and economic benefits of forest reserves (Brown, 1999; Berkes, 2009). Among these approaches are Community-Based Natural Resource Management (CBNRM), Community Conservation Areas (CCAs), Integrated Conservation and Development Projects (ICDPs), and Collaborative Management (Co-Management). A Co-Management approach, involving collaboration, partnership, and benefit sharing, focuses on intensifying collective efforts, maintaining stability, and ensuring commitment to the long-term objective of sustainable management of forest resources (Fox, 2007: 2).

There are many opportunities for Co-Management to improve the sustainability of forest resource conservation. According to Brown (1999), the role of communities in Co-Management is critical for various reasons, including their proximity to the forest. The latter makes them the immediate custodians of the reserve as well as the stakeholders in closest touch with the resource and dependent on it for their livelihood: hence, they are best placed to ensure its sustainability. However, Co-Management can be complicated and difficult to achieve. Experiences worldwide

have shown that most Co-Management approaches in forest resource conservation have been successful when they are based on action-oriented activities and education (Brown, 1999). The involvement of fringe communities early on in the process of resource management is critical in order to ensure the sustainability of a resource. This paper assesses the role of fringe communities in the management of the Gbele Forest Reserve in the Upper West Region of Ghana. The assessment is undertaken within the context of a Co-Management principle premised on collaboration, partnership, and benefit sharing. Unlike other studies (e.g. Agyemang et al., 2010; Mensah & Adofo, 2013; Mensah & Amoah, 2013; Sagoe, 2013; Husseini et al., 2015), this study provides a quantitative evaluation of the determinants of participation in forest resource management.

Overview of forest conservation in Ghana

In Ghana, at the beginning of the 20th century, the high forest zone was estimated to cover over 82,000 sq km. This has been on the decline for many years, particularly since the 1970s, to about 18,726 sq km presently at a deforestation rate of 0.9%, translating into about 5.2 million ha of forest cleared annually (BIRD, 1998). Ghana's total forest cover, which stood at 8.2 million ha (i.e. 34% of the total land area) at the turn of the last century, is now less than 1.6 million ha and has suffered from an estimated annual deforestation rate of 2.0% (MLNR, 2012). The drivers responsible for Ghana's diminishing resources in forest reserves include population pressure, increasing demand for agricultural and forest products in local markets and for export, policy failures, weak institutions in the timber sector, and, most importantly, low community or local-level participation.

One of the key factors in Ghana's deforestation has been the alienation of forest fringe communities from the policy formulation, planning, and implementation of various forms of management strategies of forest reserves that have been engaged in so far, although such communities were expected to assist in protecting the forests (MLF, 1996). Also, in recent times, the management of forest resources tends to generate local conflicts between fringe communities and public sector institutions (Sagoe, 2013). Consequently, the need to involve local communities in the governance of Ghana's local forest resources has attracted much academic and

developmental attention. Such an approach is not only to ensure greater commitment on the part of the fringe communities to conserve forest resources sustainably, but also to empower and improve these communities' socio-economic well-being.

In order to prevent total destruction of the country's forest, the colonial government instituted a number of forest management measures throughout the country. It started on a note of collaboration between traditional leaders (representing local people) and the government (represented by the Forestry Department). Forest management in Ghana started in 1909 with the establishment of the Forestry Department. According to Oduro et al. (2011), as early as 1920, Forest Ordinances were passed. Demarcation and reservation of the forest estate took place between 1928 and 1939; and the Forest Policy of 1948 was developed as a guiding instrument for the management of forests (Boakye & Affum, 2006). The 1948 policy established 282 forest reserves and 15 wildlife protected areas, which occupied more than 38,000 sq km, or about 16% of the country's total land area; an additional 4,000 sq km of forest existed outside this gazetted area. Since then, 50,000 ha of plantations have been planted in forest reserves, and additional plantations have been established by individuals, institutions, and communities (ibid.).

The 1948 Forest Policy contained some elements of collaboration, but it was driven by the need for commercial timber production, mainly for export. The policy stipulated that the government manage forest resources single-handedly, without the collaboration of forest fringe communities (FMSC, 1999). It is argued that the constitution of the reserves had both positive and negative effects on the lives of local communities. On the one hand, it made it possible for the country to preserve some of its forest resources; on the other hand, the constitution of the reserves took fertile agricultural lands from the fringe communities and this has had a negative impact on their livelihood.

The 1994 Forest and Wildlife Policy provides the basis for community participation in forest management. The policy aims at a conservative and sustainable development of the nation's forest and wildlife resources for the maintenance of environmental quality and perpetual flow of optimum benefits to all segments of society (MLF, 1994).

It recognizes the following guiding principles on collaboration:

- The rights of people to have access to natural resources for maintaining a basic standard of living and their concomitant responsibility to ensure the sustainable use of such resources
- Retention of a share of financial benefits from resources utilization in a fund for the maintenance of resource production capacity and for the benefit of local communities
- The need to develop a decentralized participatory democracy by involving local people in matters concerning their welfare.

In addition to the above guiding principles, the policy also highlights the necessary strategies to increase public awareness and communities' involvement in conservation of forest and wildlife resources, especially in areas which affect their livelihood and ecological stability. These have been considered in the Forest Services Division strategies to propagate the collaborative concept. To give effect to the participatory goals of the policy, the forestry sector formally created a Collaborative Resource Management Department (CRMD).

Passage of the Forest and Wildlife Policy of 1994 led to some progress regarding stakeholder collaboration, but it did not solve the ownership issue regarding trees outside forest reserves and on farmland. Building on the 1994 Policy, the concept of community participation in forest resource management was deepened by the Forest and Wildlife Policy of 2012, which states (MFNR, 2012: 24):

> *Due to the strong interest and rights of local communities in forest resource management, the Forestry Commission has modified the focus of its management system to ensure greater consultation with stakeholders, especially local communities that are dependent on the forests and are willing to ensure its maintenance. Thus, the focus of forest management in Ghana is shifting from a government-led system to a community government collaborative management approach.*

According to Asare (2000), collaborative forest management can be practised at two levels: involvement of communities in decision making, and in the execution of forest operations. Collaboration in decision making ranges from the highest levels of policy and legislation formulation through forest systems development and projects formulation, down to the level of

forest reserve management planning. Over the years, there have been a number of programmes and/or initiatives by the CRMD of the Resource Management Support Centre (RMSC) to ensure community participation in forest resources management. These include plantation development, Modified Taungya system (MTS), industrial (commercial) plantations, and the community forest management project (Agyeman et al., 2010).

The forest sector's potential to contribute to sustainable forest resource management and poverty reduction for socio-economic development faces challenges related to forest ownership, resource tenure, and the lack of effective participation from resource owners and local communities in decision making. This lack of participation is due to inadequate incentive structures to ensure sustainable forest management. The Conservation Education and Public Awareness (CEPA) unit, with its roots in the 1994 Forest and Wildlife Policy, was thus created in 2000 and seeks to involve communities in natural resource management. The CEPA unit exists at all levels, from the national to regional to reserve level. The Forestry Commission has realized that strict law enforcement alone cannot solve the problem of forest resource degradation in the conservation areas.

Conceptual framework

Arnstein's (1969) seminal work, 'A ladder of citizen participation', has often served as a useful reference point in community participation. Arnstein recognized that there are different levels of citizen's participation, ranging from manipulation or therapy of citizens—where participation is a sham—through consultation, to citizen control (regarded as genuine participation). The ladder of participation identifies eight levels of citizen participation (Figure 1).

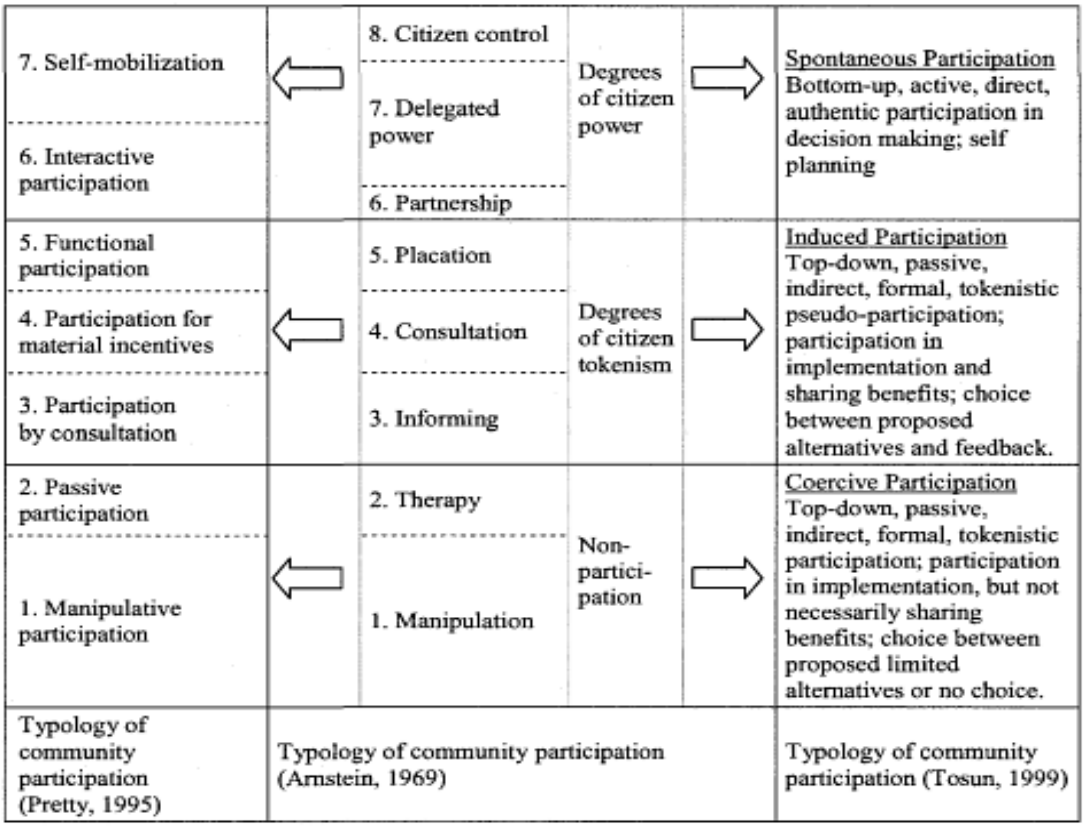

Figure 1: Normative typology of community participation

Source: Based on Arnstein (1969).

According to this framework, communities' participation is the redistribution of power that enables have-not communities to be deliberately included in the developmental decision-making process. It is the 'means by which they can induce significant social reform, which enables them to share in the benefits of the affluent society' (Arnstein, 1969: 23). In this definition of participation, the most important point is the degree of power distribution. The framework has conceptualized the degree of participation in terms of a ladder or typology of community participation comprising eight levels, which are classified into three categories relative to the authenticity of community participation. While the lowest category represents non-participation, the highest category refers to degrees of community power, and the middle category indicates degrees of community tokenism. Some of the criticisms levelled against Arnstein's typology are that it was developed in the context of developmental studies in general and not related to a particular sector of an economy

(Tosun, 2002); it does not specifically deal with forest resource management (Leksakundilok, 2004); and it provides misleading results within a developing country context (Choguill, 1996).

Tosun & Timothy (2003) present a normative model of the argument for participatory tourism development. This normative model of community participation in the tourism development process has been built on a set of seven propositions: (i) the relationships between the participatory tourism development approach and the implementation of tourism plans; (ii) achieving sustainable tourism development; (iii) increasing tourist satisfaction; (iv) preparing better tourism development by tourism professionals; (v) distributing costs and benefits fairly among stakeholders, (vi) satisfying locally felt needs; and (vii) strengthening the democratization process in local tourist destinations.

According to this model, community participation stimulates the formulation of implementable policies, the assumption being that if community members believe they have a say in a fair and open process of policy and plan development, they may be willing to accept the outcome of that process (Buck, 1984; Timothy, 1999). As Timothy (1999) and Tosun (2000) contend, with special reference to developing countries, most tourism development plans have been prepared by central authorities, who may not be aware of the conditions under which the plans will be implemented at local levels by their regional or/and local extensions. Thus, planning and developing with local authorities and communities rather than for them may help central bodies know what local resources are available for tourism development. Community participation in the planning process and plan implementation is important due to the fact that forest resource management takes place in existing and well-established socio-cultural, political, economic, and administrative environments.

Community participation contributes to sustainable tourism development in several ways (Tosun & Timothy, 2003). It is commonly noted that the more that communities benefit from resource conservation, the more likely they will be to protect the forest (McIntyre et al., 1993; Timothy, 1999). According to Pearce (1994), community involvement represents a technique for limiting negative social impacts; that is to say, a reasonable degree of consensus, which may be reached through public participation, is requisite for sustainable tourism development.

Community participation contributes to a fair distribution of costs and benefits among community members (Tosun & Timothy, 2003). Forest resource conservation generates social, cultural,

economic, and environmental costs and benefits. However, these have not been distributed fairly among stakeholders because of the disconnection between local people, tourism, and power structures among interest groups. Eadington and Smith (1992), for instance, argued that the current style of resource management has already created 'winners' and 'losers' among local people. Furthermore, many of the 'winners' in fringe communities are outsiders who may be viewed as exploiters of the native population and rapists of the land.

According to Tosun and Timothy (2003), some of the arguments made in favour of community participation in forest resource management may be thought to apply in some localities and others in other ones; but they are not in general mutually exclusive, and taken together they make a sensible argument. Furthermore, while the arguments for community participation are presented positively, it is also noted that the validity and practicality of these arguments may not be feasible in some developing countries or peripheral regions in advanced economies owing to the existence of various operational, structural, and cultural limitations.

Methodology

The Gbele Resource Reserve is the largest and most populous forest reserve in the Upper West Region of Ghana. The reserve (Figure 2) covers an area of 565 sq km and lies partly in the areas of Wa, Nadowli, and Tumu. It is about 61 km from Tumu and 89 km from Wa. The resource is a nature reserve. Its estimated terrain elevation above sea level is 253 m, and it is within latitude 10°34' east to 56°35' west and longitude 2°17' east to 16°44' west. The reserve has 23 active fringe communities across three administrative districts, comprising Sissala West, Sissala East, and Dafiama-Bussie-Issa districts of the Upper West Region.

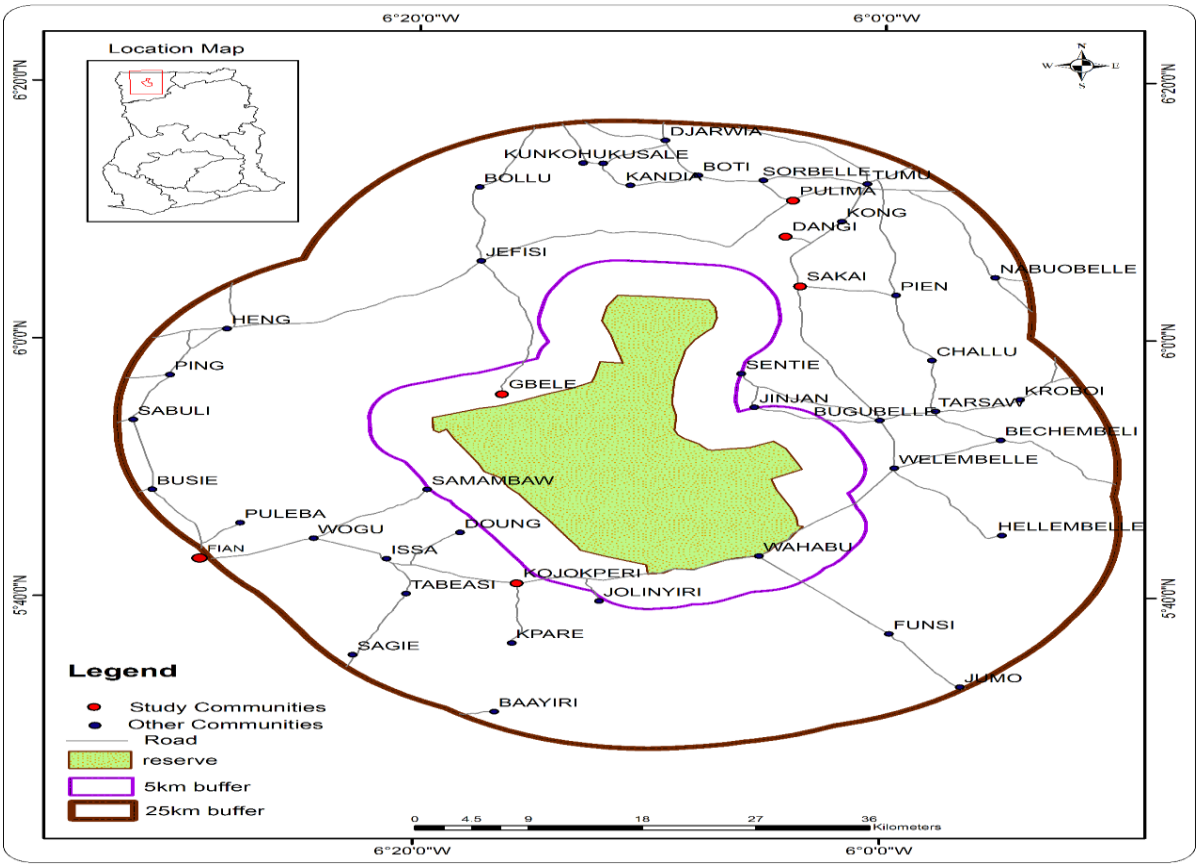

Figure 2: The Gbele Resource Reserve

Source: Forest Services Commission, Upper West Region (2014)

This study employed a descriptive and interpretive case study design. A case study design is an investigative tool that is commonly used in studying social phenomena (Babbie & Mouton, 2004). It permits an in-depth investigation of individuals, groups, or events which may be descriptive or explanatory. The mixed method approach was used to collect data for the study. The mixed method research is the process and procedures for collecting, analysing, and inferring both qualitative and quantitative data in a single study or in sequential studies based on priority and sequence of information. Questionnaires were used to collect quantitative data for the quantitative study. The qualitative methods that were used included observations, key informant interviews, and focus group discussions.

Local residents in the 23 fringe communities hosting the reserve, officials of the Forest and Wildlife Division, District Assemblies Representatives (Assemblymen), Reserve Guards, Chiefs,

and members of Community Resources Management Committees (CORMACs) constituted the target population for the study. A multiple-sampling technique was employed in the selection of respondents. In the first stage, one community each was selected from each of the three surrounding districts through a simple random sampling method. The three communities selected were Kojokpere, Pulima, and Dangi in the Daffiama-Bussie-Issa, Sissala West, and Sissala East Districts, respectively. In addition to the three randomly selected communities, Fian, Gbele, and Sakai in the Daffiama-Bussie-Issa, Sissala West, and Sissala East Districts, respectively, were purposefully selected owing to their closeness to the forest reserve. Whereas Gbele is located inside the reserve and has greater influence on it, Sakai and Fian are communities where the Forestry Guards stay and, as a result, residents of those communities have more information about the reserve. Thus, a total of six communities were selected for the study.

The population of residents above 15 years in all the selected communities (N=1,435 people) was obtained from the regional of office of the Ghana Statistical Service in Wa and used for the study. The formula below (Saunders et al., 2007) was used for the sample size determination with a confidence level of 95% (i.e. e=0.05). This yielded a total sample of 313 people.

$$n = \frac{N}{1+Ne^2} \quad \text{..... (1)}$$

Where n=Sample Size

e=Margin of error (which is **0.05** with confidence level of **95%)**

N=Population **(1,435**)

The sample size, so determined, was proportionally distributed across the six communities based on their population. Table 1 shows the sampling frame. Within the selected communities, houses were systematically sampled, and a respondent each was randomly chosen for questionnaire administration. The questionnaires covered various socio-demographic and economic characteristics of respondents, as well as their knowledge of communities' involvement in the management of the reserve. Of the 313 questionnaires that were distributed, 240 questionnaires were duly completed and returned for analysis, a response rate of about 77%.

Table 1: Sample frame

Community	Total population (15+ years)	Sample share
Fian	251	54
Kojokpere	319	70
Gbele	148	32
Pulima	250	56
Sakai	318	69
Dangi	149	32
Total	**1,435**	**313**

Purposive sampling was used to select those sample units that are directly in authority in managing the Gbele Reserve, such as the Forest and Wildlife Division Manager, District Assemblies Representatives (Assemblymen), Reserve Guards, and Chiefs. These categories of respondents formed the key informants for the study. In all, 12 key informants, involving Assemblymen (4), Chiefs (5), Reserve Guards (2) and a Park Manager of the Forest and Wildlife Division, were interviewed using key interview guides. Focus group discussions were also held with CORMACs in each community.

The information obtained in quantitative form was transformed into descriptive statistics involving frequency counts, means, and percentages, supported by chi-square test of significance, for purposes of analyses and interpretation. Qualitative information was analysed manually using content analysis. Content analysis refers to 'a variety of techniques for making inferences by objectively and systematically identifying specified characteristics of messages' (Holsti, 1969: 14). Topic coding was used to group the texts into various categories in accordance with the sub-themes of this study. The categories identified pertained to communities' roles in the management of the reserve in terms of collaboration, partnership, and benefits sharing.

Theoretical model and specification of variables

The mixed logit model (Hensher & Greene, 2002) was used for this study. This model is considered to be the most promising state-of-the-art discrete choice model currently available. Theoretically, the logit model is specified as:

$Y_i = X_i\beta + \mu_i$ ..... (1)

Where:

Y = a dummy variable, such that Y=1 if respondent plays a role in the management of the reserve, and Y=0 if otherwise.

X_i is a vector of socio-economic/policy variables.

Also, Prob $(Y=1|x) = f(x,\beta)$..... (2)

Prob $(Y=0|x) = 1 - f(x,\beta)$..... (3)

Where, x is a vector of variables influencing role playing.

According to Hensher and Green (ibid.), we can therefore adopt a suitable function for the right-hand side of equations (2 and 3) above such that $f(x, \beta) = x^1\beta$. Since $E(Y|x) = f(x,\beta)$, we can construct the regression model as:

$Y = E(Y|x) + [Y- E(Y|x)] = x^1\beta + \varepsilon$..... (4)

The estimation of such a linear model cannot be assured that the predictions from this model will truly look like probabilities. Thus we cannot construct $x^1\beta$ to the (0-1) interval. The requirement then is a model that will produce predictions consistent with equations 3 and 4. For a given regression vector, we could expect:

limProb $(Y = 1|x) = 1$ …….. (5)

$x^1\beta \rightarrow +\infty$

limProb $(Y = 1|x) = 0$ ……..(6)

$x^1\beta \rightarrow -\infty$

From the above, the logistic regression model is given as:

$$\text{Prob}(Y=1|x) = \frac{e^{x1\beta}}{1+e^{x1\beta}} = \Phi(x^1\beta) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

Where, Φ is the logistic cumulative distribution.

$$\begin{aligned} Participation &= \beta_0 + \beta_1 Age + \beta_2 Sex + \beta_3 Household\ size + \beta_4 household\ position \\ &+ \beta_5 Education + \beta_6 Occupation + \beta_7 Group + \beta_8 Residential\ status \\ &+ \beta_9 Community\ role + \beta_{10} Local\ taboo + \beta_{11} Ownership\ of\ reserve \\ &+ \beta_{12} Economic\ + \beta_{13} Environmental + \beta_{14} Managerial\ benefit + e \end{aligned}$$

The outcome variable for the study was playing a specific role in the management of the reserve. This was entered as a dummy variable indicating 'Yes' or 'No' and coded 1 and 0, respectively. The predictor variables are shown in Table 2.

Table 2: Definitions of variables

Variable	Definition/measurement	Expected outcome
Age	The total number of years from birth of a respondent	Positive
Education	The highest educational level attained by a respondent	Positive
Position in household	This is if a respondent is a household head	Positive
Household size	Total number of people in a household	Negative
Indigene	This is if a respondent is a native of the community	Positive
Occupation	The type of economic activity engaged in by a respondent	Negative
Group membership	This is if a respondent is a CORMAC* member or not	Positive
Local taboos	That is if a respondent indicates the presence of a taboo	Positive
Ownership of reserve	If a respondent indicates that the reserve belonged to the community	Positive
Economic benefits	If there are economic gains from the reserve	Positive
Environmental benefits	If there are environmental gains from the reserve	Positive
Managerial benefits	If there are benefits for participation in the management of the reserve	Positive

* CORMAC = Community Resources Management Committee

Results and discussion

Socio-demographic characteristics of respondents

From the data (as shown in Table 3), the majority (82.1%) of the respondents were males. Although the selection was random, this result may not mean that there are more males than females in the study area; rather, it is an important finding since the males are usually those involved in the management of the reserve and, therefore, capable of providing relevant information for the study. Also, in northern Ghana, females are traditionally less responsible for household and community decisions. The average age of respondents is 39.9 years, which is far above the region's mean age of 24 years (GSS, 2012). From the results, the majority (72.1%) of the respondents were married, 26.6% were single, and 1.3% of them were widows or widowers. The importance of the majority of the respondents being married is that they would be able to share responsibilities in terms of both household decisions and the management of the reserve. Like most communities in the Upper West Region, Muslims constitute the largest number of people in the Gbele Resource Reserve area. In this study, 80% of the respondents were Muslims, 15.8% were Christians, and 4.2% were Traditionalist. An important characteristic of all the religious groups in Ghana is that none of them is against the preservation of natural resources. Therefore, policies towards the conservation of the Gbele Resource Reserve can also be channelled through the activities of the various religious groupings.

Table 3: Respondents' characteristics (%)

Characteristic	*%*	*Characteristic*	*%*
Sex		*Position in household*	
Male	*82.1*	*Head*	*49.6*
Female	*17.9*	*Member*	*50.1*
Age		*Level of education*	
15 – 30	*37.9*	*No formal education*	*51.7*
31 – 40	*27.9*	*Primary school*	*13.3*
41 – 50	*14.6*	*JHS / Middle school*	*11.7*
51 – 60	*5.0*	*SHS / SSS*	*15.7*
61+	*14.6*	*Tertiary education*	*7.9*
Mean = 39.9; Min = 18; Max = 130			
Marital status		*Religious affiliation*	
Never married	*26.6*	*Christianity*	*15.8*
Married	*72.1*	*Islam*	*80.0*
Widow / Widower	*1.3*	*Traditionalist*	*4.2*
Household size		*Residential status*	
1 – 5	*13.8*	*Indigene*	*91.2*
6 – 10	*42.9*	*Migrant*	*6.7*
11 – 15	*11.6*	*Settler*	*2.1*
16 – 20	*4.6*		
21 – 25	*2.1*		
25 – 30	*5.0*		
Mean = 39.9; Min = 18; Max = 130			

The position of the individual in the household is very important in resource management. This is because household resources are held in trust for the household by the household head. From Table 3, there was less difference in the percentage distribution among the household heads and the household members. While the latter was 49.4%, the former was 50.6%—a difference of 0.8%. Table 3 indicates that the largest percentage (37.9%) of the respondents has ages between 15 and 30 years. The implication is that the respondents are youthful, which is very important for the sustainability of the management of the reserve. In terms of educational levels of the respondents, only 7.9% were schooled up to the tertiary level, while 51.7% had no formal education and the rest had basic and secondary education. Education is essential in human capital development and the appreciation of the need for environmental conservation. The introduction of new policies for the management of the reserve requires that both the community members and the management of the reserve have common ground, and this requires some level of formal education. Therefore, the

relatively high number of people with formal education, especially tertiary education, should help to ensure that the Gbele Reserve is properly managed and reserved for future generations. Also (as shown in Table 3), the majority (42.9%) of the respondents had a household size of 6–10 members, followed by 33.8% with household sizes of 1–5 members. A household size of 21–25 recorded the lowest percentage, 2.1%. The study revealed that 91.2% of the respondents were indigenes of the various communities, 6.7% were migrants who came to settle for farming, and 2.1% were settlers in the communities for several years who have no intention of going back to their home communities (Table 3). The respondents, being indigenes, also have good knowledge of the activities and management issues of the reserve. The majority of the respondents (84.6%) have food crop farming as their main occupation, 4.9% have hunting, and charcoal business and formal employment in the public sector account for 4.3% each.

Communities' awareness and compliance with Gbele Reserve's laws and policies

Like other protected areas in Ghana (see Mensah & Amoah, 2013; Husseini et al., 2015), there are well-established laws and policies governing the operations and management of the Gbele Resource Reserve. These laws and policies are designed to protect the entire reserve and everything that is found in it. Fringe communities' awareness and respect for these laws and policies help to minimize illegal activities that tend to adversely affect the reserve. A high number (94.6%) of the respondents noted that they are aware of the laws and policies governing the operations and management of the Gbele Resource Reserve. To these respondents, their major source of information on the laws and policies is through community sensitization or forums organized by the Wildlife Division of the Forest Services Commission. Also, 11% of the respondents got to know of the laws and policies of the reserve through sensitization by CORMAC members. In addition, 7.5% of the respondents heard of the laws and policies on local radio stations, and 1.8% heard of them through reading from books, Internet, and signposts. Only 2.6% of the respondents got to know of the existence of forestry laws and policies through the chiefs and elders of their communities. This means that the community elders have to step up education of their community members on the Gbele Reserve.

Specifically, the major law known by the local people is 'no felling of trees'. About 28% of the respondents know this law because they are prevented from cutting trees in the reserve for firewood, charcoal production, or other purposes. This is a way of ensuring that the trees are not destroyed, which will affect habitation of the animals in the reserve. A respondent in Sakai noted:

> *We have been told to plant trees around our houses for use in order to avoid cutting trees from the forest reserve.*

The second most known policy is 'no hunting' in the reserve (27.8%). In the view of these respondents, it is strictly out of bounds to enter into the reserve to kill any animal. A related law is the 'no entering of the reserve without permission'. To prevent people from entering the reserve to hunt, the Wildlife Division encourages fringe communities to rear domestic animals. This is the reason 4.4% of the respondents considered that rearing animals at home is a law guiding the reserve. Thus, 6.2% of the respondents mentioned that no one, except the forest guards, is allowed to enter the reserve area without permission from the guards. Culprits in these cases are severely punished. Indiscriminate bush burning is one of the major environmental problems in northern Ghana, where people deliberately set fires to burn the bush. In this study, 15.8% of the respondents mentioned that no one, irrespective of political, social, or household status, is allowed to set a fire in the reserve. Farming is the major occupation of fringe communities; therefore, land acquisition is a major priority of these people. However, 7.3% of the respondents mentioned that it is a law not to farm in the reserve area.

Knowledge of the existence of the laws and policies does not really matter for the preservation of the forest reserve. The most important thing is compliance with the laws and policies by fringe communities. The results of this study indicate that 91% of the respondents comply with all the laws and policies governing the Gbele Resource Reserve. This high level of compliance seems to correlate well with the 94.6% of the respondents who are aware of the laws and policies. This finding confirms the study by Thanh et al. (2004), which revealed a significant correlation between the extent of people's participation in co-management activities and the awareness level of some forest policies. However, in spite of this high level of self-reported compliance with laws and policies, this study revealed that the bio-diversity of the Gbele Resource Reserve has declined over the past ten years. Admittedly, 52.9% of the respondents hold the opinion that the Gbele Resource Reserve is declining, while 47.1% said the reserve is improving. Surprisingly, 9% of the respondents indicated that they do not comply with the laws and policies of the Gbele Resource

Reserve. Those who indicated non-compliance claimed that they are either not aware of the laws and policies or see no importance of the reserve to them. Others mentioned that their livelihood depends on farming; therefore, they need more farm lands for farming activities, and this compels them to farm in the reserve. In addition, they also indicated that the animals in the reserve destroy their farms, which leads them to kill the animals.

Role of communities in the management of the Gbele Reserve

Applying Arnstein's (1969) 'ladder of citizen participation' and Tosun and Timothy's (2003) model, this study assessed fringe communities' contribution to management of the Gbele Resource Reserve in the areas of planning/decision making, implementation, monitoring, and benefit sharing. The study sought the respondents' views on their involvement in each of these areas. The results (as shown in Figure 3) show that for a large number of the respondents, the communities' involvement in management of the reserve is low in all aspects. Participation in monitoring and implementation are better than planning, with no participation in benefit sharing at all. Monitoring and implementation recorded 73% and 52% involvement, respectively, by the communities (Figure 3). The results are consistent with many studies, including those of Kotey et al. (1998), Amanor (1999), Ganz et al. (2003), Borrini-Feryerabend et al. (2004), Eshun (2008), and Mensah and Amoah (2013). They all reported that forest resources management is characterized by extensive state forest agencies' involvement with little recognition of the potential of forest-dependent fringe communities for achieving positive, long-term sustainable forest management. The results are also in agreement with those of the study by Mensah and Adofo (2013), which showed that there is a low level of community involvement in the Brobi Forest Reserve and Butterfly Sanctuary ecotourism project in the Ashanti Region of Ghana.

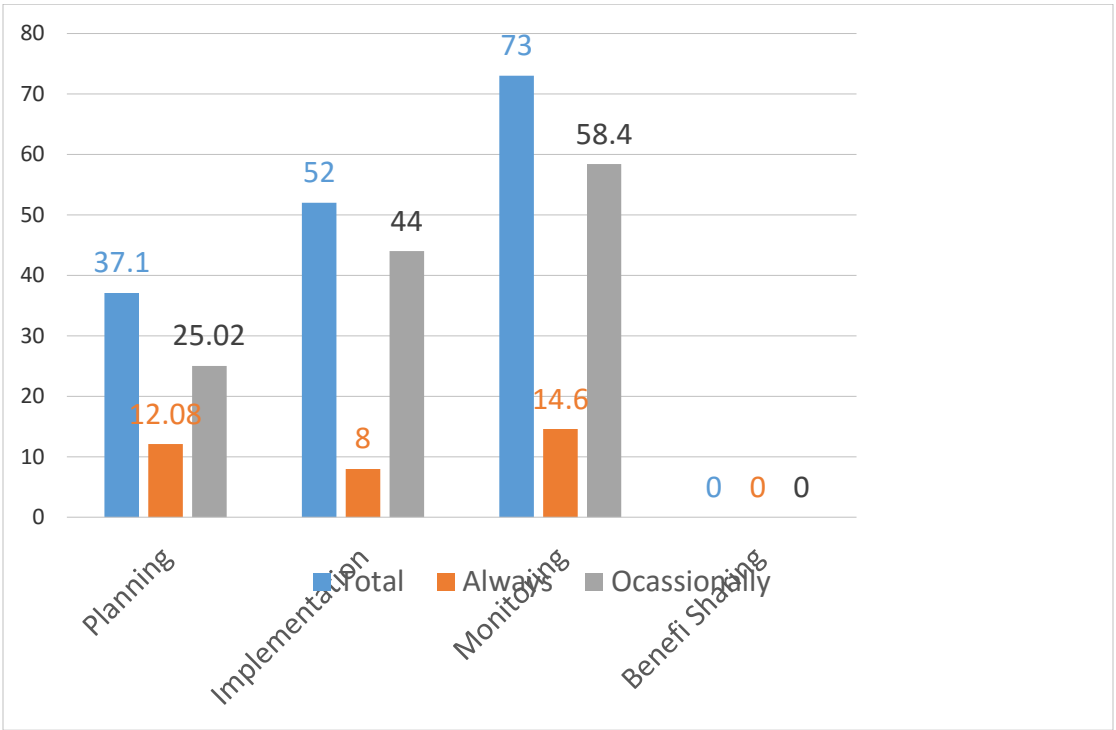

Figure 3: Areas of community participation (%)

The predominant opinion of respondents is that they are not deeply involved in planning the management of the Gbele Resource Reserve. Communities' involvement in planning is mainly limited to participating in meetings at the community level to decide on implementation strategies in areas where they are involved and, as in most cases, to listen to decisions taken by the authorities in charge of the reserve. The key informant interviews confirmed respondents' opinion of their low involvement in the decision-making/planning process of the Gbele Resource Reserve management. In an interview, the park's manager stated:

> *This is a central government managed reserve, so we don't involve communities in planning. We plan and inform communities.*

The outcome of focus group discussions also indicated that the planning process involves only community committee members. In other words, meetings are not opened to all who may wish to participate but limited to members of CORMACs, which are made up of the local chief and opinion leaders, including Assembly Members.

The revelations of low community participation in planning in this study confirmed the fact that forest decision-making processes in Ghana for the management of forest reserves are still a case of the top-down approach, whereby the authorities over the reserves initiate managerial and

technical decisions for implementation by local Forestry Guards, with little or no involvement of forest fringe communities (Adams, 2010). Asare (2000) also argued in the same way that local communities are involved only in monitoring of forestry reserves but not in the decision-making process. This clearly implies that the authorities in charge of forest reserves do not see the important potential contribution of fringe communities to the planning process. All activities in the reserve need proper planning. It is this phase of the management process that determines the direction and specific measures that need to be implemented. Communities' participation at this stage is crucial, since it will allow them to get more involved in the conservation of the reserve (Tosun & Timothy, 2003). Engaging fringe communities in the decision-making process makes the planning process more effective, equitable, and legitimate—since those who participate are representatives of the whole community—and therefore ensures that the collective interests of all stakeholders are satisfied (Buanes et al., 2005). The non-inclusion of community members at this stage makes them feel neglected and less willing to participate fully in the other processes.

Communities play a number of roles during the implementation process, including the creation of fire belts or weeding around the reserve boundaries to prevent occasional bush burning from gutting the reserve, and planting of trees. These roles involve a large number of community members because there is a project sponsored by the World Bank called 'Work for Food', where local people, who are involved in clearing boundaries, are given rice and oil to take home. This intervention has the objective of encouraging local residents to get involved positively in the activities of the reserve. Conserving the reserve means that there should be cautious efforts to plant more seedlings to replace old trees. At the same time, apart from clearing the reserve boundaries to prevent forest fires, the direct control of fire if it occurs is very important. Furthermore, planting seedlings is not sufficient on its own; it is also necessary to ensure their growth. However, respondents indicated that they are not involved in the nurturing (e.g. watering) of the seedlings they plant. The diverse roles played by communities in implementation activities are essential for sustainable management of the reserve (Tosun & Timothy, 2003). Findings from similar studies corroborate these findings, whereby communities have been involved in similar forest resources implementation activities. For instance, studies conducted on collaborative management in Ghana by Asare (2000), Wily (2002), Amanor (2003), and Adams (2010) reported that under the collaborative system approach, state forestry agencies have involved local people in

implementation roles such as boundary clearing, seedling planting, and establishment of firebreaks.

This study confirms Amanor's (2003) finding that primary stakeholders, such as communities, performed monitoring roles in forest reserves and served primarily to assist in the protection of forest resources. Fringe communities in the Gbele Resource Reserve play various monitoring roles, including reinforcing surveillance to guard the reserve against activities such as illegal logging, hunting, or setting of fires; ensuring compliance with laws and policies (including local taboos); inspecting projects being undertaken in the reserve; and serving as forest fire volunteers. Even though communities play these roles to ensure sustaining of the reserve, they do not possess power of arrest or prosecution of people who may be involved in illegal activities in the reserve. According to one chief:

> *I have no power or authority vested in me as a chief to prevent people from hunting or cutting trees in the forest. I can only advise and plead with my people not to enter the forest to hunt or cut trees.*

Benefits derived from reserves serve as a driving force for communities' interest in taking part fully in the activities of the reserves. Naturally, people will participate in any activity if they deem it beneficial to themselves. Most rural forestry projects, including wildlife reserves, have failed because local people encroach or carry out illegal activities in the forests due to lack of benefits or economic incentives for communities to participate in sustainable management (Richards et al., 2003). In this study, respondents were asked how regularly they participate in the benefit-sharing process of the Gbele Resource Reserve. All the respondents (100%) were never involved in any benefit sharing of the reserve. In the view of one of the chiefs:

> *I have no idea how benefits from the reserve are shared or the criteria used in sharing those benefits.*

This view was corroborated by the park manager, who said:

> *We have never shared any benefit with the communities. All the monies collected from tourists go to government.*

According to the park manager, the only incentive for the communities is during implementation, when they are rewarded with food items for working at the reserve. The management of the reserve has assisted fringe communities to form CORMACs as a way of involving them and also for the

committees to work towards the formation of Community Resource Management Areas (CREMAs) in the future. None of the CORMACs have grown to a CREMA. According to the park manager:

> *It is only at CREMA level that any benefits derived from the area will be fully controlled and utilized by the communities involved.*

The overall involvement of communities in the management of the Gbele Resource Reserve revealed in this study is in tandem with the work of the Ghana Forest Investment Programme (MLNR, 2012), which revealed that the establishment of forest reserves has not ensured a flow of benefits to forest fringe communities, as demonstrated by an analysis of the benefits accruing to timber operators, landowners, and communities. Thus, community participation in the management of the Gbele Resource Reserve can be equated to the level of non-participation in Arnstein's (1969) 'ladder of citizen participation'.

As Tosun & Timothy (2003) clearly pointed out, fringe communities in the Gbele Resource Reserve are constrained in the performance of their planning, implementation, and monitoring roles. Lack of transportation emerged as the major constraint affecting the performance of their roles. According to focus group discussants, moving from their homes to the reserve area, where many of the activities are undertaken, is difficult especially for those without motorbikes. Lack of equipment and logistics for carrying out operations was also a major constraint mentioned by the respondents. A respondent, who is also a fire volunteer, reported:

> *There is no equipment for either preventing the occurrence of the fire or, even if they occur, there is only little equipment for the fire-fighting. We also don't have funds to undertake fire-fighting activities. This makes it difficult for us to perform such activities, which require the use of money.*

Generally, in developing countries, according to Baral et al. *(*2008), conservation funds are extremely scarce and come primarily from one (usually government) source. As a result, underfunding hinders conservation or development objectives and activities (Larsen, 2006). Lack of funds, according to Dixon and Sherman (1990), will likely lead to unsustainability in the long-term management of conservation lands and forests.

In most instances, lack of motivation prevents people from performing effectively, and this is also plausible in the management of the Gbele Reserve. The respondents were specific on the motivational packages and noted that their roles were not adequately compensated for. In addition,

it is important to note that there are often no immediate and direct economic gains for participating in reserve management. As such, sharing time between peoples' daily livelihood activities and the reserve management processes is limited. In other words, there is limited time for communities to play their expected roles effectively at all times.

Determinants of community participation in the management of the Gbele Reserve

A set of specific characteristics or factors determines individual's participation in the management of the Gbele Resource Reserve. From Table 4, it can be observed that no respondent strongly disagreed with any of the factors as being a determinant of participation. The mean values of the specific factors were also estimated: the higher the mean, the higher the disagreement; and the lower the mean, the higher the agreement. In other words, mean values not less than 2 are considered as being in the domain of agreement, while those greater than 3 are in the domain of disagreement; those between 2 and 3 are considered as undecided. From the results, the respondents agreed on communal status, presence of taboos, law and order, community recognition, and recognizing the importance of the reserve. Thus, community members with high status, such as chiefs and opinion leaders, are the community members who are aware of the presence of local taboos governing the reserve. The community members who recognize the presence of the reserve as important and useful to them and future generations participated in the management of the reserve. On the other hand, the respondents were undecided on the determining role of being highly educated, being a household head, communal land tenure system, rotational farming system, availability of farm land other than in the reserve area, being a member of a local group, engaging in farming and other related economic activities, and fencing the area. Thus, in their view, these factors may or may not have any specific directional effect on communities' participation. Furthermore, the respondents disagreed that being a male would influence participation in the reserve's management.

Table 4: Views on factors determining effective community participation

Factor	Response				
	SA	A	U	D	Mean
Gender; being a male	20.4	13.3	2.5	63.8	3.10
Education; being highly educated	53.8	5.0	6.7	34.6	2.22
Household status; being a head	45.0	26.3	6.3	22.5	2.06
Communal status; higher status. e.g. being a chief	65.4	8.8	3.8	22.1	1.83
Land tenure system; practising communal land system	27.1	31.3	13.8	27.9	2.43
Farming system	25.0	19.2	9.6	46.3	2.77
Availability of farm land other than in the reserve area	40.4	36.3	5.0	18.3	2.01
Group membership; being a member a community group	49.2	17.9	12.5	20.4	2.04
Economic activity, especially farming	46.3	22.5	10.8	20.4	2.05
Presence of taboos	71.3	18.8	5.8	4.2	1.43
Law and order	79.6	14.6	3.8	2.1	1.28
Community recognition; giving the opportunity to the community to manage the reserve	55.8	35.0	4.6	4.6	1.58
Recognizing the importance of the reserve	60.0	28.8	8.3	2.9	1.54
Fencing the reserve area	50.8	7.1	25.0	17.1	2.08

Note: SA=strongly agree, A=agree, U=undecided, D=disagree

Table 5 shows the logit model estimation of the determinants of community participation in the Gbele Resource Management. From the results, gender, occupation, community role, local taboos, perceived ownership of the reserve, perception of economic and environmental benefits, and playing a managerial role significantly influence community participation and performance of special roles in the reserve management.

Table 5: Logit estimation of the determinants community participation

Variable	Marginal effect	Std. error	Z-Value	P-Value	Coefficient
Age	-0.001	0.003	-0.41	0.684	-0.006
Gender	0.400*	0.097	4.12	0.000	1.934
Household size	0.003	0.007	0.44	0.659	0.015
Household position	0.025	0.094	0.26	0.795	0.126
Education	0.002	0.007	0.29	0.769	0.010
Occupation	0.363*	0.048	7.64	0.000	3.744
Group size	-0.002	0.005	-0.46	0.643	-0.011
Residential status	0.008	0.161	0.05	0.962	0.039
Community role	0.319*	0.079	4.03	0.000	1.693
Local taboo	0.333*	0.085	3.94	0.000	-1.893
Ownership of reserve	0.125*	0.074	1.68	0.093	0.635
Economic importance	-0.343*	0.090	-3.79	0.000	-1.729
Environmental importance	-0.676*	0.095	-7.11	0.000	-3.393
Managerial benefit	0.185*	0.103	1.79	0.073	0.880

*significance at 5% level

Contrary to the views expressed by respondents in the study, the logit model estimation suggests that gender has an effect on participation in the reserve's management. That is, community members that are males are found to have a higher probability of participating in the management of the reserve than their female counterparts. The estimated marginal effect is 0.400, meaning males have 40% more chance of participating in the reserve than females. This is because males in the fringe communities are usually more involved in decision-making processes than females. The females are mostly neglected, especially in matters that involve the larger community. Activities that are performed by the community members, such as weeding around the reserve boundaries and preventing or controlling bush fires, are too tedious for females and hence their low participation. An Assemblyman noted:

> *It is only men who are in charge of the reserve, but it is just recently that some women are introduced to participate in the reserve management.*

On his part, a chief reported:

> *Women see the reserve as a wicked act since they are not allowed to enter to fetch firewood.*

In their studies, Lise (2000) and Phiri (2009) found that being a male was positively and significantly associated with the extent of community participation. Contrarily, Maskey et al. (2003) reported that women participate more than men across the different levels of participation

because of advocacy by many institutions on the importance of women's participation. In the view also of Scheyvens (2007) and Li (2005), since forest conservation and, for that matter, ecotourism take place in the community, they are thought to be one of the best-placed sources of employment opportunities for local communities, including women and the informal sector.

The positive significance of occupation means that community members who are engaged in farming have a higher probability of participating in the management of the reserve. The estimated marginal effect is 0.363, meaning that farmers have 36% more chance of participation than those engaged in other occupations. This is contrary to the expectation of the research, since farmers should be more reluctant to ensure that the reserve is conserved—because it takes farm lands from them. In other words, farmers should be interested in taking the reserve land for farming activities since these areas are more fertile. Perhaps, in this study, farmers have more flexible working hours than those engaged in other occupations, and hence their high probability of participation in the reserve management.

Community role and expectation of managerial benefits were also positive and significant, with marginal effects of 0.319 and 0.185, respectively. Thus, those who perceive that the community's role in the management of the reserve would have a positive impact on the reserve conservation have a 32% higher probability of participating in the reserve's management. Similarly, those who expect to benefit from performing managerial roles in the reserve have a 19% greater chance of participating than those who do not expect to benefit. These outcomes met the a priori expectation of the research, since this group of people would have a high desire to benefit from the reserve. Like any other person, community members perform several roles in the reserve management for some rewards, be they economic, social, cultural, or environmental.

It is not surprising that the result on local taboo is positive and significant, scoring a marginal effect of 0.333. This estimated marginal effect of the variable means that community members that are aware of the presence of local taboos have a 33% probability of participating in the management of the reserve. This corroborates the respondents' general view (Table 4) that the presence of taboos influences their participation in the reserve's management. Taboos are binding forces in most rural communities, especially in northern Ghana. They tell people what to do and

what not to do. In principle, these taboos are more known to the community members than the rights, responsibilities, rules, and regulations that are legally backed by the laws of the country.

Ownership of the reserve measured the respondents' opinions on who owns the reserve. Therefore, the estimated positive value and the significance of the variable (a marginal effect of 0.125) mean that community members who perceived that the reserve belongs to the community have a 13% greater chance of participating in the management of the reserve than those who perceived that it belongs to government and other people (such as foreigners). This is consistent with the research a priori expectation, since ownership is a major driving force in sustainability measurement. Every rational human being would ensure that his or her personal assets are well catered for to ensure that their future generations also have access to these resources.

Surprisingly, community members who perceived the reserve as having environmental and economic benefits have high marginal effects of -0.676 and -0.343, respectively. This may be partly attributed to the fact that communities do not participate in benefits sharing. At the same time, the reserve has deprived communities of major livelihood activities, including farming, hunting, and charcoal production. Therefore, although communities may be aware of the environmental and economic benefits of the reserve, their willingness to participate in its management will be negatively affected. On the contrary, Lise (2000) and Maskey et al. (2003) reported that the level of local community participation is determined by the benefits obtained from forests or high dependency on forests or on good forest quality. They argued that when people's dependency on forests is high, their interest in forests is likely to be greater, inducing participation in forest management and protection activities.

Conclusion

This study assessed the role of fringe communities in the management of the Gbele Resource Reserve in the Upper West Region of Ghana, using a mixed method approach. Unlike studies conducted in other parts of Ghana, this study has provided a comprehensive quantitative assessment of the factors determining participation in the management of the reserve. The findings indicate that communities are highly aware of the laws and policies regarding the management of the reserve. Although the findings suggest that communities' compliance with the laws and policies is high, it is not clear how this translates into sustainability of the reserve, as it continues

to decline in both quality and quantity. In terms of the management process, fringe communities are generally involved in implementation and monitoring, but with limited participation in planning. This form of participation can be placed at the level of non-participation on Arnstein's (1969) 'ladder of citizen participation'. Using the logit estimation model (Hensher & Greene, 2002), this study has identified six important factors—gender (being a male), occupation (being a farmer), community role, belief in local taboos, perceived ownership of the reserve by the community, and playing a managerial role—as being positively significant in determining participation in the reserve's management. However, perceptions of economic and environmental benefits emerged as being negatively significant in determining participation.

Two conclusions are clear here: first, communities are not involved in the sharing of direct economic benefits (in terms of revenue raised from tourists visits); and, second, communities have been deprived of their traditional livelihood activities, including farming, hunting, and charcoal production. In line with Tosun and Timothy's (2003) conclusion, these fringe communities are constrained in participating effectively in management activities by non-availability of transportation, lack of funds and logistics, lack of motivation, and limited time. The effort by the Wildlife Division of the Forest Services Commission to include fringe communities in the management of the reserve through the formation of CORMACs in all the fringe communities is commendable. However, the processes that would lead to their growth into CREMAs seem to have been stagnated by the identified constraints. The commission should devise innovative ways of ensuring the speeding up of the processes of CREMA formation so as to strengthen communities' participation in the reserve's management, particularly in the area of benefits sharing, as this is the surest way of ensuring sustainability of the reserve. Sustainability can also be assured by raising communities' awareness of the economic and environmental benefits of the reserve. Opportunities exist for achieving this objective by designing educational materials that can be propagated through CORMACs, local radio, and opinion leaders, including religious leaders.

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