

Community Perceptions of Human-wildlife Conflicts and the Compensation Scheme Around Nyungwe National Park (Rwanda)

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Abstract: In African countries, crop-raiding by wild animals and human-wildlife conflicts are recurrent and common concerns for conservationists, protected areas managers and surrounding populations. At different levels, these challenges hinder the achievement of conservation goals. Although researchers have widely studied human-wildlife conflicts in Nyungwe National Park, few have examined its impact and lived experiences of local communities who are regularly facing crop-raiding by wild animals. The present study conducted in areas adjacent to the park including those affected with a high rate of crop raiding aimed to assess: (1) the community perceptions on human-wildlife conflicts and (2) the community perceptions on the compensation schemes set up to minimize the conflicts. For this purpose, a qualitative method was adopted. It relied on field semi-structured interviews with the representatives of conservation key stakeholders including local communities that experienced crop raiding. On one hand, the findings indicated that communities affected by generalized crop raiding are complaining about socio-economic and livelihood losses, food insecurity and injury. On the other hand, they showed that affected communities are not satisfied with the compensation scheme. Difficult requirements for compensation, complicated compensation procedure, rejection of compensation claims, undervalued payment and irregular compensation and delay of payments were identified as key problems that keep human-wildlife conflicts at high levels. The compensation process is so slow, so long and so costly that the victims of crop raiding abandon compensation claims. As a result, local communities continue to deal with self-defense since monetary compensation is unable to decrease the level of crop raiding. The findings call for an improved compensation scheme for reduced human-wildlife conflicts and efficient management following the model of effective compensation. Even though fencing the Park could be expensive, it would be a viable option to minimize wild-animals escape from the park. In addition, enhancing collective guiding system was proposed by the local community as their innovative strategy that could reduce crop raiding.

Keywords: Crop Raiding, Human Wildlife Conflicts, Compensation Scheme, Nyungwe National Park, Rwanda

1. Introduction

Worldwide in general and in Africa in particular, human-wildlife conflicts around natural forests are serious challenges for conservation initiatives by authorities and local communities [1-4]. In Africa, due to the rapid growth of the human populations, traditional land rights and agricultural regimes have changed considerably because of the scarcity of farmland [5-8]. This evolution led to the encroachment of the wildlife habitats and direct conflicts between wildlife and

populations with the perception that wildlife threatens human safety, health, food, and property [8-12]. Wild animals like birds, small and big mammals and wildlife baboons manage to move around protected areas and cause damage and troubles to the community property [13]. In Africa where farmers are highly dependent on agriculture, human-wildlife conflicts always occur and they are intensified in regions where dense human populations live adjacent to protected areas, and where livestock and crop fields are major components of rural livelihoods [14-17, 8]. Today, contradictory arguments are

provided by stakeholders to explain such conflicts. The conservationists argue that the communities around protected areas encroach on the wild animals habitat while local communities argue that wildlife attacks and damages their crops [18-20]. According to some authors, the killing of wild animals is caused by the lack of financial and socio-economic compensations for damaged crops, properties and human lives [21, 23]. Consequently, both people and wildlife experience serious problems of crop raiding and wildlife attacks by the local community which lead to misunderstanding and conflicts between local communities and conservationists. Crop raiding by wildlife is recognized and documented in many African countries including Kenya, Uganda, Nigeria and Senegal [5, 23-26]. As wildlife attacks occur at all periods and all stages, local communities complain to feed wildlife while they are themselves starving and are affected by socio-economic losses [1, 27, 8]. To address these conflicts and challenges, many solutions have been proposed among which fences and trenches [28], socio-economic incentives for the development of the populations living in the vicinity of protected areas [29] and the guarding of crops [30-31, 18, 32, 12]. Despite strategies and actions carried out to minimize wildlife conflicts especially crop raiding, most of local communities around protected areas are still suffering from the ineffectiveness of some of the strategies. They are affected by socio-economic injustice and therefore reclaim justice through equitable compensation in the case they experience crop raiding. Compensation typically involves reimbursing with cash or in-kind payments people who have experienced wildlife damage to crops or livestock, or who have experienced personal injury or threats from wildlife [33, 5, 19, 12]. However, the compensation scheme has been criticized especially in African countries where it creates an atmosphere of mistrust and resentment due to the unfair compensation which results in direct and significant impact on human-wildlife conflict problem. In addition, compensation in form of money is criticized for many other reasons including cheating on claims, high administration costs and lack of involvement and participation of local community in the development of compensation programs that did not achieve their goals [34-37, 14, 38-39, 12]. In Rwandan protected areas in general and Nyungwe National Park (NNP) in particular, where surrounding communities and households don't have enough farmlands to ensure food security since agriculture is the main activity [40], crop raiding is also a big challenge [37, 41]. In NNP, poaching exploitation has considerable impact on conservation as the main form of wildlife overexploitation and habitat destruction [41-45]. Species such as small birds, rodents and primates are the main crop raiders in the periphery. The crossing of boundaries by wildlife and the threat of killing animals cause major problems between managers and residents neighboring the park. The crop raids prompt the shortage of food during the year, social instability and increase human pressure on natural resources and wildlife [46, 42]. Through Rwanda Development Board (RDB), the Government of Rwanda initiated a compensation program in 2012 to alleviate tensions from local communities due to crop

raiding. The compensation scheme pays money for damages caused by wildlife on the basis of field pictures, assessment of damages by agronomists and compensation forms after verification of claims by Conservation animators (ANICOs) for the Compensating Agency. Since the compensation scheme has been initiated, it is reported that the human-wildlife conflicts and tensions reached a low level while, at the same time, increased traps for animal killing are observed. Since the policy of monetary compensation was initiated, lived experiences of local communities with regards to the implementation of the compensation process and how it reduces human wildlife conflicts are still missing in the context of scientific research in Rwanda [47-48, 44]. The studies conducted around protected areas in Rwanda are more quantitative and mainly focused on examining the socio-economic status of local communities [49-50], evaluating community-based conservation [51], examining impact of tourism revenue sharing [52], measuring effectiveness, efficiency and equity in payments for ecosystem services [53], and evaluating forest dependence and its implications for protected area management [37]. Since the policy of compensation was initiated in 2012, its impact and lived experiences of the local community with regards to the compensation process and how it reduces human wildlife conflicts are still missing. Thus, the research aims to: (1) explore and understand the community's perceptions with regards to crop raiding and (2) investigate and understand how the community perceives the compensation fund and process initiated by RDB in NNP. It intends to check if local population opinions on wildlife and conservation are influenced or not by benefit scheme to offer job and support the development projects of the people living around NNP and compensation of wildlife damage to property, and to human life.

2. Materials and Method

2.1. Study Area

The Nyungwe forest was designated as a national Park in 2005 under the law n° 22/2005 on November 21, 2005. Previously, it has been under protection since 1933, when it was first gazetted as a forest Reserve. Now, NNP is one of the four Rwandan national parks and one of the largest remaining forest tracts in east-central Africa. It covers an area of 1019 km² and is a highly diverse hotspot as a home to endemic and globally threatened species. It supplies enormous ecosystem services, including water provisioning and tourism activities [54]. NNP is located in the Albertine Rift Valley on the Congo-Nile fracture and is adjacent to Kibira National Park in Burundi in the South, forming one of the largest blocks of mountain forest in Africa [37, 42]. The park is surrounded by Nyaruguru, Nyamagabe, Karongi, Nyamasheke and Rusizi districts (Figure 1). The main socio-economic activities around NNP are agriculture, livestock breeding, petty trading and other secondary activities. The main crops that are grown in the area are sorghum, maize, corn, sweet potato, potato,

cassava, beans, bananas, fruits, cabbages, tomatoes, carrots and coffee. NNP under the study has its periphery areas with human settlements and average farm size of 1 ha/household which is insufficient to ensure food security for an entire family since agriculture is the main activity [40]. Communities living in and around the Nyungwe forest have always relied on forest resources. They use the forest as a source of materials for construction, medicines, firewood, and grass for cattle. The people around Nyungwe National Park are primarily depending on agriculture for their livelihoods [48, 51]. Masozera has established the link between the

poverty of the local communities and the menaces to protected parks. A high percentage of the people around NNP are poor families with low education level and this is a challenge for both tourism and conservation development. He said, “The dependency on natural resources can be explained by the low agriculture income, limited access to job opportunities, food insecurity, illiteracy, and large size of local households (over six people per household) among other things [36]. In addition to poverty and population growth, poaching and crop raiding are the main form of wildlife overexploitation and habitat destruction in NNP [42, 44].

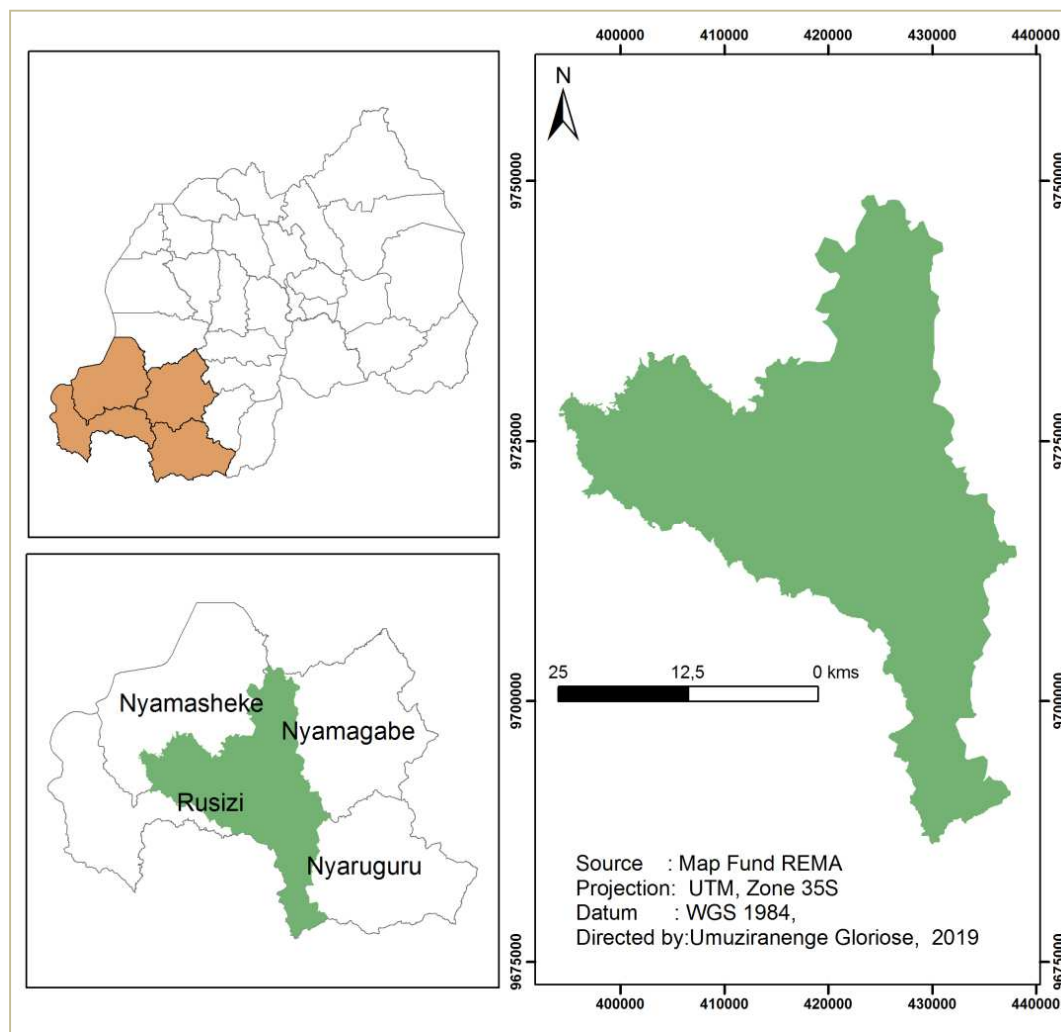


Figure 1. Location map of Nyungwe National Park.

2.2. Research Methods and Data

Due to the aim of the research to explore people's perceptions about crop raiding and compensation program, the qualitative method was adopted. In practice, qualitative approach is preferred when one seeks to explore how individuals interpret their experiences on a given matter [55-57]. It focuses on understanding people's beliefs, perspectives, experiences, attitudes, and opinions, perceptions about phenomena and situations or issues [58]. For the reason that the study is mainly aiming to explain how people perceive crop raiding as a big challenge in their daily life, and how their

perceive and understand the compensation program, qualitative approach fits the purpose of this study because beliefs, experiences and perceptions can be effectively explored through open expression of participants. Adding to that qualitative research approach produces the broad description of participants' feelings, opinions, and experiences and interprets the meanings of their actions. It seeks to understand and interpret more local meanings, recognizes data as gathered in a context and sometimes produces knowledge that contributes to more general understandings [55-57]. In this regard, participants express their beliefs, their feelings,

experiences and perceptions. Thus, the knowledge is constructed from the context in which it was generated. To approach the question about community perceptions on human-wildlife conflicts and compensation scheme, individual semi-structured interviews were used to allow respondents to express their personal experiences or views in their own words, which allows the interviewer to gain the interviewee's experience and knowledge [59]. This study used a theoretical sampling to progressively select participants [56]. In this regard, reference was made to the grounded theory as means of generating theories from empirical data [60-61]. In this process, the size of the sample is not pre-determined. Rather, the sample size is determined by the saturation point when no new data is being emerged [56-57]. During Theoretical sampling, choice of participants, data collection and data analysis are done concomitantly [56, 55, 62]. The respondents were selected purposively based on criteria such as gender, age, professional qualification and working experience, as well as living experience, are considered in the process of sampling (Table 2). Three categories of stakeholders were considered: (1) local community members, (2) RDB staff, and (3) NGOs members. The repartition and the relative importance of selected and interviewed respondents

are shown in Table 1. Respondents were asked five key questions: (1) to share how they perceive the challenge of crop raiding as neighbors of the park, (2) to show how crop raiding has impacted their households, (3) to tell what has been done do resolve the issue, (4) to indicate the challenges that are still found to resolve the issue of crop raiding both on the side of the local community and RDB, and (5) to tell how they perceive the process of compensation for crop raiding. At the end, they were asked to propose strategies to overcome existing challenges in line with crop raiding and compensation process. Interviews were recorded by means of audio-recording instrument. For ethical consideration, each participant was assigned a code to ensure anonymity and confidentiality. Collected data were transcribed and analyzed using the software MAXQDA. Deductive code delivered from the existing literature were developed and supplemented with new codes emerged from the interviews [63]. Comments were coded based on whether the problem is related to direct economic loss, food insecurity, physical injury, Government strategy to deal with crop raiding and perceptions with regards to the compensation process. Emerged perceptions were added in the coding system to be analyzed and compared to the theory of effective compensation model (Figure 2).

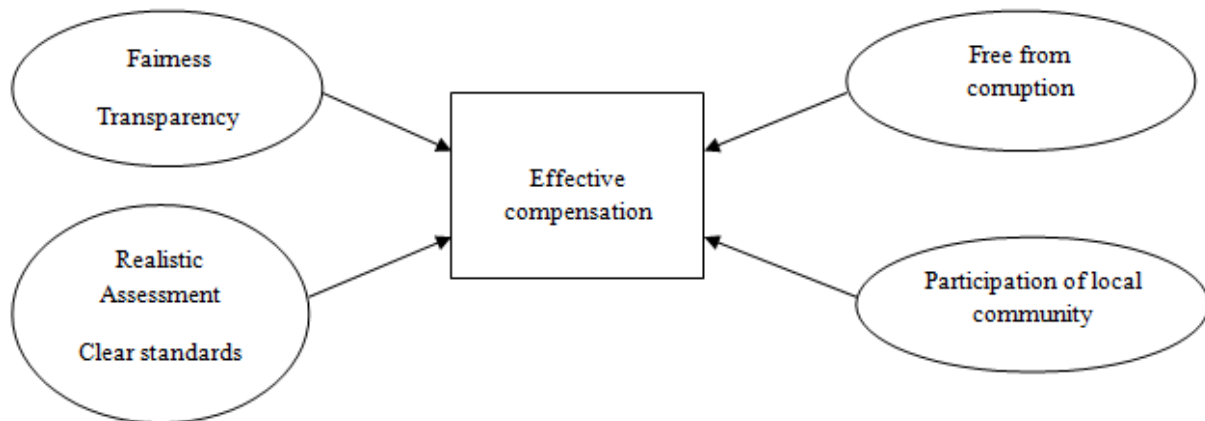


Figure 2. Model of effective compensation adapted from [64].

Data analysis was conducted using content analysis considering the views of respondents to the best information regarding the research questions [65].

Table 1. Repartition and relative importance of the participants to interviews.

Category of Stakeholders	Institutions	Number of Participants
Local Communities	Park's surrounding Communities	15
Decision makers	Rwanda Development Board	3
Conservation NGOs	Wildlife Conservation Society	2
Total		20

The local community is the social focus of this study, as they are placed as the change agents of the future in the policy, public debates and the success of natural resources conservation in Rwanda. Furthermore, it was presumed that communities are significant actors in conservation process and would, thus, provide important views about crop raiding as a challenge in their daily life and in the conservation process; how they perceive the compensation process and strategies to improve it. The governmental institution RDB

was included as decision makers and the primary actors in conservation of natural resources in Rwanda. Their views concerning crop raiding and the process of compensation are important for understanding key problems and later help in formulating better recommendations for the successful conservation of the Park. In terms of the three groups of stakeholders, local community, decision makers here RDB and NGOS, representatives from different community conservation programs were included.

Table 2. Characteristics of the respondents.

Interviewees Codes		WCS1	LC1	WCS2	RDB1	LC2	LC3	LC4	LC5	LC6	LC7
Sampling Criteria											
Age Years	25-30				x						
	30-35										
	35-40	x		x		x				x	
	40-45						x	x			
	45-50		x						x		
Gender	≥50										x
	F					x	x	x			
	M	x	x	x	x				x	x	x
Working and living experience Years	1-5				x						
	5-10	x					x				
	10-15			x							
	15-20					x					
	>20		x					x	x	x	x

Table 2. Continued.

Interviewees Codes		RDB2	RDB3	LC8	LC9	LC10	LC11	LC12	LC13	LC14	LC15
Sampling Criteria											
Age Years	25-30										
	30-35	x									
	35-40		x				x				x
	40-45			x						x	
	45-50							x	x		
Gender	≥50				x	x					
	F			x			x		x	x	x
	M	x	x		x	x		x			
Working and living experience Years	1-5	x				x					
	5-10		x								
	10-15										
	15-20						x			x	x
	>20			x	x			x	x		

3. Results and Discussion

3.1. Community's Perceptions on Human-wildlife Conflicts

The findings obtained on the community's perceptions on Human-Wildlife Conflicts and Compensation scheme by means of the coding system are shown in the Table 3 presented below.

Table 3. Community's perceptions on Human-Wildlife Conflicts and Compensation process.

Parent code	Codes	Coded segments of all documents
Human-Wild life Conflicts	Injuries	3
	Crop raiding	19
	Loss of compensation files	1
	Long process	9
Perceptions about Compensation process	Subjective assessment	6
	Expensive process	6
	Not fair	10
	No clear standards	3
	Ease and improve the process of compensation	5
Local community wishes	Increase collaboration and partnership approach	6
	Collective guarding sytem	8
	Increase financial support	5
	Continuous teaching and trainings	6
Government strategies	Fencing the park	9
	Raising awareness	15
	Financial support	20

The research findings of this study clearly show that most of participants interviewed rely on subsistence agriculture for their livelihood. Crop raiding was identified as the main

challenge faced by farmers because the local community claims to have lost crops to wildlife raid. All types of the crops including maize, vegetables, and others were devastated. They

were primarily raided by baboons, colobus monkeys, mangabeys and chimpanzees mainly during day time. According to respondents, the more dangerous and devastating animal species are baboons and chimpanzees. The human-wildlife conflicts continue to cause economic and livelihood losses to local communities in the boundary of NNP. Human-wildlife conflicts intensify during the dry season because of limited food available in NNP that force wildlife to damage crops and rise up the conflict between communities and wild animals. This finding was confirmed by previous studies conducted in Uganda [34]. These results are confirmed by other studies that indicated that the problem of crop damage is one of the most prevalent conflicts across the African continent [66, 8] and remains common due to the inefficient crop protection strategy and easy access to the farmer's land by wildlife [67].

The crop raiding affects the socio-economic improvement of rural communities by reducing financial income of farmers and negatively impact their health, education and economical status of the population. Wildlife can cause direct material and economic damage to crops, livestock, game species, and property [39, 12, 8]. Indeed, the crops play an important economical source for the populations because they supply food products to local small markets and to big cities in the region. To give an example, the losses of maize, an important crop in the study area are likely to cause an unbalanced effect on nutrition, particularly among children. This is also confirmed by a previous research for the case of the Volcano national Park in Rwanda [50]. Respondents indicate that wildlife attack on the communities which results in injuring people and to revenge people also kill the wildlife. This is confirmed by other studies conducted in Africa [21-23]. The crop losses to wildlife are not related only to an economic pressure on farming households. The losses encompassed many other fields in communities, including time and labor spent an increase of the need to guard the crops, which add the labor and disturbance of children's education due to their contribution in crop guarding as already proved by a study case in Sumatra [68]. In some cases, the risk of family members injury from wildlife, the diseases transmission and human mortality are expected as indicated by other studies [69, 3]. Findings indicate that local communities are facing serious negative consequences, including food insecurity. They indicated that crop raiding affected people who failed to feed their respective families, especially children, and therefore, malnutrition problems persist in some households. This finding confirms the strong link between crop raids and shortage of food during the year, social instability and increased human pressure on natural resources and wildlife as described by previous studies [46, 42]. The crop raiding also affect students' performance in schools and parents confirmed that the loss of agricultural production impeded the education programs as their economy relied up the agriculture production activity. In addition, parents are not capable of paying fees or providing food for school lunches, which contribute to the school children dropping out. People expressed fear of wild animals' attacks and indicated that most

of the time, the attacks occur when they are guarding their crops. The strategy of preventing the invasion of wildlife relies on sensitizing local populations, creating guarding groups and setting up crops that are not preferred by baboons, specifically. The farmers are required to adopt the new strategy for crop protection that scares baboons away from their fields considering the important conflicts existing between people and wild animals as already reported by other studies [10, 66, 8]. On one hand, local populations, being the victims of the depredation of crops, use the technique of guarding the field through the use of children to protect their crops. However, the use of children for the guarding of fields and crops has negative impacts on school performances as indicated by other studies [30-31, 18, 70, 32, 12]. They organize a surveillance group against animals. The guarding strategy seems not to be efficient despite the presence of buffer zones. On the other hand, some of the populations affirm that this strategy is effective because the baboons do not easily invade the crops at the time of the guarding that starts from the beginning of the agricultural period and ends at the crop harvest. People are aware of and manifest their concern about benefits of living along-side wildlife, such as gaining jobs to guide the tourists in NNP. The compensation scheme is considered when wildlife attacks villages and damages the crops of community members. The following section shows how the compensation fund is managed and how local communities perceive it.

3.2. Community's Perceptions on Compensation Scheme Process

The findings showed that crop damages caused by wild animals have often been evaluated by a joint committee of local authorities and park staff responsible for community conservation and compensation process. To access financial compensation, damage from crop raiding must be clear and obvious to apply for compensation (flattened or damaged crops) and local people claimants should be able to provide evidence. In practice, the evidences are made of photographs, ANICO's reports verifying a wild animal caused the damage and testimonies from local government leaders like village or cell leaders. The findings indicated in Table 2 showed that local communities are not satisfied with the compensation scheme due to the following main reasons: (1) low awareness of compensation, (2) little payment compared to crops damages and human attacks and (3) the delay of the payment. The interview with local community members indicated that the process of compensation is not easy. The requirement of presenting photos of wild animals during the crop raiding in the respective fields is very difficult to meet. The respondents claimed that the process of compensation took too long from the local administration to the headquarters in Kigali. This always creates conflicts between decision makers and local communities. The weaknesses and inefficiency of the compensation scheme confirm the findings of other studies [71, 35-37, 14, 38-39, 12]. In fact, for the African countries that pay compensation for damages caused by wildlife, the compensation procedure is so long that the victims abandon

claims. The compensation system is not in place to diminish the damages caused by wildlife conflicts considered as natural disasters [72, 73]. As indicated by other studies, the failure of most compensation schemes is related to the following reasons: (1) bureaucratic incompetence, (2) corruption, (3) fraud of all kinds, including falsified complaints, (4) the time and cost involved and (5) the moral hazards and practical obstacles that must be overcome. In addition, the compensation systems are not easy to manage because of required reliable and mobile staff capable of objectively verifying and evaluating damages to large areas as established by previous studies [74, 64]. This often leads to delays in decision making, undervalued payment, irregular or inappropriate compensation, or the rejection of compensation claims [72, 74, 39, 12]. According to many respondents, compensation agents verify claims on the field by visual assessment and decide on the amount of the money to compensate. However, this is seen by scholars as subjective in visual assessment that leads to conflicts and both under and overcompensation is counterproductive in the long run (Watve and al, 2016). This situation impoverishes the applicant population, which depends basically on agriculture. Moreover, monetary compensation is criticized because of the main three reasons: (1) it is unable to decrease the level of the problem of crop raiding, (2) it is expensive and slow to administer and (3) it has never sufficient funds to cover all compensation claims. However, it has the merit of reducing the incentive for self-defense by farmers. Compensation scheme should go beyond cash payments for direct losses, which we have found to be only one aspect of the human wildlife conflict problem. For instance, compensation of lost critical food resources associated with protected wildlife could be provided "in kind" in the short-term; innovative approaches to compensation elsewhere have repaid losses with replacement of animals, grains, or seeds [75]. The local community wishes to be paid on time and suggests the increase of the fund allocated to the compensation scheme, especially crop damages and human attacks.

4. Conclusion

The study on the community perceptions of human-wildlife conflicts and the compensation Scheme around Nyungwe National Park shows that since the last decade, number of strategies of which crop guarding and compensation schemes have been experienced to address the problems of crop raiding by wild animals and recurrent human wildlife conflicts. The study that aimed to assess community perceptions on human-wildlife conflicts and the compensation scheme as an efficient strategy for minimizing human-wildlife conflicts and developing a good harmony between stakeholders for sustainable natural resources management led to interesting findings. The study shows that the damages of crops by wildlife are the source of human-wildlife conflicts. It indicated that all kind of crops including maize, beans, sorghum and potatoes are ravaged mainly by baboons, chimpanzees, mangabeys and mountain monkeys. It also

reveals that most of the people living in the study area are victims of crop depredation and that there has not yet been effective strategy to minimize the frequency of crop raiding. Indeed, the compensation scheme and process seems not to work and is not effectively addressing human-wildlife conflicts. In fact, the study shows that the compensation scheme is still complicated and takes long to provide compensations in cases they are accepted. As a result, people affected by the phenomenon of crop raiding are complaining about socio-economic and livelihood losses that lead to the degradation of their relationship with park managers and to the development of self-defense activities. The population ascertains that improving the compensation scheme in a way that it facilitates local community to be compensated could provide a solution to minimize human-wildlife conflicts. Due to this, conservation organizations in collaboration with local communities could continue to develop innovative and sustainable solutions to address human-wildlife conflicts with relation to the realities on the ground. The study suggests the development of other solutions based on non monetary compensation forms like animals, grains or seeds in replacement of lost food resources associated with protected wildlife. The compensation scheme should go beyond cash payments for direct losses, which we have found to be only one aspect of the human wildlife conflicts. Moreover, the increase of the fund allocated to the compensation scheme and on time payments are suggested to repair more efficiently crop damages and human attacks and to minimize related human-wildlife conflicts. Furthermore collective guarding system was proposed as an innovative strategy from the local community and should be enhanced. Even though the local community advocate for fencing the park, they still perceive this strategy as expensive but still it could be a good strategy to reduce wild animals break out from the park.

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