

# People's perceptions on conservation opportunities and challenges for Nyungwe and Mukura national parks, Rwanda

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## Abstract

This study assesses people's perceptions of conservation opportunities and challenges. Research was conducted in Nyungwe and Mukura-Gishwati national parks, Rwanda. Data were collected through interviews, focus group discussions, and observational methods. Participants were selected purposively based on their living experience, societal role, and experience in conservation programs, and the data was analysed using qualitative methods. The findings indicate that the management of Nyungwe National Park has improved relationships between the local community and the Park. This is through the accommodation of local needs such as infrastructure (schools, health centres, and communal water tanks), and provision of income-generating activities. Also, there has been increased awareness in terms of park protection through a tourism revenue sharing scheme introduced in 2005. However, some cases of human-wildlife conflict, fire, deforestation, agricultural expansion, and wildlife hunting in Nyungwe National Park threatened conservation efforts. The relationship between Gishwati-Mukura National Park and the local communities has yet to be shaped; local communities currently receive no income or direct benefit from the Park. Threats such as mining activities, fodder cutting, firewood collection, and grazing were prevailing threats for Gishwati-Mukura National Park. To address these challenges, researchers recommend decision-makers increase initiatives that economically empower local communities and therefore reduce poverty as a critical indirect threat that hinders better conservation outcomes.

**Keywords:** community conservation, local people, conservation challenges, opportunities



## 1. Introduction

This study is focused on people's perceptions of conservation opportunities and challenges for Nyungwe and Mukura national parks. This paper introduces the study in three parts. First, the background of the study is described in Section 1.1, followed by an overview of related problems will in Section 1.2, by reflecting on the objectives of the study. Third, Section 1.3 illustrates and explains the conceptual framework.

### 1.1. Study background

Over the past 50 years, the loss of biodiversity and related environmental changes has become more prominent and frequent than ever before in human history. Many animal and plant populations have declined in either abundance, geographical distribution, or both (Dirzo and Raven 2003, MEA 2005, Jackson and Sax 2010). Although species extinction is considered a natural part of the Earth's history, current losses are the result of various human actions. Such losses have been exacerbated in many regions of the world through a burgeoning human population, leading to increased exploitation of natural resources including forest resources; this makes environmental conservation a critical and complex issue (Vitousek *et al.* 1997, Haddad *et al.* 2015, Nibeza 2015).

The population in the Albertine Rift mountains, where Rwanda is located, has significantly higher population densities than other parts of Africa (Burgess *et al.* 2007). This high population density has increased deforestation activities and, as a result, reduced the area of forests and natural ecosystems. These impacts have resulted in soil erosion, landslides, flooding, relocation of local people around natural forests, and high biodiversity loss due to changes in ecosystems (Armenteras *et al.* 2006, Andrew and Masozera 2010, Lambin and Meyfroidt 2011, Kideghesho *et al.* 2013, Kakuru *et al.* 2014).

Studies indicate that current rapid human population growth has increased the demand and competition for natural resources through over-exploitation at the highest level beyond the capacity of available resources. As the human population continues to expand, there is an increasing demand for agricultural land and other natural resources for industry in terms of land settlements, cultivation, and livestock grazing, wood and timber, and water resources for livestock and domestic needs. In conjunction with these demands there has also been increased contact with wildlife, resulting in human-wildlife conflicts such as crop raiding and wildlife attacks (Campbell *et al.* 2001, Loibooki *et al.* 2002, Kideghesho *et al.* 2005).

Conservation approaches had begun with "fortress conservation", which excluded local populations from the use of natural resources and did not share power with local communities or institutions (Siurua 2006, Doolittle 2007).

Blomley *et al.* (2010) reported that a new conservation approach known as integrated conservation and development (ICD) was introduced in the 1980s. The premise of the approach was that conservation

should be community-based to achieve community development. This would help minimise conservation challenges and ensure the socio-economic development of local communities.

Numerous studies have indicated that among ICD approaches, park management sharing the benefits of tourism with the local community has consistently been considered a unique method for community participation in natural resource conservation (Timothy 1999, Tosun 2000, Adams and Hulme 2001, Archabald and Naughton-Treves 2001, Li 2004, 2005, Cole 2006, Zacarias and Loyola 2017). Tourism revenue sharing (TRS) programs promote tourism development and ensure that local communities enjoy tangible benefits whilst participating in wildlife conservation. It is considered a way of reconciling conservation and development by ensuring that local community interests and knowledge are considered. Community involvement in tourism development leads to obtaining local community support for conservation initiatives, and also acts as a crucial component in achieving sustainable development of the industry.

Some researchers have also determined factors that lead individuals to become involved in illegal activities despite conservation efforts. For instance, Bulte *et al.* (2003) showed that some aspects of wildlife resemble the characteristics of a public good that the local community is interested utilising. The authors highlight the issue appropriate incentives from conservation to capture the full benefits from the required investments; however, these incentives continue to be elusive. In addition, other researchers have found that if protected areas act as a mechanism that generates hostility among local populations, some local people have gone to greater effort to utilise conserved lands illegally. This has required Park managers to implement the near-impossible job of enforcement in order to accomplish protection objectives. McGrath *et al.* (2018) illustrates how informal and unequal revenue benefit-sharing (money and/or information) may mediate jealousy and tension between communities living around protected areas.

## **1.2. Problem statement**

The government of Rwanda through the Rwanda Development Board (RDB), has initiated efforts to improve socio-economic conditions for local communities, whilst concurrently achieving conservation goals; these efforts include TRS with local communities. Since 2005, when this policy was initiated, more than \$5.8 million was invested in 647 development projects around Virunga, Akagera, and Nyungwe national parks. TRS financed a variety of projects, and community cooperatives were supported; from 2005 to 2017 approximately, 1 133 195 986 Frw was invested in 152 different developmental projects for local communities in districts adjacent to Nyungwe National Park (Imanishimwe *et al.* 2018).

However, negative anthropogenic activities are persistent and involve a full suite of direct drivers that cause biodiversity loss in protected areas (Imanishimwe *et al.* 2018). In terms of poaching activities,

683 snares were removed for each kilometre in central Nyungwe National Park, corresponding to an average of 0.65 snares/km (RDB 2015, Imanishimwe *et al.* 2018). Cutting trees and illegal mining are also dominant illegal activities threatening Nyungwe National Park, and similar cases were found in Gishwati-Mukura National Park, which has been highly degraded by human activities in recent history (REMA 2015). This study seeks to understand the benefits and challenges associated with conservation activities in Nyungwe and Gishwati-Mukura national parks. The study seeks to elucidate the reasons underpinning the persistence of illegal activities and conservation challenges in Nyungwe and Gishwati-Mukura national parks, despite the establishment of conservation initiatives and opportunities to conserve these national parks. The conceptual framework of this study is illustrated in Figure 1.

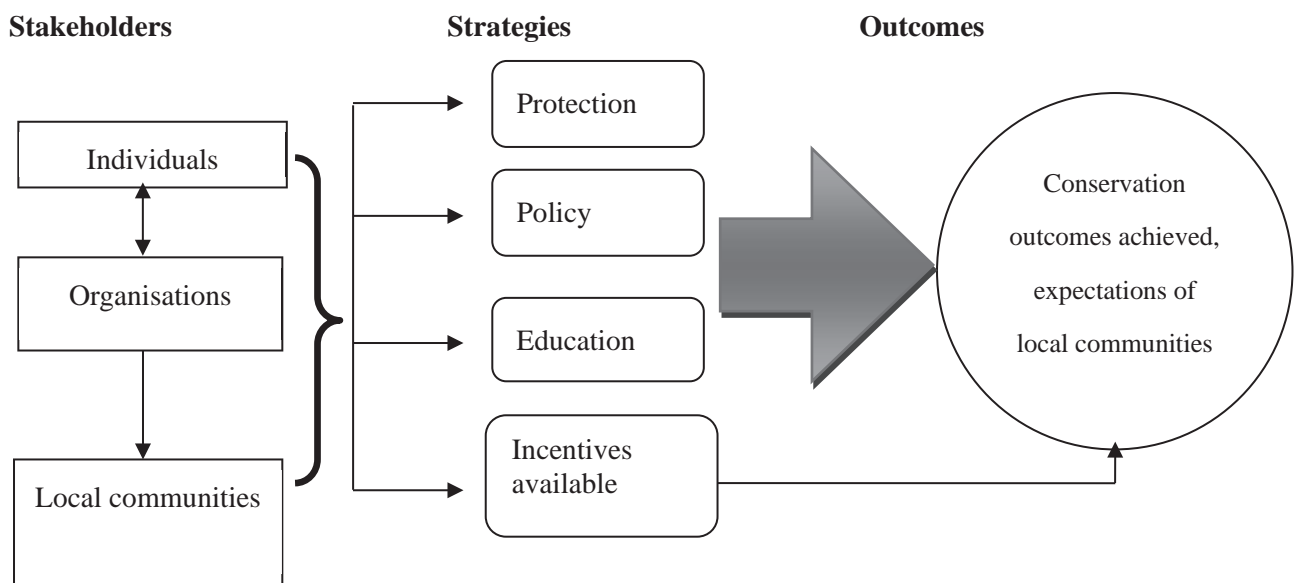


Figure 1. Conceptual framework based on a generalised conservation model from Salafsky *et al.* (2002)

To achieve better conservation goals, there is a need for clear collaboration between individuals who value conservation, and are equipped with the skills and knowledge for conservation efforts to be successful. Individuals involved in conservation take account of resource users, field practitioners, program managers, researchers, donors, and policymakers. On the other hand, individuals are generally associated with organisations that include non-profits, government agencies, universities, local communities, and research institutions. During the conservation process, all stakeholders are involved in the early stages of project initiation for the design stage, and the implementation, management, monitoring, and analysis phases. This requires a full understanding of the process and all stakeholders must have knowledge, administration, and communication skills and be equipped with conservation skills.

This model shows that during the conservation process, there must be clear strategies, or actions to

achieve better conservation outcomes, and these must be adopted by everyone in the process. In the past, conservationists used one broad approach: conservationist or direct protection through the establishment of parks or through limiting the harvest of key species. Based on this approach, the individuals or communities that were in close proximity to these resources had no rights to use or harvest these resources. The socio-economic conditions of the local community was not considered, and the local community was merely considered as the destructors of natural ecosystems and resources. Over time, the conservation approach has shifted to benefit local communities, including legal and policy reforms and environmental education efforts. More recently, conservationists have tried an alternative approach to community conservation to identify economic and other measures that would incentivise communities and other stakeholders to protect and conserve biodiversity.

## **2. Literature review**

This chapter presents the literature relevant to the findings of the study; the reviewed literature focuses on ecotourism as an empowerment tool (Section 2.1), conservation challenges, and threats (Section 2.2). The literature review refers to general discussions, focusing particularly on research centred in Sub-Saharan Africa and Rwanda. The literature review provides information on community participation in natural resource management from various perspectives.

### **2.1. Conservation opportunities through ecotourism**

Many authors indicate that various political and economic instruments that aim to combine environmental objectives with socio-economic development goals have been implemented by countries all over the world. This is based on the premise that if conservation and development can be linked, then the interests of both can be served (Berkes 2004).

Ecotourism has been proposed as a viable economic activity that may minimise negative human impacts on wildlife habitats, whilst providing an incentive to preserve natural areas. This approach also attempts to decrease the dependence on natural resources by local people through by substituting with alternative livelihood activities where natural resources are intrinsic to everyday livelihood. This is because the willingness of the local community to participate in biodiversity conservation and landscape protection is to some extent dependent on whether their basic needs are satisfied, because they rely on natural resources for their survival (Lin and Lu 2013, Fennell 2015). It is a process of providing alternative means of making a living, for example, the provisioning of alternative fuel to prevent forest degradation or economic compensation to outweigh the costs of changing to less environmentally harmful behaviours (Nilsson *et al.* 2016, Zacarias and Loyola 2017).

Ecotourism is an umbrella term defined as responsible travel to natural areas that conserve the environment and improve the well-being of local communities by focusing on increased economic

benefits, non-economic impacts, and policy processes (Zacarias and Loyola 2017). It also helps educate the tourist, provides funding for conservation, directly benefits the economic development and political empowerment of local communities, and fosters respect for different cultures and human rights. One of the principles in the ecotourism equation is that it provides financial benefits and empowerment for local communities through the provision of incentives (Kipkeu *et al.* 2014).

The economic benefits of ecotourism include the expansion of business and employment opportunities. The non-economic benefits include building capacity and the empowerment of poor communities, as well as the mitigation of environmental and socio-cultural impacts of tourism on the local community. Finally, policy processes include establishing more supportive and planned frameworks that enhance participation of the local community in the decision-making process; tourism must be financially reasonable, environmentally delicate, and socially suitable (Zacarias and Loyola 2017). Ecotourism is considered a sustainable development tool that offers many potential economic benefits for host communities compared to traditional commodity exports; this includes increased employment, improved socio-economic conditions, and greater market stability. It contributes to the economic growth of countries as it generates income for the local community, the creation of new employment opportunities, improvements to the structure and balance of economic activities in neighbouring communities, and the encouragement of income-generating activities (Ashley and Garland 1994).

Mpumalanga Province provides an example on how the local community has focused efforts on amplifying profits through tourism around national parks. In this province, towns contiguous with Kruger National Park, have begun focusing on offering additional tourism activities that has initiated businesses and, in turn, increased the positive effects of the Park in the district (Saayman and Saayman 2006).

Since 2005 in Rwanda, a TRS scheme was initiated that aimed to share 5% of tourism-generated income between the nation and the local community that is at its recreation centre. Whilst this community and bears the cost of preservation efforts, it also receives additionally advantages from conservation and thus, has a stake in its prosperity. In 2017, the Rwanda Development Board increased 5% to 10% of the TRS scheme and invested 40% of total revenue sharing funds to support local community projects; the remaining 60% of the funding was directed to local infrastructure. This is to ensure that the local community feels a sense of ownership of these parks. From the environmental perspective, this is one of the ways to increase awareness amongst the local community in hopes that they will support conservation and contribute to natural resource protection. The defenders of TRS philosophy, including Archabald (2001), argue that it promotes tourism development and ensures that local communities enjoy tangible benefits from the industry whilst participating in wildlife conservation (Archabald and Naughton-Treves 2001). However, Tosun (2000) has noted that sharing tourism benefits

with local communities has always been a controversial issue regardless of the community participation approaches adopted by the tourism industry.

Although there is no doubt that tourism can generate considerable benefits, another dimension of the problem is related to the inequitable distribution of costs, benefits, and power among different stakeholders at various scales. For example, there may be insignificant economic impacts at local destinations where only a handful of locals benefit from tourism or are included in decision making (Rice 2007, Blanco and Razzaque 2011). Estrella and Gaventa (1998) have observed that the community is often involved during the implementation stage, as opposed to the entire process, such as project identification, preparation, monitoring and evaluation (Estrella and Gaventa 1998). This failure to engage the community at all levels of the process led Reed *et al.* (2006) to suggest that engaging the community during the early stage of the project cycle provides better decision outcomes and strengthens trust between the community and conservationists. For Reed *et al.* (2007) the combination of local and scientific knowledge should be considered whilst empowering the community to monitor and manage environmental projects (Reed *et al.* 2007). Another constraint of ecotourism is that tourism development is associated with habitat degradation, increased water and energy use, increased littering, disruption of local social values, social imbalances, child labour and/or prostitution, among other negative impacts (Mugisha and Ajarova 2006). Ecotourism has been proposed as a tool for local community participation and empowerment by engaging locals as members of the public and as tourism-related decision-making bodies (Zhao and Ritchie 2007).

Participation in the decision-making process is a crucial determinant to ensure that the benefits local communities receive from tourism are partly guaranteed, and their lifestyles and values are respected. It is a means in which to enable a social environment where decisions and choices made either individually or collectively are directed at social transformation by strengthening the native ability to acquire skills, knowledge, power, and experience (Chambers 1994, Li 2005, Chok *et al.* 2007). Various studies, including Tosun (2006), have indicated that local community participation in tourism development may be achieved through involvement of a committee elected by local communities or through joint decision-making by the appointed and elected local government agencies or through consultation with the local community residents. However, this requires a large commitment by the government to empower the local community in terms of building beneficiary capacity, increasing effectiveness in the desire to share costs, and improving the efficiency and success of projects. As shown in the general model, conservation actions may be grouped into four categories: direct protection and management, law and policy, education and awareness, and incentives. All stakeholders are trained and equipped with knowledge that helps them fulfil their tasks, where incentives are provided to make them feel that they are part of the conservation process.

## 2.2. Challenges and threats to conservation

Figure 1 shows that they threat are factors that negatively affect biodiversity and the achievement of conservation goals (e.g. commercial logging or overfishing by local community members, mining, poaching, and others). During the conservation process, it is very important to identify who or what is linked to specific threat to integrate this type of information through the planning process.

According to Salafsky *et al.* (2002), when listing direct threats, it is necessary to indicate who or what is underpinning these threats. For instance, poaching to obtain meat for consumption at the household level differs from poaching by large industrial companies that sell bush meat. Threats are different when they are caused by individuals in the community as opposed to being instigated by the entire community or large companies. It is also necessary to identify internal and external threats when they are caused by local communities near or outside the area. It is very important to identify indirect threats and opportunities that are drivers that lead to direct threats (e.g. poverty, lack of education and awareness in the local community, or resource management institutions). The indirect threats critically induce direct threats such that when local communities are unempowered, they will directly rely on natural resources. For instance, by harvesting trees, killing wild animals to obtain food or to sell to acquire cash income. Whilst resources are considered economic resources, such as cash income they are also considered living resources, where local communities value these resources in terms of being sources for food and well-being.

Conservation challenges are not a new phenomenon in Rwanda. Currently, conservation has been a cornerstone strategy for national economies and a guiding principle to comply with Vision 2020 for the achievement of sustainable development goals (Nibeza 2015). Two of the most current pressing challenges in Rwanda are poverty reduction and conservation strategies for natural resources (Andrew and Masozera 2010). Poverty was a major cause for people to be involved in unsustainable and destructive activities to improve their well-being, whilst threatening biodiversity (e.g. by killing wild animals (Kideghesho *et al.* 2005, Wittemyer *et al.* 2008). Household poverty also limits access and usage of sustainable and environmentally friendly sources of energy. This is a challenge for the conservation of ecosystem goods such as firewood and charcoal, which are the most dominant and reliable sources of energy for cooking and heating in Rwanda. The increase in energy demands places greater pressure on woodland areas, driving significant land cover change in most unprotected areas (Kideghesho *et al.* 2013). The conservation of natural habitat may also create conflicts and negative relationships between conservation and human well-being, including loss of access rights to natural resources and human-wildlife conflicts (Gleason *et al.* 2011).

## 3. Material and methods

This study aims to explore public perceptions on conservation opportunities and challenge, using the



Nyungwe and Gishwati-Mukura national parks in Rwanda, as a case study. This section describes and explains the methodology and decisions regarding the empirical part of the study. First, the study area (Section 3.1) and data collection process (Section 3.2), is described.

### **3.1. Study area**

Data for this research was collected in villages directly adjacent to Nyungwe and Gishwati-Mukura national parks (Figure 2). Nyungwe National Park is a highly diverse hotspot in terms of endemic and globally threatened species that are recognised in the eco-region and internationally. The park supplies substantial ecosystem services, including water provisioning and tourist attractions (Banerjee *et al.* 2017), spanning an area of 1019 km<sup>2</sup> and is contiguous with Kibira National Park in Burundi. It is one of the largest remaining forest tracts in east-central Africa. Populations are at high densities, with an average of 300 inhabitants/km, where approximately 90% of the population is engaged in subsistence farming (Masozera *et al.* 2006).

Gishwati-Mukura National Park is made of two forest blocks that are distant from each other. We selected the Mukura forest because of its management history and site characteristics that differ from those of Gishwati. There has been investment into many conservation efforts and a conservation organisation has been in permanent operation. Mukura Park, a high-altitude forest located in the west of Rwanda, covers an area of 1798 ha (17.98 km<sup>2</sup>) in a densely populated area with many people living below the poverty line (Kakuru *et al.* 2014).

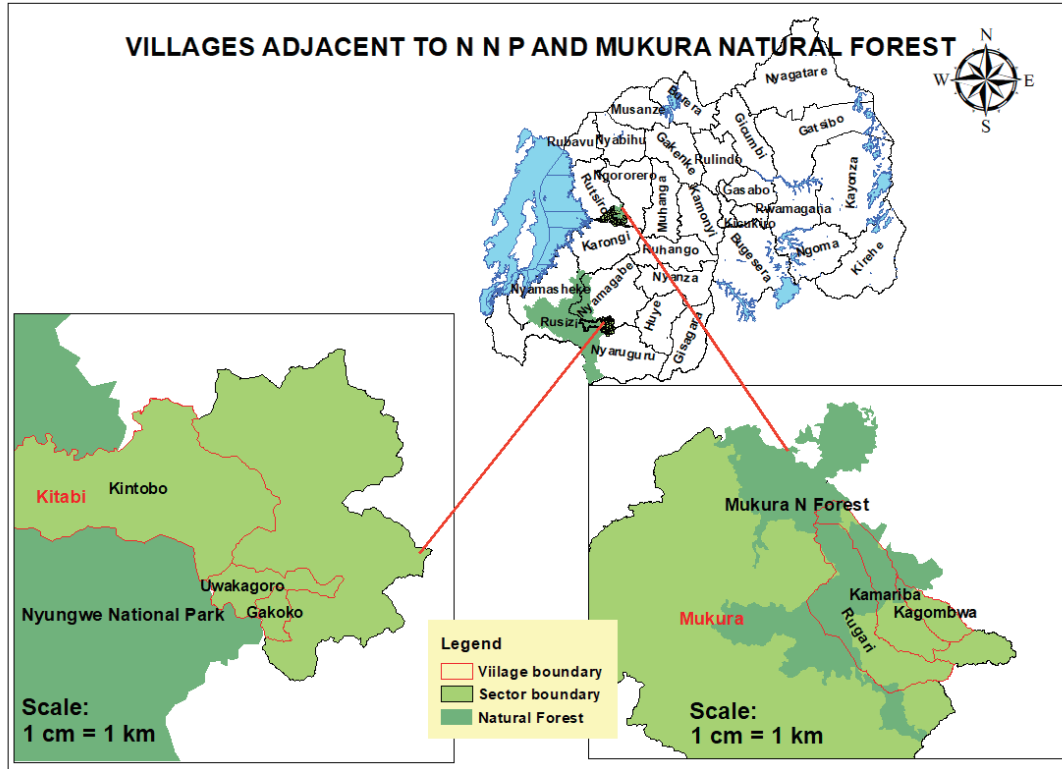


Figure 2. Location of study sites as of 8 July, 2018.

Villages constituting within the study area were selected purposively in Kitabi in the eastern part of Nyungwe National Park. The Kitabi sector located in Nyamagabe District was selected as a tourism sensitive site featuring many conservation programs. In Gishwati-Mukura National Park, villages in the Mukura sector of Rutsiro District were selected due to the significantly larger zone surrounding the forest, its location as an influential site for conservation project initiatives, and the presence of different categories involved in the management of the park. The latter includes local leaders, forest patrol teams, conservation program staff, illegal activity factors, and business centres.

### 3.2. Data collection

Primary and secondary sources of data were used, where the former was gathered via focus group discussion (FGD), in-depth interviews, and observations. Data was collected in May and June, 2018 to identify information related to factors that influence wildlife resources and conservation practices within the two parks. Secondary sources of data included journal articles, websites, and reports. Natural resource conservation organisations and the Rwanda Development Board, were consulted to harness ideas on the practice and challenges of wildlife conservation. The observation methods were also used to acquire further information on anthropogenic activities in both areas.

The selection of respondents was based on the purpose of finding individuals that were able to provide information related to the issues under investigation; as such, respondents were selected

purposefully (Creswell 2014). At each site, individual semi-structured interviews were framed for key persons as respondents. In Nyungwe National Park, interviews were administered to selected respondents in the Kitabi sector of Nyamagabe District. A number of participants were selected in the Kitabi sector: one group discussion with six park rangers, key respondents with 2 RDB staff, one local government staff, one representative of ex-poachers, and two respondents from the bee-keepers union association. It was presumed that such a selected sample would have sufficient experience and understanding of the conservation of Nyungwe National Park to link it with their past and present experiences. All participants were interviewed at their workplace. We selected qualitative interviews to go through further into the conceptions or experiences of participants in order to engage them to express their perceptions regarding the benefits and causes of illegal activities and how they are challenging conservation initiatives. Interviews were a practical means of understanding peoples' perspectives using qualitative research (Bryman 2012). Focus group discussions were also used to allow participants with similar backgrounds to express certain views through interaction.

At Mukura Park, we were deliberate in our selection of respondents; these included one local authority, one conservation project staff, and five community members involved in mining activities that were engaged through a focus group discussion. All semi-structured interviews were conducted in Kinyawanda, transcribed, and translated back into English. The collected information was then analysed using content analysis by identifying deductive codes derived from existing literature and supplemented with inductive categories that emerged from collected data.

For ethical consideration, prior to the beginning of the interview, participants were briefed on the aim of the research and the possible benefits of the research. The researcher clearly informed the participants that they were free to request clarification at any moment and these questions would be addressed. The researcher clarified that their true names would not appear in data analysis or publication of results. To anonymise participants, we used alphabetical letters to ensure confidentiality during data analysis and the presentation of results.

## **4. Results**

This study aims to understand the public perception of conservation opportunities and challenges around Nyungwe and Gishwati-Mukura national parks. This section summarises the findings, spanning the topics of conservation opportunities (Section 4.1), conservation challenges and threats (Section 4.2), and strategies and solutions to overcome conservation challenges (Section 4.3).

### **4.1. Conservation opportunities around Nyungwe and Gishwati-Mukura national parks**

The findings indicate that the local community neighbouring Nyungwe National Park benefited from TRS, where different infrastructure such as schools, roads, health centres, and water tanks were

developed. The results showed that the involvement and empowerment of local people was undertaken through activities-based cooperative associations and funded projects. Reference was made to resource use, awareness raising and skills for interactions, cooperative spirit promotion, and entrepreneurship. The findings at Gishwati-Mukura National Park indicate that local communities did not directly benefit from the park.

#### **4.2. Direct and indirect threats that hinder better conservation outcomes in Nyungwe and Gishwati-Mukura national parks**

According to the community adjacent to Nyungwe National Park, before this park was established as a national park, it was used by the local people as economic and social living resources. The local people collected timber and sold this to earn an income, produced honey inside the park, poached wild animals as a source of meat, mined inside the park to obtain resources for income generation, collected medicinal plants, and engaged in other activities such as agriculture. The majority of respondents indicated that these activities were very important to their livelihood. Since the establishment of this park as a national park in 2005, the Government of Rwanda through RDB set policies and regulations that protected the park from the human activities that destroy it. From this time, many initiatives and projects that were designed to protect the park were implemented. However, this park continues to be subject to threats related to illegal logging, human-wildlife conflicts, snares, and some cases of poaching wild animals. These were also reported by one of the RDB staff who indicated that mining, snares, logging (red wood), honey collection, planting marijuana inside the park, and poaching were some of the illegal activities they frequently encountered in Nyungwe National Park. They were also supported by a FGD, where park rangers reported fodder cutting, wood collection, tree cutting, mining, and snares as major legal activities found in Nyungwe National Park. This was reinforced in an interview with one local community member who reported cases of poaching and killing animals, and the culture of hunting as the primary job of hunters.

The results show evidence that older people still consider the Park as their own property and believe that hunting is not an illegal activity rather, it represents their job and is part of their culture, as confirmed by participants in the FGD. This was also confirmed by one of the RDB staff, who reported that the most critical challenges they face are bamboo cutting, the collection of grass for livestock, mining activities, fire or forest burning on the Burundi side, and the collection of wood for cooking. These activities are carried out by locals who mainly collect bamboo and produce handicrafts or use the resources collected to build their houses.

Respondents pointed out issues related to the provision of incentives where the oldest participants mentioned that for many years, they had been using the forest for their livelihoods, whilst it is now prohibited. As such, they desired extra support beyond the common benefits gained through TRS, such

as the constructions of school buildings and clinics.

Residents also complained about the lengthy process for wildlife damage compensation. Residents stated that the forest is their neighbour, and as such, it should be of great benefit to them. This is often the case for individuals that were either unemployed, poor, or older who had no other abilities to receive benefits introduced by the Park, such as through businesses and service delivery.

Challenges at the Nyungwe National Park site were shared in Gishwati-Mukura, where most respondents illustrated that fodder cutting, mining, firewood collection, and grazing were major threats to the latter park. This was emphasised by a community leader who stated that people are involved mostly in mining, fodder cutting, firewood collection, and tree cutting. The main reasons that force individuals to illegally engage in activities within Gishwati-Mukura park was the collection of resources like fodder, minerals, and firewood, as they do not have alternatives to these resources that are critical for their livelihood, and they lack of other income-generating activities to substitute for the resources collected from the Park.

According to the field observations and information from respondents, the most important conservation challenges to wildlife around the study area were habitat disturbance through agricultural expansion and settlement, and human-wildlife conflicts due to crop raider and livestock attack problems. Conflicts between wild animals and the community as well as park staff always occur once wild animals raid crops planed by the community and the community seeks revenge by killing wild animals. This constitutes a big challenge in the conservation of the Park. RDB staff emphasised this issue, stating that there were consistent conflicts between the RDB and the community. One of the rangers was killed by the local community in Nyamasheke District, and wild animals were also killed. RDB still faces challenges related to a community mindset that feels that meat from wild animals is sweeter than domestic animal meat and still considers resources from wild animals a traditional remedy. RDB also faces transboundary threats related to security in some parts of the park, posed by people from Burundi.

Results from field observations (Figures 3, 4, 5) show that many anthropogenic threats including bamboo cutting, mining activities, and fodder cutting, are the most crucial challenges directly impacting Mukura and Nyungwe forests, which may in turn compromise wildlife conservation in the area.



Figure 3. (left) Bamboo used to build roofs on some houses; (right) bamboo parts are left inside the bamboo forest zone.



Figure 4. (left) Active mining site extending, a long distance from inside Gishwati-Mukura National Park; (right) diversion of natural water courses and alteration of other forest resources for mining.



Figure 5. (left) Fodder cutting inside Gishwati-Mukura National Park; (right) severity and number of landslides at the highly sloping edges of Mukura Forest during heavy rainfall.

Key respondents were arguing that the community surrounding protected areas were causing problems in Nyungwe and Mukura forests through overgrazing, firewood collection, agriculture expansion, fire, and killing wild animals. All these constitute challenges for the conservation of both forests, as these areas still serve the community as a grazing and agricultural space. During the interview with one respondent named B, they stated ‘if Park managers increased the support to our initiatives, I think many of those involved in illegal activities could stop it and get involved in conservation activities’.

#### **4.3. Strategies and solutions to overcome conservation challenges**

In 2005, the government of Rwanda through the RDB initiated a TRS program, where a percentage of the revenue from tourism was returned to the community to support them through cooperatives starting from those involved in illegal activities; this percentage was initially 5%, and has now increased to 10% . In addition, some members of the local community reported that the money allocated to support community initiatives is insufficient, especially for unemployed youth, as this group are more involved with illegal activities as alternatives to earn money. To this end, there is a need to increase opportunities for local communities.

Respondents at Mukura forest also pointed to the issue of creating more opportunities that could serve as alternatives to illegal activities. This was highlighted in an FGD where participants reported that a potential alternative to illegal activities could be to provide progressive opportunities from different jobs to people involved in illegal activities as they currently face difficulty finding alternatives. They said that they should be paid regularly to avoid temptation when short of income. For them, this is one strategy that may be effective and facilitate a long-term goal to prevent illegal activities.

In terms of the restoration of degraded areas, local leaders emphasized the promotion of projects at this site, which would regularly provide job opportunities to individuals that were previously conducting illegal activities. For them, it is fair to implement measures aimed to protect the park due of its importance. They argued that if protection measures were not implemented, even those resources they were being collected illegally may become completely depleted. The prioritisation of strategies towards sustainable solutions has provided job opportunities to locals around Mukura as an alternative occupation for those previously involved in illegal activities. Many respondents identified other strategies such as the plantation of other trees and promotion of improved stoves that could serve as sources of energy to replace firewood use.

## **5. Discussion**

The loss of biodiversity and related changes in the environment have become rapid in the past 50 years, than ever before in human history. Many animal and plant populations have declined either in abundance, geographical distribution, or both; however, current losses are the outcome of human actions. Human activities have increased the extinction rate by at least 100 times compared to the natural rate (Dirzo and Raven 2003, MEA 2005, Jackson and Sax 2010).

Protected areas in Rwanda are threatened by an ever-increasing population, habitat loss, and degradation (Andrew and Masozera 2010). Due to the growing human population, there is increasing encroachment into the wildlife area and more lands adjacent to protected areas are used for farmland, creating stress for wildlife. Land use changes through agriculture, and rural and urban development activities degraded and altered wild areas, resulting in the extinction of wildlife species and natural areas, which serve as important habitat. For instance, a large area of land has been cleared within Nyungwe National Park to cultivate marijuana and set snares (RDB 2015).

This study assessed the opportunities and threats experienced by two National Parks that directly impact conservation activities. Lack of income-generating activities and alternative resources were identified as the main causes of illegal activities, especially at Mukura Forest. At Nyungwe, although the community recognises the intervention of RDB in the creation of other resources and job opportunities through TRS, there is a need to strengthen existing initiatives and increase income-generating activities in the area.

According to the Millennium Ecosystem Assessment (2005), the current major issue facing wildlife areas is the increase in human population around protected areas. This is the case for Nyungwe and Mukura national parks where deforestation, animal hunting, and land degradation are major threats for many wild animals. The human population around most protected areas over the years has been changing in terms of size, density and livelihood strategies (MEA 2005). These changes have influenced many attitudes and activities of the local communities surrounding protected areas that have provided the



results of this research. Additionally, anthropogenic activities have degraded the attractiveness of the wildlife and natural resources in the two natural forests.

In Nyungwe and Gishwati-Mukura national parks, as well as many areas abundant in wildlife, conservation initiatives are challenged by logging, mining, grazing, grass-cutting, and firewood collection (Kakuru *et al.* 2014) occurring at the forest edges and within the forest itself. This was similar the findings of this study for the Mukura sector around the Mukura forest, where frequent illegal activities included fodder cutting, firewood collection, and mining activities. The poor local communities still consider the forest as their own property, and do not consider firewood collection as a problem as they rely on it as a source of energy. However, it is difficult for a poor community to gain and maintain control over resources that produce high economic profits (Angelsen and Wunder 2003). Gleason *et al.* (2011) indicates that the conservation of natural habitat may create conflicts and negative relationships between conservation and human well-being, including loss of access rights and human-wildlife conflicts (Amare 2015). The most critical situation and a major concern for most people living near protected areas are conflicts that arise when wild animals raid crops and the local communities kill these animals.

People are also a source of conflict around protected areas; there have been incidences of the murder of park rangers, and the discrimination of individuals who work towards protecting areas. According to field observations and information provided by respondents, the conservation challenges are different in the two forests; Nyungwe National Park has many more rangers and many conservation challenges compared to the Gishwati-Mukura National Park. Other researchers have reported that the threats and resulting challenges around protected areas are the expansion of agriculture and settlement, competition with livestock and resources, and human and wildlife conflicts due to crop raiding and livestock concerns.

Human activities disturb the integration of natural forests, including Nyungwe and Gishwati-Mukura national parks. Threats identified by Kideghesho *et al.* (2013) and Kakuru *et al.* (2014), include logging, mining, grazing, grass cutting, and firewood collection, also emerged in this study. In Nyungwe National Park, the threat of snares was significant. It has been demonstrated that poverty at the household level causes people to engage in unsustainable and ecologically destructive activities to improve their well-being. These activities threaten biodiversity by killing wild animals and other species (Salafsky *et al.* 2002, Kideghesho *et al.* 2005, Wittemyer *et al.* 2008); these findings were echoed in this study, where poverty is considered an indirect threat that hinders better conservation outcomes.

### **5.1. Critical thoughts from researchers**

By comparing Nyungwe and Gishwati-Mukura national parks, conservation activities have brought significant changes to the livelihood of the community living around Nyungwe parks than the

community of Gishwati-Mukura National Park. Although conservation efforts in different parks has been substantial, illegal activities are still prevalent in both parks relating to common illegal activities such as wood collection, grazing, and wildlife killing for bushmeat. Mining activities are more prevalent in Gishwati-Mukura than in Nyungwe National Park.

Tourism-related activities are not accessible to all parts of Nyungwe National Park; this may lead to a lack of access to tourism opportunities, including employment and other incentives to individuals living near the Park and force them into disregarding conservation efforts.

At the Gishwati-Mukura National Park, residents mentioned that conservation awareness and campaigns should be strengthened. Tourism development initiatives should be established for a better understanding of the critical role of transitioning from natural forest to national park.

For illegal activities, some respondents mentioned that some individuals are involved in illegal activities as it is their habit, whilst others pointed out that these activities persist due to poverty and the failure of benefits from ecotourism to reach the entire community. This is also highlighted by Turiansky (2010), who recognised that community conservation mostly helps the wealthiest community members, increasing economic when revenue sharing remains at the community level instead of focusing on differing economic capacities of the community.

## **5.2. Conclusion and recommendations**

This study assessed the public perceptions on conservation opportunities and challenges for Nyungwe and Gishwati-Mukura national parks.

The study findings revealed the role of ecotourism in creating opportunities for local communities around national parks, such as income-generating activities, employment, development of infrastructure, and the increase of environmental awareness.

The major challenges that constitute direct threats to biodiversity conservation in Nyungwe and Gishwati-Mukura National Parks were overgrazing, human settlement, agricultural expansion, illegal logging, forest shrinkage, human-wildlife conflicts, habitat fragmentation, insufficient water, migration of wild animals, and cut-carry systems of grass, with some incidences of human-induced fire, mining activities, and killing and hunting of wildlife. These direct threats were emphasised by the significant poverty that is experienced by the local community living adjacent to Nyungwe and Gishwati-Mukura national parks.

The following recommendations and suggestions were made based on findings for the sustainable use of resources by minimising threats and human-wildlife conflicts. This research recommends that policy-makers strengthen the TRS policy to better achieve conservation goals and meet the expectations of local communities through different opportunities. Tourism activities should be initiated around Gishwati-Mukura National Park, and there should be concurrent increases in infrastructure, awareness,

and community participation in this Park. There should also be efforts to strengthen and improve the existing compensation policy in both parks.

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