



Approaches and Constraints for Community Participation in Wildlife Conservation: A Case Study of the Rungwa Game Reserve in the Manyoni District

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The study was tailored to assess the approaches and constraints for community participation in wildlife conservation in the Rungwa Game Reserve particularly in the Rungwa and Mwamagembe villages in the Manyoni District. Specifically, the study focused on the approaches used for community participation and constraints facing communities that participate in wildlife conservation. A sample size of 98 respondents was involved in the study. Data were collected using questionnaire surveys, key informant interviews, field observations, focus group discussions and document reviews. Data were analyzed with Statistical Product Service Solution (IBM-SPSS20). The results were produced in the form of tables, mean/averages, frequencies, plates/photographs, and figures. The communities' participation observations in wildlife conservation revealed that publicity and community based conservation were the main approaches used in the studied area. Local community argued that the Rungwa Game Reserves inadequately provided conservation education

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to adjacent villages. The failure of the game reserve to allow meaningful local participation lead to hatred, resentment, and illegal off take of natural resources from the game reserve, resulting in poor wildlife conservation.

Keywords: Wildlife; community participation; protected area; conservation approaches; conservation education.

1. INTRODUCTION

Protected areas worldwide are viewed as refuges for wildlife and other forms of biodiversity, most of which are currently threatened due to anthropogenic activities and other factors [1]. Law enforcement of protected areas often forms significant portions of the protected area management budgets [2]. Field managers, whether working for an agency or for a community, deal with concrete problems and responsibilities on a daily basis and directly enjoy the rewards that only wildlife and culture at their best are able to provide [3].

Wildlife conservation is aimed at preserving nature for the provision of spiritual, scientific, educational, recreational, and visitor opportunities, all of which must be environmentally and culturally compatible for the benefits of society [4,5]. Such protected areas vary greatly from strictly protected areas with no human settlement to areas that have resident communities where multiple uses of wildlife are permitted [6]. Over the years, the level of protection, distance from human settlements, and reserve boundaries all have been identified as important predictors of encroachment and hunting pressure in Africa [7,8]. These problems are pronounced in parts of Ethiopia, Mozambique, Tanzania, and Zambia protected areas [9,6]. Thus, illegal activities are a persistent, widespread problem and governments find it difficult to fund protected areas that are facing severe threats from poaching and encroachment [10].

Recently, there is a paradigm shift from exclusion to participatory approaches in wildlife management which necessitate involvement of people who live and work in and around protected areas in decision-making processes and is paramount for the long-term success of a protected area [11]. Excluding local communities from the protected areas, both in terms of access and decision-making involvement can have adverse effects on the effectiveness of the protected areas [12,13].

Several scientific researches have been conducted and recommended that local people must at least be involved in the decision making process and they should receive material benefits from the wildlife conservation [14]. Recently, the government of Tanzania has adopted a participatory approach to conservation as a result of persistent loss of wildlife species and the constraints of a “fences and fines” approach [15]. Therefore, this study aimed at assessing the approaches used and constraints facing community participation in wildlife conservation in game reserves in Tanzania in particular and indeed in other parts of Africa, selecting the Rungwa Game Reserve as a case study.

2. METHODS

2.1 Study Area

The study was conducted in the Rungwa Game Reserve focused in two studied villages, Rungwa and Mwamagembe in the Manyoni District in the Singida region. It is a unification of three game reserves namely: Rungwa, Kizigo, and Muhesi that were established at different times. Rungwa was gazetted in 1951, Kizigo (1972) and finally, Muhesi (1995) was added later to be part of Rungwa [16]. The total area of Rungwa Game Reserve located at the Central and Western part of Tanzania is 17,340 km² [17]. A large portion of the Rungwa/Kizigo/Muhesi Reserves falls in the Manyoni District whereas a small area is in the Chunya District in the Mbeya region. Adjacent Districts are Sikonge, Chamwino and Iringa [16]. Rungwa Game Reserve is part of the Rungwa-Ruaha Ecosystem that includes protected and unprotected areas (Fig. 1) with a total area of 50,886 km².

The ecosystem is known to have the largest population of African elephants in Tanzania with regard to a survey that was conducted in 2013. The number of elephants was estimated to amount to 20,090 individuals within the Ruaha-Rungwa ecosystem. It is considered to be the second largest wildlife area in Tanzania after the Selous-Mikumi ecosystem [18].

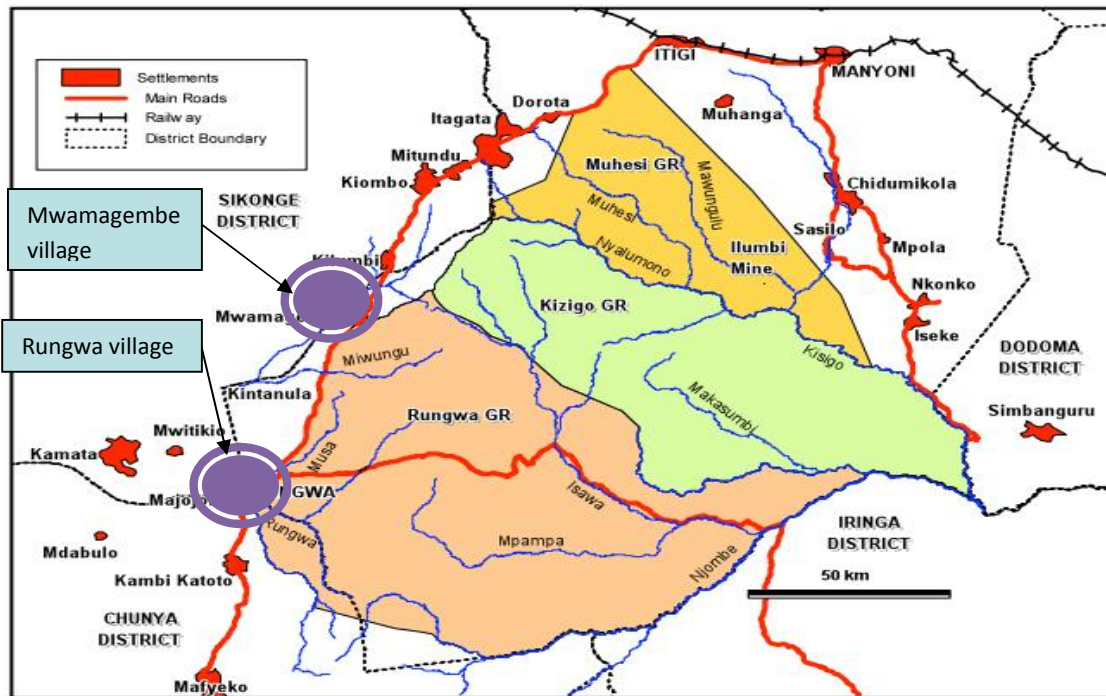


Fig. 1. Map of Ruaha-Rungwa Ecosystem showing the study area
(Source: URT, 2011)

The game reserve, which is popular for trophy hunting, is characterized by Miombo woodlands which offer the special habitats for a number of wildlife species among others including lions, leopards, buffalos, zebras, elephants, impalas, and more than 300 species of birds. On average, about 100 trophy hunters visit the reserve annually. Lions, leopards, and buffalos are the top earners (in terms of hunting fees), although buffalos and zebras are the most commonly hunted species.

The population of the Manyoni District according to Tanzania population census general report 2012 stands at 296,763 people while two villages, Rungwa and Mwamagembe have 2,209 and 6,462 people, respectively [19]. The villages were selected out of four villages based on their close proximity to the Rungwa Game Reserve, easily accessible places and representatives for adjacent villages to the Rungwa Game Reserve with a presence of diverse socio-economic activities.

The reserve is surrounded by a number of tribes including Kimbu, Nyamwezi, Sukuma, Gogo and the original Rungwa tribe from which the word Rungwa was derived. Agriculture, both livestock keeping and crop production, are the main

economic activities for adjacent communities [16]. Tobacco is a popular commercial crop grown in isolated complexes. Other crops grown mostly for subsistence include maize, beans, cassava, groundnuts, and sunflower. Bee keeping is a popular activity with honey and beeswax being an important source of household income. Livestock keeping is also practiced in the settled areas on a small scale [19]. Some villages around the Rungwa Game Reserve suffer from crop destruction, livestock attacks, injury and loss of human life caused by problem animals [16].

The reserve lies in three important watersheds drained by Rivers Rungwa, Ugalla and Ruaha flowing into three different basins, Lake Rukwa, Lake Tanganyika, and Rufiji basin respectively. The reserve falls in a predominantly semi-arid area characterized by generally low rainfall and experiences a long dry season from June to November and a single rainy season from November to April [19]. The amount of rainfall ranges from 500 mm to 700 mm and the mean annual temperature is 28°C [20]. During the wet season, the Rungwa Game Reserve receives adequate supplies of water from an extensive network of seasonal rivers, namely: Rungwa, Miyungu, Musa, Iyonga, Kizigo, and Nzombe.

Water scarcity is one of the major challenges faced by the reserve during the dry season.

2.2 Research Design

The field survey was carried out in February, 2017 in two villages namely Rungwa and Mwamagembe in the Manyoni District. The study used cross-section research design. Cross sectional research design is the most common method in social survey that allows data to be collected from different respondents at a single point in time [21]. In the study, both probability sampling and non-probability sampling were used in the sampling procedure. In probability sampling, each individual was chosen entirely by chance and each member of the population had an equal chance of being included in the sample. Under probability, simple random sampling was used to select respondents because it reduces biasness during sample selection. Non-probability sampling also was used. Under this technique, purposive sampling was used to select well informed people on wildlife conservation activities. That included management of the Rungwa game reserves responsible for anti-poaching, hunting, tourism, Community Based Conservation (CBC) activities, companies dealing with hunting and tourism, Ward Executive Officers (WEOs), and Village Executive Officers (VEOs).

The head of households in the two villages were the basic sample unit. Household sample sizes were calculated using the Yamane [22] formula. Yamane provides a simplified formula to calculate sample sizes [23].

The formula is expressed as:

$$n = N / (1 + N(e)^2)$$

Where:

n – Sample size estimate

N – Population size/ sampling frame

e – Error of prediction which will be 0.1 (90%)

The two villages have total number of households (N) of (3996). Using the above formula, the sample size became $3996 / (1 + 3996(0.1)^2) = 98$. The distribution of sample size to selected villages was based on their proportional number of households. As a result, 62 respondents were selected from Mwamagembe and 36 respondents from Rungwa villages.

2.3 Data Collection Methods (Techniques and Tools)

2.3.1 Questionnaire survey

Structured interview was done using a questionnaire as a tool and consisted of both open-ended and closed questions. The open-ended questions were intended to give respondents an opportunity to express their views on the subject. A total of 98 heads of selected sample households were asked the same question in the same order and in the same way. Household survey is one of the most appropriate research methods because it is generally representative of the community. It is designed to provide information of the whole community as a whole and generally represents a complete geographical area [24].

2.3.2 Key informant interview

Key informants were purposefully selected. These were people with long term experience in the area as well as expert knowledge which helped in counterchecking the credibility of data from other sources. For this study, Key Informant included the management of the Rungwa Game Reserve, specifically the heads of the departments for Anti – Poaching Unit, Community Based Conservation, and Tourists Hunting, together with Ward Executive Officers and Village Executive Officers from two villages, Rungwa and Mwamagembe.

2.3.3 Non-Participatory Observation

Under this method, information is sought by way of the investigator's own direct observation without asking the respondent [25]. The community participation in wildlife conservation was assessed. Special attention was on the observation of the effects of community participation in wildlife conservation, feasible community development projects supported by the government or tourism agents, and sign posts and beacons were observed. A checklist was used as a tool in this method and data collected were photographs/plates.

2.3.4 Document review

Secondary data means data that are already available i.e., they refer to the data which have already been collected and analyzed by someone else [25]. The documents were used for collecting of secondary data. This involved

searching available compendia, already compiled reports, books, research, journals, and other written sources. A checklist was used as a tool in this method. In addition, several documents related to community participation were such as approaches and constraints facing a community that participates in wildlife conservation, and records of approaches and activities for community participation in wildlife conservation. Data collected from the offices in the study area were in the form of reports, manuscripts and other documents found in office files.

2.3.5 Focus group discussion

This method was employed as it brings together different stakeholders with different experiences and varied knowledge. Using this method, the interaction between groups of stakeholders was observed during an open discussion. A single focus group discussion in each village with villagers was conducted with community members for clarifying and cross-checking data/information gathered from respondents. It was recommended that each focus discussion group must be comprised of 5-6 people, since groups with a large number of people are difficult to manage [26]. During discussions, the researcher acted as a facilitator and ensured that everyone had a say. The participants for focus group discussions were at least 18 years of age.

Generally, focus group discussions have an advantage over interviews in that, people are allowed to give their opinions and talk in detail about their beliefs and feelings and also ensure that views of the minority groups are captured [27].

A tool which was used in this method became a part of the checklist. Data collected were related to laws and by-laws, approaches for community participation and constraints facing communities that participate in wildlife in wildlife conservation.

2.4 Data Processing, Analysis, and Presentation

2.4.1 Data processing

The collected data using questionnaires were organized into a manageable form (checked, edited and coded) and then entered into Statistical Product Service Solution (IBM-SPSS 20) for analysis. The data obtained

from focus group discussions and observer checklists and key informants were organized and used to complement information from respondents.

2.4.2 Data analysis

Data obtained using questionnaires were analyzed through descriptive statistical analysis that included the measure of central of tendency such as mean, frequency, range, and percentages. The data obtained from focus group discussions and observer's checklists and key informants were organized into manageable forms around themes and areas of concern for ease of interpretation and used to complement information gathered from respondents.

2.4.3 Data presentation

The analyzed data have been presented in tabular form, charts, plates, and figures.

3. RESULTS AND DISCUSSION

3.1 Socio-Economic Characteristics of Respondents

3.1.1 Age of respondents

Results from Table 1 indicate that a majority of respondents (25.50%) are between 45-54 years of age, with very few (6.1%) between 18-24 years of age. The adult group being the majority that implies many respondents are mature enough to understand and take part in the decision making process for a particular community, while youth are very energetic, high risk taking and fast learners [28].

3.1.2 Sex of respondents

Findings from Table 1 reveal that most of the respondents (78.6%) were males, and large majority (68.4%) were married. This is possibly because the study was based on heads of households, and in Tanzania, traditionally men are mostly the heads of households.

3.1.3 Education level of respondents

Findings from Table 1 indicate that 73.5% of total respondents had a primary education and 7.1% had at least a college/vocational education. The possible reason could be due to the fact that primary education in Tanzania is compulsory. This is supported by [29,30] who argue that

primary school education in Tanzania is nationally compulsory, and children are expected to attend school from age 7 to 13.

Table 1. General characteristics of respondents

Variable	Frequency (n)	Percent (%)
Sex of respondent		
Male	77	78.6
Female	21	21.4
Age of respondent		
18-24	6	6.1
25-34	21	21.4
35-44	23	23.5
45-54	25	25.5
55 and above	23	23.5
Marital status of respondent		
Married	67	68.4
Single	21	21.4
Divorced	3	3.1
Widowed	2	2.0
Separated	5	5.1
Education level of respondent		
Non formal	10	10.2
Primary education	72	73.5
Secondary education	9	9.2
College/vocational	7	7.1
Occupation of respondent		
Formal employment	6	6.1
Informal employment	92	93.9

Education affects many aspects of the lives, including their attitude and involvement in conserving wildlife resources living freely within their communal lands. Similarly, [31] argue that high level of illiteracy in the communities could lead to impatience and conflicts, especially when the youths are not fully engaged.

3.1.4 Occupation of respondents

Moreover, the results from Table 1 indicate that majority (93.9%) of respondents had informal employment and only a few (6.1%) had formal employment. The possible reason could be due to low level of education of most respondents in the studied area as formal employment in most cases requires people with a higher level of education. This implies that low education level provides low payment employment opportunities (informal employment) to the tourism industry of the Rungwa Game Reserve.

3.1.5 Main economic activities of the respondents

Findings from Table 2 indicate that farming activity had the highest frequency of responses (63.7%), followed by business (17.8 %), and livestock keeping (17.1%). The reason for a majority of people in the Rungwa and Mwamagembe villages doing farming activities might be due to land suitability. For example, [16] argues that agriculture; both livestock keeping and crop production are the main economic activities for the communities living adjacent to the Rungwa Game Reserve.

Table 2. Main economic activities of the respondents

Main economic activities	Responses	
	Frequency (n)	Percent (%)
Farming	93	63.7
Livestock keeping	25	17.1
Business	26	17.8
Nursing	2	1.4

3.2 Approaches and Activities Used for Community Participation in Wildlife Conservation

3.2.1 Approaches used for community participation in wildlife conservation

Results from Fig. 2 indicate that community based conservation ranked the highest as the approach (65%) used for community participation in wildlife conservation. The reason for community based conservation to be ranked as the highest could be due to the fact that the community mostly receives material and financial supports from hunting companies and the government.

A study conducted in Uganda by [32] revealed that community based conservation (CBC) activities have experienced limited training opportunities to members of local communities neighboring protected areas through programs such as study tours, seminars, and workshops. Such activities are expected to have a positive effect in increasing knowledge and improving local people’s attitudes about wildlife and protected management. This implies that increased revenue to the local community will decrease poaching, but other factors must be taken in consideration regarding the degree of

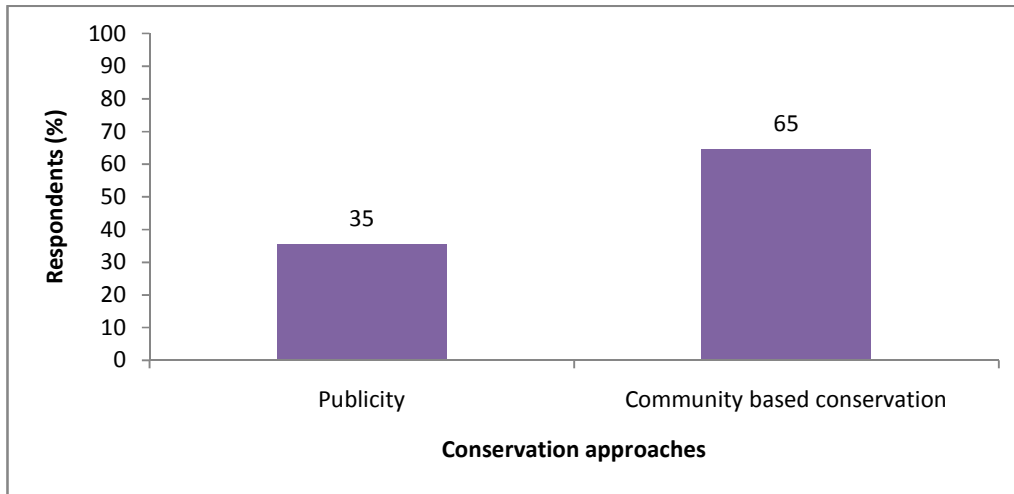


Fig. 2. Approaches used for community participation in wildlife conservation

support for conservation coming from the communities [33].

In addition, the findings from Fig. 3 also indicate that publicity approach was the least (35%) mentioned as approach used for community participation in wildlife conservation. This may imply community receives inadequate conservation education from the Rungwa Game Reserve management. Likewise, [31] argue that the representation of local communities in the planning process is expected to promote understanding of protected area management rationale, and to increase support for management initiatives.

On the other hand, the results also show that the provision for services had the least (16.3%)

respondents (Fig. 2). The Game Reserve also provides other services to the communities including transport in case of emergencies (e.g., taking pregnant women to health centers in neighboring villages). Additionally, [34] argue that overall, 25% of the total revenue collected by the Game Reserve goes into supporting community activities in neighboring villages.

3.2.2 Activities used to involve for community participation in wildlife conservation

Results from Fig. 3 indicate that building and construction of social services was the highest activity as part of community involvement (59%). The possible reason might be due to the fact that the community receives support from the

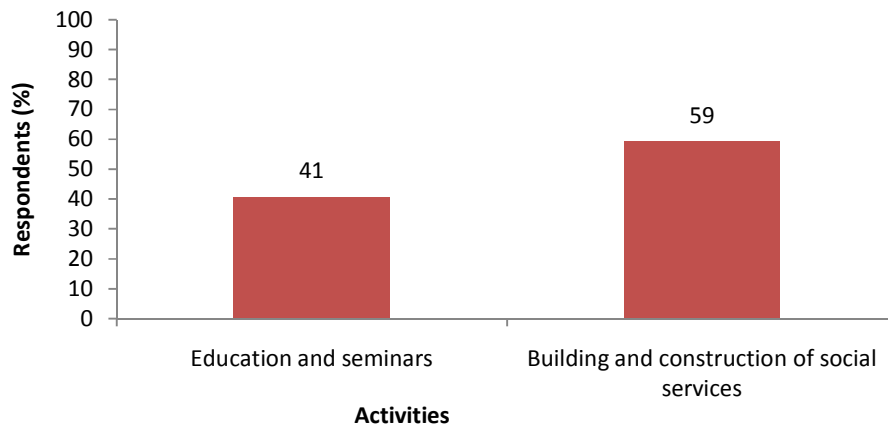


Fig. 3. Activities used to involve for community participation in wildlife conservation

Government and hunting companies, or sometimes they are involved in the collection of building materials.

For instance, a few of the hunting companies and the government have supported community development projects such as building classrooms, teacher housing, village office buildings, construction of pit latrines, and providing desks to primary and secondary schools (Figs. 4 and 5).

Additionally, findings also indicate that education and seminars showed the least (41%) activity for community participation (Fig. 3). This could be due to the fact that education and seminars were inadequately provided to the adjacent community by the Rungwa Game Reserve management. The participation in the planning process is expected to promote understanding of protected area management rationale, and to increase support for management initiatives [31]. This is also supported by [35], who argues that community participation is applicable in afforestation programs, provision of

environmental education, and through sharing the benefits of the game reserve by financing some of the social service programs like education, health, water and transportation in the adjacent villages. The extent to which people participate in natural resources management depends on the approach used by conservation institutions, which largely is determined by the extent of power sharing, in this case, between the state and community [36].

Nevertheless, the Rungwa Game Reserve has only provided conservation education three times between 2013 and 2017 through village meetings, seminars, and cinema in the studied villages. The management of the Rungwa Game Reserve has started to build the beacons to the borderline between the reserve and adjacent villages at the same time putting restrictions and instructions boards (Figs. 7 and 8).

Furthermore, sensitizations of conservation education may impact on their participation in wildlife conservation activities requiring professionals, for instance tour operators, tour



Figs. 4 and 5. Teacher's house built and desks in the Rungwa Primary School with support from hunting companies in the Rungwa game reserve
(Source: Field survey, 2017)



Fig. 6. Pit latrine in the Mwamagembe primary school and village office built with support from hunting companies in Mwamagembe villages
(Source: Field survey, 2017)



Fig. 7



Fig. 8

Figs. 7 and 8. Beacon in border between Mwamagembe village and Rungwa game reserve and warning signboards

(Source: Field survey, 2017)

agents, experts, or facilitators for conservation education and other programs. As a result, this increases wildlife resources protection efforts and creates a sense of ownership within the local community. For example, awareness about wildlife management issues has been raised in the communities through continuous sensitization, initially by the Mount Cameroon Project and Ministry of Environment and Forest (MINEF) and later by the wildlife management committees that helped community members to be more conversant with the wildlife law and its provisions [37]. The information obtained from focus group discussion in the studied villages, Rungwa and Mwamagembe, emphasizes the sensitization of conservation education in local communities is very important for wildlife conservation and on their participation and sense of ownership.

3.3 Constraints Facing Communities that Participate in Wildlife Conservation

The results from Table 3 show that inadequate conservation education was the most (22.4%) mentioned constraint facing community participation in wildlife conservation. This could be due to the fact that conservation education

was inadequately provided. The effort played by the Rungwa Game Reserve in the provision of conservation education was found to be insufficient as more efforts are needed for the community to participate effectively for sustainable wildlife conservation. Secondary information obtained from the Rungwa Game Reserve revealed that conservation education was only provided three times between 2013 to 2017 through village meetings, seminars, and cinema in the study area villages. Such awareness concerning wildlife conservation helps to create sense of ownership to local communities, and as a result, raises wildlife resources protection efforts among the local community.

There is also a need to reverse methods/techniques for providing the knowledge so as to reach all groups in the communities as supported by [38,39]. On other hand, the findings from Table 3 depict that inadequate community participation in wildlife conservation was the least (2.4%) mentioned constraint facing community participation in wildlife conservation (Table 3). The possible reason for poor participation might be due to the provision of inadequate conservation education as claimed

Table 3. Constraints facing communities that participate in wildlife conservation

Constraints	Responses	
	Frequency	Percent
Inadequate conservation education	85	22.4
Poor governance and corruption	18	4.7
Inadequate community participation	9	2.4
Safety/security	75	19.7
Inadequate benefits from wildlife conservation	63	16.6
Poverty	64	16.8
Human-wildlife conflicts	66	17.4

by most mentioned constraints that faces community participation in wildlife conservation. This could also be due to the fact that budget and facilities constraints facing the Rungwa Game Reserve management.

Another possible reason could be that the management of the Rungwa Game Reserve mostly relies on regular patrol and the use of fences and fines to the wildlife offenders. However, weaknesses of involving local communities include failure of national governments to give the communities full responsibility to manage, as well as lack of capacity on the part of the communities [32,40], were among constraints facing community participation elsewhere.

4. CONCLUSION AND RECOMMENDATIONS

The study about the approaches and constraints for community participation in wildlife conservation community participation in wildlife conservation conducted in the Rungwa Game Reserve focused in two studied villages, Rungwa and Mwamagembe revealed that community participation is important in achieving both wildlife conservation goals and local community livelihood needs. Publicity and community based conservation were the popular approaches used for community participation in wildlife conservation in communities living adjacent to the Rungwa Game Reserve.

Generally, various activities were involved for community participation including supporting community projects, provision of conservation education, and seminars in the studied villages of Rungwa and Mwamagembe. However, the study findings revealed that conservation education to a community was insufficiently provided and thus ranked the most mentioned constraint that faces community participation in wildlife conservation.

The Rungwa Game Reserve should have a plan and funds in place for facilitating and implementing appropriate conservation approaches to include the community. For example: sport tournaments, facilitate free transport for game view in the game reserve for recreational and education purposes for students and village leaders that will ensure the building a good rapport, and a consistent and appropriate flow of confidential information about wildlife offenders from the adjacent community. This would include the use of local knowledge and

their experiences in order to increase the sense of ownership of wildlife conservation.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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