

## **IMPACT OF ANTI-POACHING STRATEGIES ON WILDLIFE CONSERVATION IN PROTECTED AREAS, CASE OF AKAGERA NATIONAL PARK**

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### **ABSTRACT**

The poaching activities cause significant loss of biodiversity mainly due to lack of awareness on the importance of biodiversity protection. This study aimed to investigate the impact of anti-poaching strategies on the conservation of wildlife in protected areas. The case study was the Akagera National Park (ANP) in the Eastern Rwanda and covered a period of five years (2013-2017). The authors utilized structured and semi-structured questionnaires for data collection. The respondents were the park staff working in conservation, local leaders, cooperatives and clubs dedicated to conservation of natural resources. The mean and standard deviation were used to analyze conservation measures applied at the park. The T-test and Regression analysis assessed the extent to which the community-based strategies helped on the park's conservation and the relationship between both. The results were analysed by employing the SPSS, Version 20. The results indicated that anti-poaching strategies reduced the number of poachers, animal loss and farmers' intrusion into the park. This was with a strong mean of 4.27695 and standard deviation of .52679. The relationship between anti-poaching and wildlife conservation showed a significant level of 0.01 and strong correlation of .976 (p-value=0.00). The coefficient of determination was 0.000 and generated a positive relationship (.314) between anti-poaching strategies and wildlife conservation. Therefore, the applied anti-poaching strategies potentially reduced of all sorts of poaching at ANP. This increased the biodiversity within the park and enhanced the wellbeing of the surrounding communities since they are engaged in and benefit from the protection schedule.

**Key words:** Akagera National Park; Anti- poaching strategies; Conservation; Wildlife.

## 1. INTRODUCTION

### 1.1. Wildlife Conservation

Conservation approaches started with “fortress conservation” that excluded the local populations from the use of natural resources (Kusters, 2009). This approach considered local people as ignorant and destructors against whom the nature should be protected (Wells & Brandon, 1992:11). In the 1980’s, that old conservation approach was replaced by a new conservation approaches known as “community-based conservation (CBC) that included local communities in natural resources management. Conservation strategies in Africa have been characterized by exclusion of human use of resources in protected areas. In particular, this approach, which is often described as “fortress conservation” or “the fines and fences” approach (Wells & Brandon, 1992:11).

The increasing human population, subsequent close proximity of human settlements to protected areas and land use practices have resulted into interaction between people and park animals with negative impacts on people and/or their resources and animals as well. In Rwanda, the problem can be seen around all four protected areas (Nyungwe National Park, Volcanoes National Park, Akagera National Park and Gishwati Forest). This problem is further exacerbated by lack of buffer zones around some of these protected areas and availability near protected areas, of crops or plantations that are palatable by forest animals (MINIRENA, 2016). This expresses that conservation goals cannot be attained without active participation of

local communities and all stakeholders involved in a way or another in biodiversity management.

Rwanda is listed among countries with severe demographic stress relying on natural resources for subsistence on a limited resource base. About 57% of Rwandans live in abject poverty and people occupying or living in the vicinity of the world’s areas richest in biodiversity are the poorest (Rwanyiziri, 2011). In Rwanda, illegal wildlife hunting within protected areas is a big threat to biodiversity conservation. At the Akagera National Park (ANK), the majority of poachers are Rwandans in search for ways to support their livelihoods. Recently, poachers from the neighboring countries were also evidenced as the park shares borders with other countries. The recorded poachers use snares or traps, spears, bows and arrows, and dogs (MINIRENA, 2016). However, the use of modern weapons such as high-powered rifles, shotguns or assault rifles in poaching has been recorded across the Park too (MINIRENA, 2016).

Several studies have explored the causes of poaching, ways of conservation and biodiversity preservation (Barnes and Jones, 2009, Bernard 1998, Leader Williams 1990, Milliken et.al 1993, Western 1997). Accordingly, few studies have examined how the anti-poaching strategies like socio-economic and security focused strategies are implemented as part of wildlife conservation efforts (Child 2012, Kahler 2010, Nelson 2006). However, the contribution of community-

based strategies in wildlife conservation has received little attention.

## 1.2. Anti-poaching strategies

It is well recognized that there is no simple solution to tackling wildlife crime. Many years ago, Africa, as a whole has been facing major poaching incidents, and numerous anti-poaching strategies were introduced to fight poaching such as dehorning, penalties for poaching and shoot to kill (Cheteni & Priviledge, 2014). The study of Leila, (2017) listed top-bottom and bottom-up anti-poaching techniques. The top-down strategies mainly focus on increased law enforcement, military strategies and technology to protect wildlife populations through violent means, high fines, imprisonment and even death. The bottom-up/community-based approaches engage local communities in wildlife conservation through the provision of economic opportunities and alternative livelihoods as part of conservation initiatives.

The reports from Namibia, Tanzania, South Africa and Kenya indicated that the economic (sharing tourism revenues; creation of conservation jobs for community members as rangers or eco guards; land leasing initiatives) and social (adding a connotation of prestige to being an eco-guard or ranger; human elephant conflict mitigation; community intelligence gathering; relationship building and integrated community support in law enforcement) policies initiated through bottom-up approaches were successful than that of top-bottom approaches. These strategies encourage community to ensure wildlife protection by preventing poaching

on their land, enterprise development and community resource management (Cooney et.al, 2016 and Roe, 2015). In addition, the report of Biggs (2016) revealed that the most important element for successful community driven incentives is the provision of alternative livelihoods, development of ecotourism industry, training and education of locals as either guides or rangers.

In Rwanda, the local government and its stakeholders set out anti-poaching patrols, sensitization protected areas' neighboring communities and addressing their livelihood issues. This is done through provision of some economic opportunities like revenue sharing, compensation for damages caused by wildlife, fencing and trenching to address human wildlife conflict (HWC) and maintain a good relationship with communities living adjacent to protected areas (Moore et. al, 2017). At the Akagera National park, the main threats are human activities. Historically, more than 60 per cent of the park area was converted into farmland and biodiversity losses have been estimated at 50-80 per cent of large mammals and 13 per cent of birds. The government of Rwanda recognized the importance of biodiversity protection, and presently, the park has maintained an important diversity of birds.

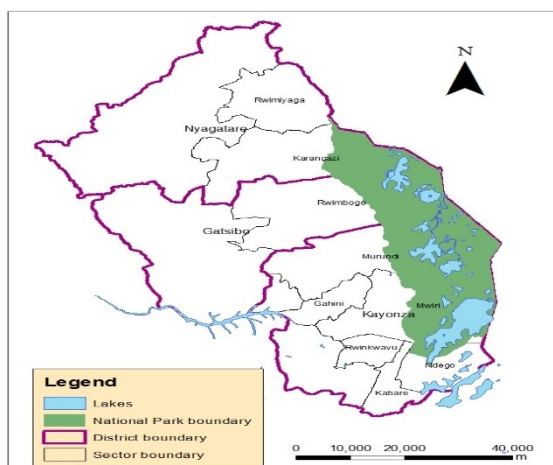
However, there is need of assessing the extent to which the local community is aware of wildlife protection, and the benefits associated to both biodiversity conservation and community's livelihoods. Therefore, this study investigated the impact of anti-poaching strategies on the conservation of wildlife at the Akagera

National Park. The authors believe that the results of this study will provide current awareness on and readiness to wildlife conservation among the park surrounding community. This will be essential to policy makers in recognizing the required law enforcement and prevention of biodiversity declines in the park.

## 2. MATERIAL AND METHODS

### 2.1. Description of the study area

The Akagera National Park (ANP) covers a total surface of 1,200 km<sup>2</sup>. The park is located in the Eastern province of Rwanda, along the Tanzanian border. It was founded in 1934 to protect animals and vegetation in three ecoregions: savannah, mountain and swamp. The park is named for the Akagera River which flows along its eastern boundary feeding into several lakes, the largest of which is Lake Ihema. It stretches in three districts; namely Kayonza, Gatsibo and Nyagatare. Almost a half of ANP is located in Kayonza district, another half in Gatsibo and Nyagatare districts (REMA, 2015). The Figure 1 below describes the location of Akagera National Park in Rwanda.



**Figure 1: Location of Akagera National Park**

### 2.2 Methodology

For this study, purposive sampling method was used to develop the sample of the research. This method belongs to non-probability sampling techniques where sample members are selected based on their knowledge, relationships and expertise (Freedman et al., 2007). The authors selected the sample based on the (a) phenomenon under investigation, (b) sufficient and relevant work experience in the field of conservation and tourism, (c) active involvement in several conservation and tourism initiatives and partnerships.

The data were collected from a sample of 65 individuals selected from the study population of 185. The sample size was calculated by using the Yamane's formula (Yamane, 1967). The selected 65 respondents were approached from 3 sectors namely the Mwiri, Rwinkwavu and Ndego of Kayonza district. The questionnaire was provided to the respondents from Akagera national park working staff, conservation cooperatives and clubs, local community leaders and students. The questionnaire was written in both Kinyarwanda and English. The questionnaire contained three major sections: Section A: demographic characteristic of respondent (age, gender, occupation, etc.). Section B: anti-poaching strategies and wildlife conservation and Section C: the relationship between communities based strategies and conservation of wildlife.

After data collection and editing, the SPSS, version 20 was used to generate quantitative data, figures, tables and other trends that respond to the objectives. The mean and standard deviation were used to analyze the

forms of community anti-poaching strategies applied at Akagera National park. The T-test was used to ascertain whether community based strategies have or no impact on the wildlife conservation in Akagera National Park. Finally, the regression analysis examined the relationship between the local community based strategies and wildlife conservation in Akagera National park.

### 3. RESULTS

#### 3.1. Respondents’ demographic characteristics

The results in Figure 2 indicated that the majority of respondents (48.98%) are active

population, aged in the ranges of 30-34 and 35-39 years. With regard to respondents’ occupation, 44 percent of them were cooperative members, students’ club members (24.44%) and 22.2 % who were the community leaders (Figure 3). As shown in Figure 4, female respondents were 36 percent against 64 percent of male. These categories of respondents mostly understand the value of the park, its conservation and benefit from park activities. In addition, the fact of high percentage of male can be justified by the reason that male occupy the majority of daily activities in and around the park.

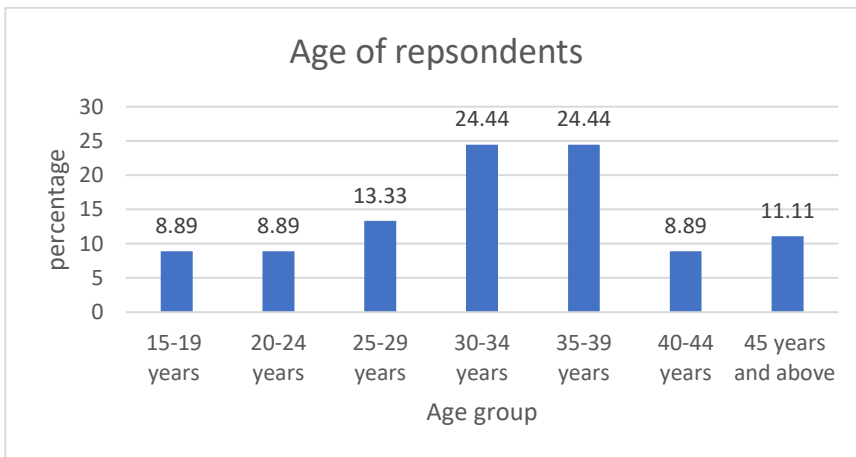


Figure 2: Age of respondents

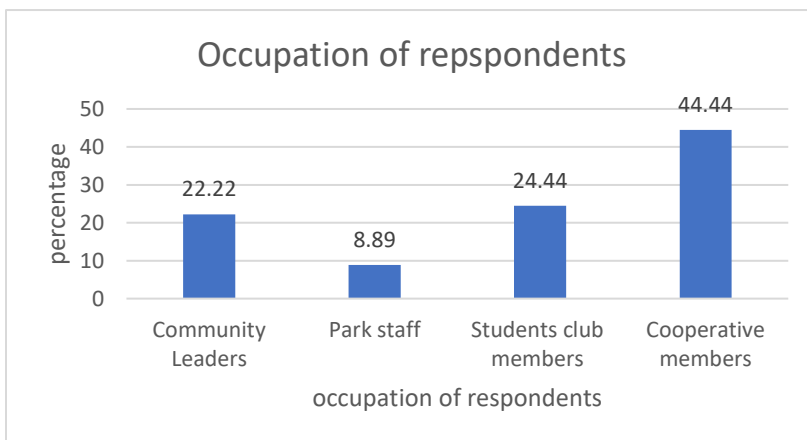


Figure 3: Occupation of respondents

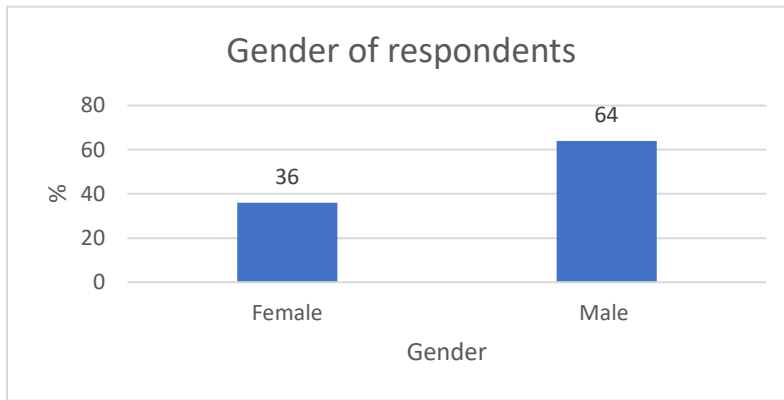


Figure 4: Gender of respondents

### 3.2 Analysis of Community Anti-poaching strategies in Akagera National Park

The authors investigated the knowledge of respondents about the community based anti-poaching strategies implemented at the ANP. The related findings were presented in the following Tables and Figures.

**Table 1: Analysis of forms of community anti-poaching strategies at Akagera National Park**

Anti-poaching strategies at ANP	Mean	Std. Deviation	Comments
Community awareness strategy	4.3231	.53349	Strong heterogeneity
Revenue sharing strategy	4.1692	.48635	Strong homogeneity
Job creation strategy	4.2615	.53843	Strong heterogeneity
Intelligence gathering strategy	4.1538	.50716	Strong heterogeneity
Human wildlife conflict mitigation strategy	4.2632	.47615	Strong heterogeneity
<b>Summary of findings</b>	<b>4.2269</b>	<b>.51635</b>	<b>Strong heterogeneity</b>

The results in Table 1 on the forms of anti-poaching strategies at Akagera National Park showed that community awareness was highly practiced by the park management. This practice had a strong mean of 4.3231 and heterogeneous standard deviation of .53349. This is followed by job creation (Table 1) which also generated a strong mean of 4.2615 and a heterogeneous standard deviation of .53843. The results (Table 1) also generated a strong mean of 4.1538 and a heterogeneous standard deviation of .50716 on the intelligence gathering as a strategy. While human

wildlife conflict mitigation had a strong mean of 4.2632 and a heterogeneous standard deviation of .47615. Thus, the applied forms of community anti-poaching strategies revealed strong heterogeneity and can be ranked as being successful in protecting the biodiversity at the park.

### 3.3. Community outreach and job creation in Akagera National Park

The programs of community outreach and creation of job opportunities were investigated to know how these programs were implemented at the Akagera National

Park and how community benefits from them between 2013 and 2017.

The findings in Table 2 collected from secondary data sources showed a progressive increase in number of local population that attended the education on the park conservation awareness prepared by the Akagera National Park. The results of the study also, as shown in Table 2, indicated that the number of training/education attendants increased from 27,504 to 43,070 in 2014 and 2017, respectively. During such training and/or education, sufficient skills related to the park and its biodiversity conservation and community issues were discussed, including human-wildlife conflict and how these can be mitigated.

**Table 2: Community outreach program in Akagera**

Year	Number of participants
2014	27,504
2015	31,386
2016	37,438
2017	43,070
<b>Total</b>	<b>139,398</b>

**Source:** Secondary data, AMC Report 2018

This likely, expresses that the local community surrounding the park is aware of the types of various activities carried out at the park in relation to its conservation. This is similar to the Akagera Management Company (MAC) Report, (2018) which indicated that during such trainings, the local people get conservation skills from meetings/workshops, study tours, trainings,

and other activities such as Lion cup competition, Drama and film show.

**Table 3: Community job creation at Akagera National Park from 2013-2017**

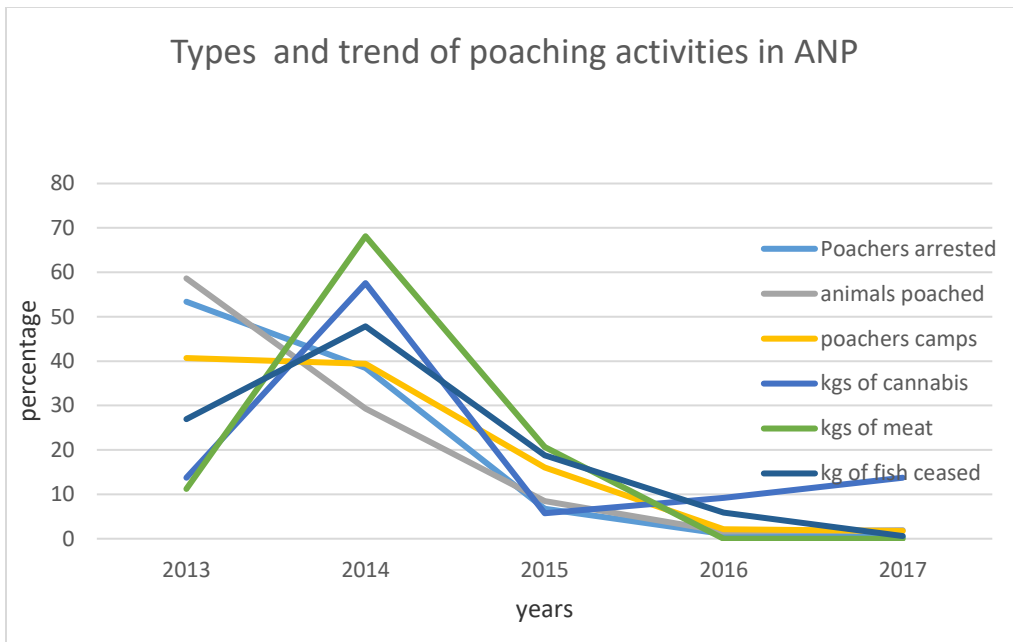
No.	Job creation in ANP	Number of beneficiaries
1	Community freelance guides	20
2	Community development projects and fire management Cooperatives	161
3	Fence maintenance	20
	<b>Total</b>	<b>201</b>

**Sources:** Author, 2018

The findings in Table 3 showed that from 2013 to 2017, a total of 201 individuals have benefited from job employment opportunities created by the ANP. The majority (161) were hired in different development projects (such as road construction and fire management cooperatives) while others were employed in activities related to maintaining electric fence around the park boundary and freelance guides.

### 3.4. Types and trend of poaching activities at Akagera National Park

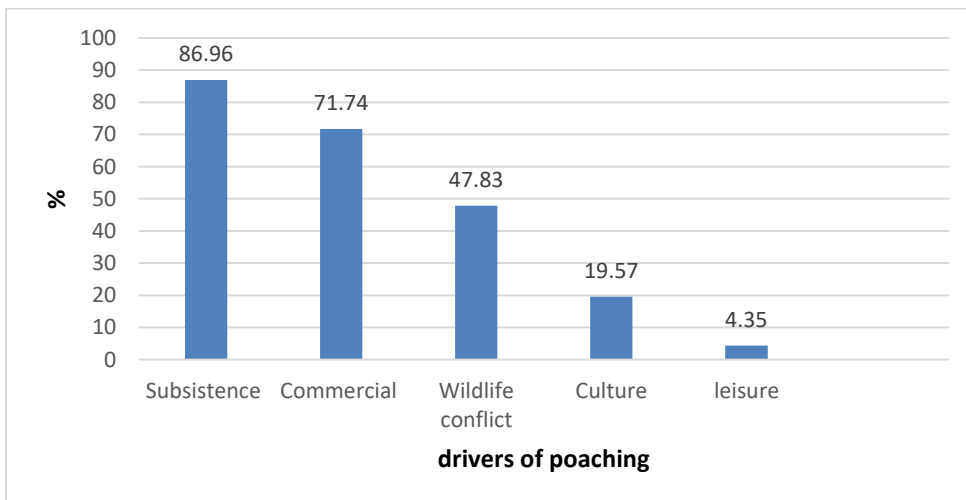
The authors conducted an analysis in order to gain an understanding on the status of illegal activities at the ANP. The findings showed that from 2013 to 2017, the poaching activities in the Akagera National Park have been decreasing (Figure 5).



**Figure 5: Type and trend of poaching activities at ANP Source: AMC Report 2018**

As illustrated in Figure 6, the authors considered the respondents’ perceptions on the drivers to poaching at the Akagera National Park.

**3.5. Drivers to poaching at Akagera National Park**



**Figure 6: Drivers to poaching at Akagera National Park.**

The results in Figure 6, as asserted by respondents, indicated that the major drivers to poaching at Akagera park include the subsistence ranked at 86.96% followed by commercial at 71.74 % along with Human wildlife conflicts and cultural practices with 47.83 and 19.57 percent, respectively. The leisure ranked as the least driver (4.35 percent) to poaching at the ANP.

**3.6. Human wildlife conflicts**

The results on the reported cases of human wildlife conflicts (HWC) at the Akagera National Park were highlighted in Table 4. It was noted that crop raiding (46,30 %) and livestock (50,7 %) are the main problems caused by wildlife to community around the ANP. Crop raiding is a critical issue for communities living around ANP and causes much of the conflict between community members and ANP. Most respondents within the three sectors of the sample reported that crop raiding was a major threat to their economic survival. It is important to note that Human deaths and injuries, although less common than crop damage,



are the most severe manifestations of human-wildlife conflict.

**Table 4: Cases of Human Wildlife Conflicts at ANP**

Human wildlife conflicts	Number of cases	Percentage
Crop raiding	344	46.30
Death and injuries	24	3.23
Livestock loss	375	50.47
Total	743	100

*Source:* Secondary data, October 2018

### 3.7 Impact assessment of wildlife conservation measures at ANP

The results on the impact of implemented anti- poaching strategies on wildlife conservation at the Akagera National Park are presented in Table 5 below.

**Table 5: Impact assessment of wildlife conservation measures at ANP**

Impact	Mean	Std. Deviation	Comments
Reduced number of poachers	4.2154	.51515	Strong heterogeneity
Reduction of poached animals	4.3385	.53843	Strong heterogeneity
Reduction of farmers intruding the park	4.4485	.52343	Strong heterogeneity
<b>Summary of findings</b>	<b>4.27695</b>	<b>0.52679</b>	<b>Strong heterogeneity</b>

The analysis in Table 5 showed that community based anti-poaching strategies contributed to the reduction of poachers in the Park. This recorded a mean of 4.2154 and heterogeneous standard deviation of .51515. In addition, the mean of 4.3385 and heterogeneous standard deviation of .53843 were noted by the reduction of number of poached animals in the park.

in Akagera National Park, as shown in Figure 5.

### 3.8. Relationship between anti-poaching strategies and wildlife conservation

The authors analysed the relationship between anti-poaching strategies and wildlife conservation measures (Table 6), and forms and trends of poaching activities

**Table 6: Relationship between anti-poaching strategies and wildlife conservation**

<b>Relationship</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Comments</b>
Community anti-poaching strategies have reduced on numbers of poachers in Akagera National Park	4.3385	.56670	Strong heterogeneity
Community anti-poaching strategies have reduced on number of animals poached in Akagera National Park	4.2769	.59968	Strong heterogeneity
Community anti-poaching strategies have reduced on intruding the park by farmers	4.2462	.61316	Strong heterogeneity
<b>Summary of findings</b>	<b>4.2269</b>	<b>.51635</b>	<b>Strong heterogeneity</b>

The results in Table 6 revealed that both anti-poaching strategies and wildlife conservation at the Akagera National Park are interrelated. The analysis indicated that independent variable has positive strong correlation to dependent variable equal to .976\*\* and the p-value is .000 which is less than 0.01. The significant level of 0.01 was obtained between anti-poaching strategies and wildlife conservation at the ANP. Thus, the initiated anti-poaching strategies contributed to the conservation of the wildlife at the Akagera National Park.

#### 4. DISCUSSION

The results of this study indicated that the selected respondents have good understanding and knowledge about different anti-poaching strategies implemented at the Akagera National Park. As shown in Table 1, the informants highlighted that the park uses different community-based strategies to protect its wildlife ranging from Community Awareness, Job creation, Human Wildlife conflicts and Intelligence gathering strategies. These initiatives significantly

contributed to the protection of the park and its wildlife. The results analysis indicated that the local population neighboring the park benefited from job opportunities, Human wildlife conflict mitigation measures and outreach programs which were conducted in the park over the last 5 years (2013-2017).

The anti-poaching strategies put in place had potential improvement to the wellbeing of local population and increase the skills on conservation, hence leading to reduction of poaching activities. The study conducted In Kilum-Ijim Forest, Cameroon, showed that since an income livelihood project began in 1987 through a participatory approach, the park’s boundaries have been respected, and the local community now had a positive attitude towards the conservation program (Abbot et al. 2001). Lack of local community empowerment in decision making, transparency and an adequate benefit-sharing system are major drawbacks of buffer zone programs (Budhathoki 2004). In addition, it is believed that providing jobs to potential and active poachers could reduce their resort to

illegal activities as a way of providing for their families.

Moreover, it has been argued that providing employment opportunities to poachers is an effective mean for reducing poaching because it raises income and occupies a poacher's time (Knapp 2007). Similarly, the results of this study in Figure 6 revealed that subsistence reasons was the major poaching activity at the Park. However, Tables 1 and 6 showed that the community based anti-poaching policies have led to minimizing poaching across the park. Accordingly, the study of Duffy et al., (2013) revealed that there is a need to tackle rural poverty to reduce incentives to poach, and to look for ways of wildlife conservation which could empower rural communities. This in turn enhances the park's surrounding community's extent of engagement in the conservation of the wildlife.

Furthermore, as recently reported by Roe, (2015) and Cooney et al., (2016), the anti-poaching strategies which engage and encourage community incentives contribute to wildlife protection, but also, enhance the park's surrounding population's living conditions. This is similar to the results of this study (Figure 5) where the types and trends of poaching have reduced over time. In addition, Tables 5 and 6 indicated that the initiation of community-based anti-poaching practices at the Akagera National Park has played a key role in the conservation of the park and its wildlife. This led to reducing the number of poachers, poached animals and less intrusion of farmers in the park.

The study conducted in India which stated that education and training activities at different levels, for instance in schools or in adult education arenas such as farmer field schools help to disseminate innovative techniques, build local capacity in conflict resolution and increase public understanding of Human Wildlife Conflicts (Sethy, 2015). In addition, the report of Ormsby and Kaplin (2005) and (Mugisha, 2015) indicated that wildlife education and awareness programs promote the skills on the protection of wildlife among the neighboring communities through activities such as drama, seminars, workshops and employment of environmental extension agents. Accordingly, a study conducted in Madagascar revealed that 93% of residents living near the park were aware of the existence of the park and expressed positive opinions about the park (Knight et al., 2013).

The above are in congruency with the results of this study (Table 1) where the community awareness was highly mentioned by respondents as the form of anti-poaching strategy at the Akagera National Park. The fact that the local communities living around ANP is aware of positive impact of protecting the wildlife can promote people's engagement and participation in the wildlife management by reporting, detection and prevention of poaching activities. Although human wildlife conflicts (HWC) were not the most driver of poaching, it was noticed that livestock and crop raiding were the main problems caused by wildlife to community around the ANP (Table 4). The government of Rwanda has established the Social Guarantee Fund (SGF) to compensate the

claims for wild animals damages, including cases of crops destroyed, cattle killed as well as number of people killed or injured by animals (SGF, 2017).

The Human Wildlife Conflict compensation schemes aim to spread the costs of wildlife conservation more fairly within society, and when carried out effectively, they raise awareness about community concerns and shift economic responsibility to a broader public depending on where the funds come from (Pantoren E., 2016). However, the study of Infield, (1988) revealed that crop raiding conflicts in particular, reinforce the attitude amongst farmers that conservation programs and conservation areas actually contributes to their subsistence problems rather than benefit them. Thus, as suggested by Nyhus et al., (2005) and Wagner et al., (1997), a major benefit attributed to compensation programs is that they may increase tolerance of wildlife and promote more positive attitudes and support for conservation among people who live closest to endangered and dangerous animals.

## 5. CONCLUSION

This study investigated the impact of anti-poaching practices on the conservation of wildlife at the Akagera National Park in Eastern Rwanda. Structured and semi-structure questionnaire was addressed to 65 respondents selected from 185 individuals composed by the park working staff, conservation cooperatives and clubs, local community leaders and students. The results, as highlighted by respondents, indicated that the main drivers to poaching at the ANP are subsistence, commercial and

human wildlife conflicts. The anti-poaching strategies under execution at the park include community awareness, job creation, intelligence gathering and human wildlife conflict mitigation. It was noted that these strategies strengthened the park conservation through lowering the number of poachers, poached animals and intrusion of farmers in the park. In addition, there is progressive rise in park conservation awareness among its surrounding community resulting from the provided trainings. Hence, there is significant relationship between anti-poaching strategies and conservation of the ANP. The livestock and crop raiding are still the main problems and causes of conflicts between community members and ANP. Therefore, it is recommended to ensure promotion of creation of job opportunities around the park to minimize community direct dependence on the park. Also, regular community awareness programs are suggested to develop the park's surrounding people's attitudes and participation in the conservation activities. Finally, it is good to manage human wildlife conflicts around park in order to maintain good relationship between the park and the local community.

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