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Impact of Community Involvement in Marshland Management, in Kigali City of Rwanda

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Abstract

The management of marshlands is of crucial importance to the community wellbeing. In Rwanda, several policies like buffer zone policy and relocation of activities in marshland are initiated for marshland management despite its high population density affecting the ecosystem while searching for daily subsistence. This expresses that full community engagement in marshland management can help to ensure that present and future generations benefit from marshland services. This study aimed to assess the impact of community involvement in marshland management with the case of Rubilizi marshland located in Kigali city of Rwanda. The authors selected 100 respondents from the community surrounding the marshland, and a structured questionnaire and interview helped to collect relevant informant among respondents. The results were analyzed by using the Statistical Package for Social Sciences (SPSS) and Microsoft Excel. The results indicated that the majority of respondents (57 percent) had archived primary level of education which is a good indicator of how intervening protection policies can be well executed since people are able to read and interpret the information. In addition, it was noted that 41 percent of respondents are married and 33% of them possess land around Rubilizi marshland through freehold. This again can be referred while approaching the community for conserving the marshland since a large number from family members will be approached. This is a high number from which policies can build on to minimize misuse of the marshland. This study can help policy makers and partners to understand the benefits of community participation in marshland management and conservation.

Keywords

Community Involvement, Marshland Management, Rubilizi Marshland, Rwanda

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1. Introduction

Marshlands are valuable ecosystems occupying about 6% of the world's land surface. They are valuable ecosystems as they play vital roles in the environment. They are effective in the improvement of the quality of water [1]. According to [2], marshlands improve water quality through various processes. These processes include sedimentation, filtration, physical and chemical immobilization, microbial interaction and uptake by vegetation. It has been estimated that marshlands may remove between 70-90% of nitrogen. Marshland can also help in groundwater recharge and replenishment. Marshlands also help to maintain the level of the water table and at the same time exert control on the hydraulic head. This provides force for ground water recharge and discharge to other water as well. They also help in controlling climate change. Marshlands can help in controlling soil erosion through marshland plant like reeds which hold the soil in place with their roots, absorb wave energy and reduce the velocity of river currents [3].

The total area of marshlands in Rwanda is approximately 278,000 ha of which, in 2009, 53% was used for cultivation.

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This accounts for 12% of the total cultivated land in the country [4]. In Rwanda, marshlands include all lowland and valley bottoms, both the well-drained and wet parts. In the past, marshlands in Rwanda have been used in many different ways and in the future they have a great role to play in the national economy. Marshlands' functions in Rwanda include agriculture production, hydrological functions, biodiversity reservoirs, peat reserve, mitigation of climate change, leisure and tourism and cultural value [5]. In Rwanda, where many rural households face food insecurity, poverty and vulnerability, these goods and services make an important contribution to livelihood [4]. In particular, the conversion of marshlands to agricultural production has increased rapidly over the last two decades due to acute scarcity of agricultural land [4]. To a great degree, the Rwandan government supports this marshland development with the aim to boost agricultural production, revitalize the rural economy and reduce poverty [4].

Rwanda's marshlands inventory consists of marshlands, lakes and rivers. The country is home to 860 marshlands that cover a total area of 278,536 ha. These account for 10.6% of the national territory. Natural vegetation covers 41 per cent of the marshes while 53 per cent is covered by fields and 6 per cent lies fallow. The marshlands are complemented by 101 lakes which collectively cover and area of 149,487 ha and 861 rivers with a combined length of 6, 462 km [6]. The best known of Rwanda's marshlands is the Rugezi-Bulera-Ruhondo marshland complex which was designated by Ramsar as a marshland of international importance in December 2005, [7].

Despite several services offered by Ribilizi marshland to the community, it faces serious anthropogenic challenges that threaten its sustainability. The main challenges include brickyard and livestock. The marshland plants like reed which help in holding soil particles thereby regulating the water quality is under threat due to harvesting by the community members especially during the dry seasons [4]. This expresses that since the local community is the main users of the marshland, its involvement in the management process would significantly contribute a lot. Therefore, the objective of this study was to assess the impact of community involvement in the management of Rubilizi marshland located in Kigali city of Rwanda.

2. Materials and Methods

2.1. Description of Study Area

This study was conducted at Rubilizi marshland located in Kicukiro district of Kigali city. The marshland (Figure 1) is bordered by Muyange and Kanserege Cells of Kagarama Sector; Busanza Cell of Kanombe Sector; Gatare, Niboye and Nyakabanda Cells of Niboye Sector; Kagasa Cell of Gahanga sector. Rubilizi marshland occupies a total area estimated at around 313 ha primarily used for agriculture, livestock and brickyard. The total population who is around Rubilizi Marshland is 15,854, and its latitude lies on 1,512 m above sea level with a tropical climate. When compared with winter, the summers have much more rainfall and the average annual temperature is 20.2°C.

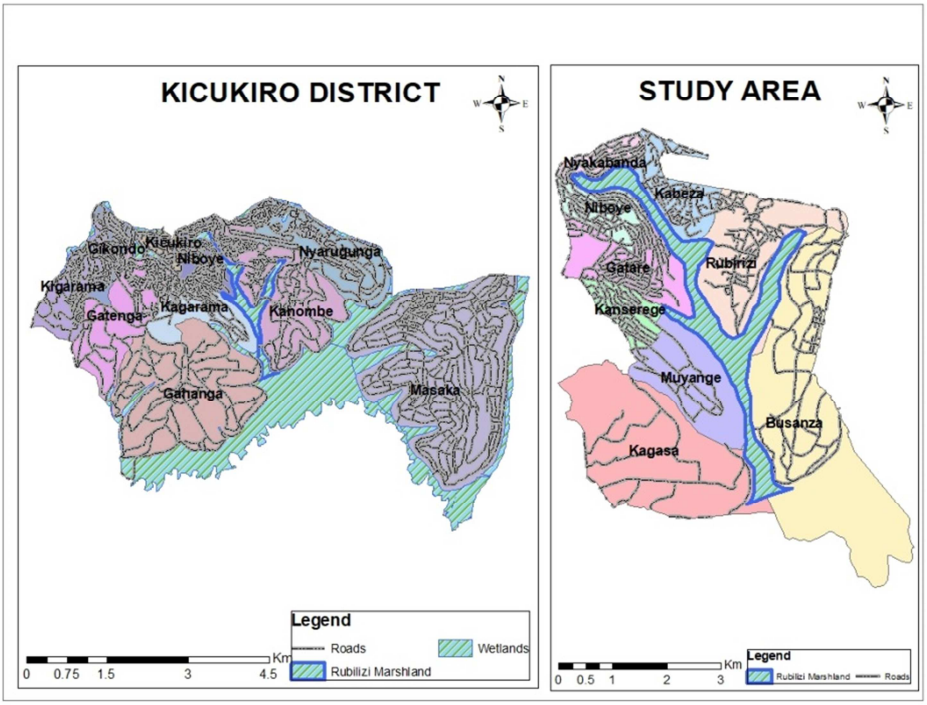

Figure 1. Location of Rubilizi Marshland.

2.2. Data Collection and Analysis

For this study, the primary data were collected by employing a structured questionnaire in April 2020. The study adopted a quota and qualitative methodologies. Both methods allowed the authors to consider a small sample from a large number of people and permitted the interviewees to express their opinions. The total households (15,854) from cells surrounding the marshland (Table 1) were considered as population of the study. However, the authors chose to utilize small number from them which was calculated by using the following Yamen's formula [8].

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

Where n is the sample size, N is the population size, and e is the level of precision. To minimize the risk that the sample size will not represent the true population the margin error was fixed at 10%. Therefore, the sample became:

$$n = \frac{15854}{1+15854(0.1)^2} = 99.71 = 100 \quad (2)$$

Thus, as indicated in the above equation 2, a sample of 1000 respondents was employed and to ensure that all seven (7) cells surrounding Rubilizi marshland were represented, the authors applied the proportionate sampling method to determine the number of respondents per cell as follows:

$$\text{ni} = \frac{Ni*n}{\text{N}} \quad (3)$$

Where *ni* is the sample size proportion to be determined, *Ni* is the population proportion in the cell, *n is* the sample size calculated in equation 2 and N *is t*he total population considered by the study. Therefore, the proportion of population in each sector is shown in the following Table.

Table 1. Sample size per sector.

Cells	Total households	Sample size
Muyange	1274	8
Kanserege	1113	7
Busanza	3704	23
Gatare	1374	9
Niboye	2238	14
Nyakabanda	2351	15
Kagasa	3800	24
Total	15854	100

The authors employed structured questionnaire and interview tools to approach the 100 respondents selected from seven cells surrounding the marshland. The questionnaire and interview were translated in Kinyarwanda (local language) in order to enable local respondents to understand the aim of the study and provide sufficient answers as well.

3. Results

3.1. Literacy Status

Literacy level is crucial as it affects aspects of life, including knowledge, skills practices and attitude. The distribution of the level of literacy among the respondents in the area of study was analyzed (Figure 2). It was noted that, the majority of community members had archived primary level of education, as scored by 53% of them. This expresses that the region has a good literacy level. The results in Figure 2 also showed that secondary and university studies have been attended by 37% and 10% of respondents, respectively.

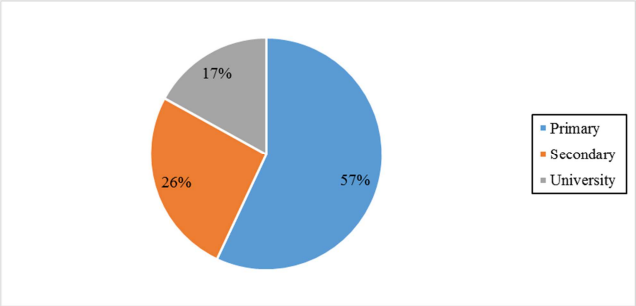

Figure 2. Literacy status of the residents.

3.2. Age Distribution on Households Sampled Around Rubilizi Marshland

According to the results in Figure 3, it was noted that respondents aged over 25 years old composed 70.4% of respondents, while those below 25 years being small proportion of only 29.6%. In the age bracket, the majority (29%) was aged between 19-25 years and those aged 45 years old and above recorded 13 percent among others.

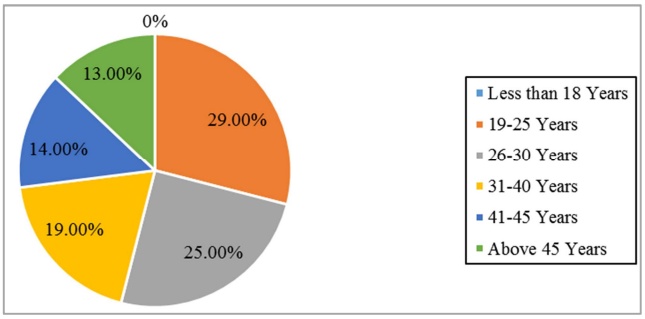

Figure 3. Age distribution of respondents.

3.3. Marital Status

The results, as shown in Figure 4, it was shown that 41 percent of respondents are married and single people recorded 30% (Figure 4). This high number of married respondents can be a good tool in managing the marshland

since people work together and share conservation practices, and can be easily reached in terms of mobilization as a family rather than working with/approaching single, divorced and/or widow (er).

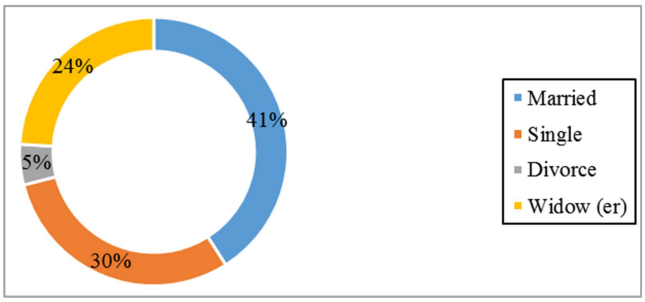

Figure 4. Marital status of the residents.

3.4. Land Tenure

From the analysis, it was realized that a large number of respondents owned land under freehold (Figure 5). According to this study, land tenure system is under freehold where the absolute ownership of the land is vested in an individual. As responded by 33 percent of the interviewed respondents, the land around Rubilizi marshland was freehold.

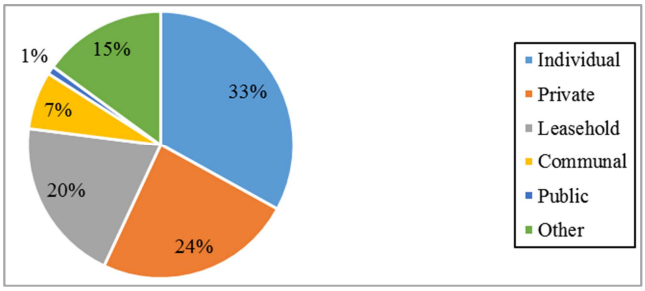

Figure 5. Land ownership.

3.5. Land Size and Usage Among Community Surrounding Rubilizi Marshland

Accordingly, as shown in Figure 6, respondents said that the land is under different usages. The majority of land owners (55 percent) utilize it for farming followed by grazing around (17%) and water extraction highlighted by 13% of respondents.

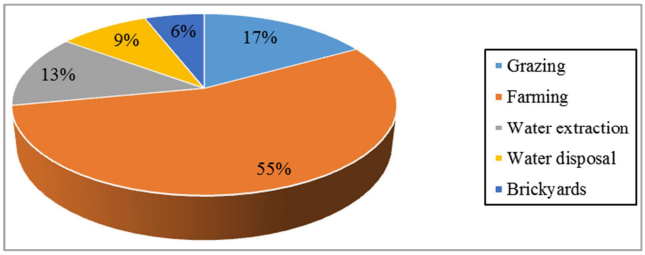

Figure 6. Land usage.

3.6. Community Participation in Marshland Management

According to the results in Figure 7, it was noted that 59% participate in marshland management activities whereas 28% did not participate in management activities, and 13% of them do not know any information about marshland management activities (Figure 7).

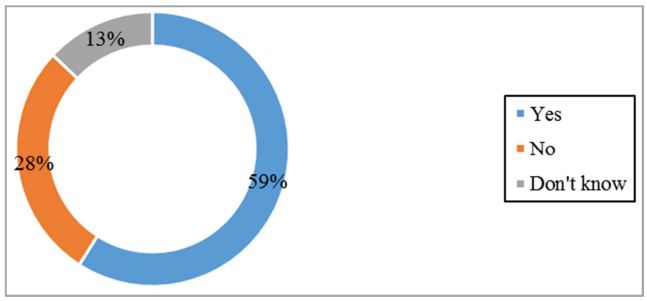

Figure 7. Community participation in marshland management.

Regarding the reasons of not getting involved in the marshland management, as indicated in Table 2, 46 percent highlighted lack of management cooperation and/or coordination. There is also 26 percent who mentioned lack of marshland management awareness or poor communication among people.

Table 2. Reasons why people are not involved in management effort.

Reason for not involved in the marshland management	Percentages
Lack of management cooperation/coordination	46
Believe it is self-protected	3
Engaged in other activities/no time for marshland management	4
Far from the area	4
Lack of awareness/poor communication	25
Lack of finances and/or income	2
No apparent reason/no benefits	8
There are organization allocated/not my duty	8
Total	100

There are various strategies that were put in place by the stakeholders to ensure proper utilization of marshland. The following Table 3 heighted the response form the respondents in terms of existing marshland management policies.

3.7. Challenges of Marshland Management

Moreover, regarding key challenges to the management of the marshland (Figure 8), it was noticed that high population growth around Rubilizi marshland is the major challenge hindering its management. In addition, lack of harmonized approach between users and policy makers and lack of community engagement and ownership are the average challenges hindering in management of Rubilizi marshland. These challenges were ranked from 1 representing the major

reason; 2 representing the average reason and 3 represented the least reason.

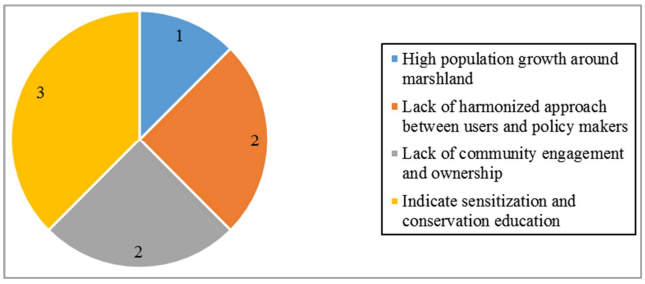

Figure 8. Community ideas about challenges hindering in marshland management.

Table 3. Types and effectiveness of strategies put in place to manage Rubilizi Marshland.

Names of the strategies put in place	Percentages
Buffer zone respect	21
Flood control canal	12
Discourage brickyard and livestock	25
Fining illegal activities in the marshland	6
Payment of marshland protection fees	5
Educate on the best way to use marshland	11
Minimize over utilization	7
Public awareness on utilization	9
Regulating water abstraction	4
Total	100

According to the results in Table 3, discouraging the brickyard and livestock activities in the marshland stands as the primary management policy under execution at Rulibizi marshland as highlighted by 25% of respondents. The usage of buffer zones (21%) and flood control (12%) measures are also under implementation at this marshland.

4. Discussion

Based on the findings of the study in Figure 2, it was revealed that education plays an important role in community participation. This is in agreement with [9] that conservation and environmental education aims to provide learners with the opportunity to gain an awareness or sensitivity to the environment, knowledge and experience of the problems surrounding the environment to acquire a set of values and positive attitudes, to obtain the skills required to identify and solve environmental problems and the motivation and ability to participate. Similarly, [10] argues that participation increases with education, and that households that are educated tend to participate more when called upon to do something.

As recently reported [11-14], community participation is very important in marshland conservation efforts, hence the key stakeholders should be the community. There is a growing awareness that interests in marshland conservation efforts should dependent on the mutual involvement of all stakeholders. It is also clear that while most community projects have been planned and implemented by involving local communities, most of them are not the original ideas of the people, they were suggested to them [15].

Many scholars have drawn attention to the importance of community participation in the natural resource management and decision making process to improve the outcome of management results. They have emphasized on the mobilization of local communities, utilization of local institutions and local knowledge, establishment of a common property regime and effective partnership for community-based management with formal institutions [11-14]. Additionally, the study of [13] found that community participation in decision making and implementation of the laid out laws and regulations works best.

The results of this study (Figure 8) revealed that local communities possess certain knowledge and are particularly interested in getting involved in the decision making process of marshland resource management under the opportunities created by the development project. According to [16], through their involvement, local communities can assure enhanced livelihood opportunities, access to and control over resources and the legitimacy of exercising collective actions. The present management system of marshland resources is focused on property rights transfer from state to individual or groups for revenue earning, which inevitably excludes local communities from access and traditional use rights to resources. Therefore, as suggested by [17], participation is a key strategy to engage local people and to link scientific and local knowledge about the management of the protected areas and fragile ecosystems.

5. Conclusion

The present study intended to assess the impact of community involvement in marshland conservation with case of Rubilizi marshland in Kigali city. The researcher employed a questionnaire among 100 households residing in cells surrounding the marshland. The results indicated that the majority of community members had archived primary level of education which is a good indicator of how intervening protection policies can be well executed since people are able to read and interpret the information. In addition, it was noted that 41 percent of respondents are married and 33% of them possess land around Rubilizi marshland through freehold. In addition, a large number of people are aware and participate in the management practices of the marshland. Lack of cooperation between local community and leaders was mentioned as the key challenge to the conservation of this marshland despite some polices under exercise like buffer zones, discouraging

brickyard and livestock. This is associated with high population growth around the marshland, and the fact that local community perceives that the conservation of the marshland should be merely attributed to the government, which limits their involvement. Thus, more efforts in conserving the marshland mainly involving the local community are very essential.

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