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CONTRIBUTION OF PROTECTED AREAS TO THE LIVELIHOOD OF ADJACENT LOCAL COMMUNITIES

Case study of Nyungwe National Park in Kitabi and Uwinkingi Sectors

A thesis submitted in partial fulfillment of the requirements for the degree of Master in Biodiversity Conservation and Natural Resources Management

By

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Kigali, October 2024

DECLARATION

I, Pascaline NIYONSABA INGABIRE, declare that this master's dissertation "Contribution of Protected Areas to the Livelihood of Adjacent Local Communities, Case Study of Nyungwe National Park in Kitabi and Uwinkingi Sectors" is the result of my own work in partial fulfillment of the requirements for the award of a master's degree in Biodiversity Conservation and Natural Resource Management at the University of Rwanda, College of Science and Technology and has not been submitted for any other degree at the University of Rwanda or any other institution. All sources I have used or quoted have been indicated and acknowledged in the references.

Date: 21 /10 / 2024

Signed by:

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APPROVAL

I certify that this research project entitled "Contribution of Protected Areas to the Livelihood of Adjacent Local Communities, Case study of Nyungwe National Park in Kitabi and Uwinkingi Sectors" was done under my supervision and has been submitted for examination with my approval.

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DEDICATION

This dissertation is dedicated to my beloved departed sister NIYONSABA ISHIMWE Sandrine, my dearest parents NIYONSABA Innocent and MUKANTWARI Stephanie, my dear siblings N. IRADUKUNDA Blaise Pascal, N. ISHIMIRWE Landry Michel and N. CYIZA Aime Bruno.

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LIST OF ABBREVIATIONS

CBD**:** Convention on Biological Diversity

NISR: National Institute of Statistics of Rwanda

PA: Protected Area

PAs: Protected Areas

IPBES: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

IPRC: Integrated Polytechnic Regional College

NTFPs: Non-Timber Forest Products

NGOs: Non-Governmental Organizations

GoR: Government of Rwanda

ANP: Akagera National Park

GMNP: Gishwati-Mukura National Park

NNP: Nyungwe National Park

VNP: Volcanoes National Park

MINILAF: Ministry of Lands and Forestry

TRS: Tourism Revenue Sharing

NBSAP: National Biodiversity Strategy and Action Plan

ORTPN: Rwanda Office of Tourism and National Parks

MoE: Ministry of Environment

SPSS: Statistical Package for the Social Sciences

ABSTRACT

Preserving biodiversity is crucial, and Protected Areas (PAs) are essential for this purpose. However, the impact of PAs on local communities' livelihoods is a critical aspect of conservation efforts. Negative effects on these livelihoods can reduce support for PAs, leading to conflicts as PA managers strive to protect resources that locals depend on. The study presents the findings of research conducted in the Kitabi and Uwinkingi sectors in the Nyamagabe district. The research aimed to investigate the contribution of protected areas in improving the livelihoods of adjacent local communities. Specifically, this study aimed to analyze the benefits shared by Nyungwe National Park to improve the livelihoods of adjacent local communities, to identify the challenges associated with Nyungwe National Park and the local communities, and to propose suitable strategies to enhance the positive contributions of Nyungwe National Park to communities' livelihoods. The study used questionnaires, field observations, and key informant interviews to gather data. A sample of 100 people from the population participated in the survey. The study showed that communities living near Nyungwe National Park experience both positive and negative effects that influence their attitudes and impact their livelihoods. The park provides benefits to the local communities such as contributing to forest protection, offering opportunities for beekeeping, generating employment, and education, and involving them in ecotourism activities. Also, the findings revealed that there is a weak association between education level and perception of the benefits of the park. However, there are challenges such as crop loss, limited access to resources, displacement, and restrictions on land use that hinder the full potential of the park in improving people's lives. There was a statistically significant association between proximity to the park and challenges arising from NNP. To enhance the benefits of NNP and improve communities' livelihoods, respondents suggested increasing revenue sharing from tourism, providing employment opportunities to nearby communities, implementing capacity building programs, and improving compensation around the park. The study highlights the importance of the relationship between protected areas and the livelihoods of local communities in conservation efforts. Policymakers and conservation managers need to involve local communities, ensuring their active participation in decision-making processes and fair sharing of benefits.

Keywords: conservation, livelihoods, local communities, protected areas, tourism

Chapter 1: INTRODUCTION

Preserving biodiversity is paramount, and Protected Areas (PAs) play a vital role in this endeavor. Despite changes in conservation science, these areas provide a comprehensive approach to conservation that is essential for safeguarding our planet's natural resources (Rechciński et al., 2019). Protected areas now cover approximately 17% of the Earth's land surface (IPBES, 2019, as cited in Mbise et al., 2021).

Poverty is a pressing concern that poses a great challenge to the local communities in developing nations (Agyeman et al., 2019). It is a major contributor to environmental degradation and biodiversity loss (CBD, 2020). In Rwanda, tourist attractions of high biodiversity value are often surrounded by poor, densely populated communities (Sabuhoro et al., 2017).

A growing consensus among conservationists holds that the effective management of protected areas (PAs) requires the support and cooperation of local communities (Brandon & Wells, 1992). This study aimed to investigate the contribution of protected areas in improving the livelihoods of adjacent local communities. This is essential for understanding the complex interactions between conservation and human well-being. Also, it will provide evidence to guide conservation policies and practices. This chapter contains the background of the study, problem statement, research objectives, and research questions.

1.1 Background of the study

The relationship between protected areas and the livelihoods of local communities is a fundamental consideration in conservation efforts. It is imperative to recognize that conservation can have a profound effect on the livelihoods of local people, and negative impacts on their livelihoods may lead to a lack of support for the continued existence of protected areas. This issue is particularly acute in areas where local communities depend on natural resources for their sustenance (Marshall, 1995).

In developing countries, resources are often limited, coupled with the demand to use them locally, which may impede the ability to balance conservation and resource utilization (Alpert, 1996). Forest-adjacent communities within developing nations have historically relied upon forest resources as a means of subsistence but face challenges due to rising population growth and land reduction. Forested areas offer benefits such as commercial exploitation, tourism, Non-Timber Forest Products (NTFPs), subsistence livelihood, and ecological services (Babigumira et al., 2014). As a result, there is a need for more dynamic and adaptable protection strategies that can account for these contextual challenges (Alpert, 1996).

Establishing protected area systems in the Albertine Rift region has led to the displacement of local communities from their livelihood sources, causing resentment and conflicts towards the protected areas. To mitigate these issues, protected area authorities and conservation NGOs launched various programs such as revenue-sharing schemes, resource access programs, income-generating activities, problem animal control techniques, and collaborative resource management, aiming to reconcile communities with conservation and share the benefits of protected areas (Kanyamibwa, 2013).

Rwanda's natural resources are critical to its development. These resources, including fertile soils, diverse flora and fauna, natural forests and wetlands, unique landscapes, abundant surface and groundwater resources, and valuable minerals, provide food security and employment opportunities and form the foundation of the national economy. Their conservation and sustainable management are essential to safeguard their finite nature and support the country's economic development objectives (NBSAP, 2016).

Rwanda's protected areas, including national parks, natural forests, and wetlands, are home to a diverse range of species making the country rich in biodiversity (GoR, 2014). Rwanda has designated four national parks, Nyungwe National Park (NNP), Akagera National Park (ANP), Volcanoes National Park (VNP), and Gishwati-Mukura National Park (GMNP). Tourism is a rapidly growing industry in Rwanda, which brought in approximately US$404 million in 2016, making it the country's largest source of foreign exchange. This industry is heavily reliant on the conservation of the VNP's mountain gorillas, as well as the preservation of the Nyungwe, Mukura-Gishwati, and Akagera National Parks (MINILAF, 2018).

To promote integrated wildlife conservation and rural development, Tourism Revenue Sharing (TRS) has become a popular strategy for reconciling communities with conservation and sharing the benefits of protected areas (Kanyamibwa, 2013). However, different studies' results reported otherwise. For instance, according to Munanura et al., (2016), the TRS policy had little impact on conservation near VNP due to acute food insecurity, limited livelihood capabilities, and structural constraints, such as association membership fees, poor conservation linkages, and limited participation of the disadvantaged residents, among others. Akayezu et al. (2022) found that both qualitative and quantitative study results suggested that the TRS program did not fully achieve its goal of improving community well-being around Nyungwe National Park.

While existing studies contribute valuable insights, this study aimed to investigate the contribution of protected areas in improving the livelihoods of adjacent local communities, taking a case study of Nyungwe National Park. This research is essential for better understanding the complex interactions between conservation and human well-being. Hence, this will inform conservation and development strategies that promote the coexistence of protected areas and local communities, ensuring both environmental sustainability and the well-being of human populations.

1.2 Problem statement

Conflicts between protected areas (PAs) and neighboring communities often arise because PA managers need to safeguard resources that sustain the livelihoods of locals living near the PAs (Kanyamibwa, 2013). A growing consensus among conservationists holds that the effective management of PAs requires the support and cooperation of local communities. It is now widely acknowledged that prohibiting individuals residing near PAs from accessing these resources without offering viable alternatives is both politically unfeasible and ethically unjustifiable (Brandon & Wells, 1992).

The fate of African communities living near protected areas is intertwined with the well-being of the parks. With high poverty rates, these communities often rely on park resources to survive. However, this reliance often leads to forest degradation and a decline in wildlife populations due to illegal hunting for bush meat (Akayezu, et al., 2022). Also, people who live near protected areas often experience conflicts between humans and wildlife (NBSAP, 2016). Hence, to ensure that resources are managed sustainably, it is crucial to involve local communities in the process.

The revenue-sharing program aims to achieve sustainable conservation of the national parks by involving neighboring communities through improving their livelihoods (ORTPN, 2005, as cited in Kanyamibwa, 2013). A recent study by Spenceley et al. (2019) examined how tourism revenue sharing works in African protected areas. They found that while local communities generally appreciate these programs and the benefits they bring, there have been instances where implementation hasn't been successful.

Rwanda's natural resources are critical to its development (NBSAP, 2016), yet they are under immense pressure due to various competing land use activities, including agriculture, human settlement, industry, and infrastructure development. These activities are relentlessly depleting the country's natural wealth and ecosystems (MoE, 2019). And also, while sharing tourism revenues with communities around

Nyungwe National Park is helpful, poverty remains a challenge for these communities (Akayezu, et al., 2022).

This study provides insights into how Nyungwe National Park in Rwanda specifically contributes to the improvement of the livelihoods of the local communities living nearby.

1.3 Research objectives

This study aimed to investigate the contribution of protected areas in improving the livelihoods of adjacent local communities. Specifically, this study aimed:

- ✓ To analyze the benefits shared by Nyungwe National Park to improve the livelihoods of adjacent local communities.
- ✓ To identify the challenges associated with Nyungwe National Park and the local communities.
- ✓ To propose suitable strategies to enhance the positive contributions of Nyungwe National Park to communities' livelihoods.

1.4 Research questions

- ✓ What kinds of benefits are available for communities adjacent to Nyungwe National Park?
- ✓ What are the challenges faced by local communities due to the presence of Nyungwe National Park?
- ✓ What are the strategies to enhance the positive contributions of Nyungwe National Park to communities' livelihoods?

Chapter 2: METHODS

2.1 Study area

Nyungwe National Park is a lush, tropical mountainous rainforest situated in the southwest region of Rwanda. The park's geographical coordinates are 2° 0' 0'' S -3° 0' 0'' S and 29° 0' 0'' E -29° 30' 0'' E. It encompasses an area of about 1,019 km^2, which includes the fragment of Cyamudongo Forest that covers approximately 4 km^2, while Nyungwe National Park covers around 1,015 km^2. The park is connected to Kibira National Park in Burundi towards the south, and both of these parks constitute the largest remaining Afromontane forests in Central Africa (Plumptre et al., 2002).

Nyungwe was declared a forest reserve in 1933 but has since lost nearly 20% of its surface due to logging and conversion to agriculture. Nyungwe National Park is a highly diverse and significant montane forest located in East Africa. It is renowned for its abundance of primate, bird, and plant species. The flora of Nyungwe is exceptional, with 47 locally endemic flowering plants, and approximately 280 Albertine Rift endemics (Fischer & Killmann, 2008, as cited in Nsanzurwimo, 2021). Nyungwe is home to 13 different types of primates, around 86 mammal species, 280 bird species, up to 230 tree species, and numerous Albertine Rift endemics (Plumptre et al., 2007).

2.1.1 Nyamagabe District

This study was conducted in the communities adjacent to the Nyungwe National Park. Nyamagabe District located in the Southern Province of Rwanda is one of five districts neighboring Nyungwe National Park. Nyamagabe District has 17 sectors. Five of these sectors namely Kitabi, Gatare, Uwinkingi, Buruhukiro, and Nkomane are adjacent to the Nyungwe National Park (NNP). Two sectors of Nyamagabe District were selected for this study, Kitabi and Uwinkingi. Four cells within these two sectors were chosen: Kagano and Mukungu (of Kitabi Sector), as well as Rugogwe and Bigumira of the Uwinkingi Sector. Those four cells were selected purposefully based on their proximity to NNP, with two cells (one cell from Kitabi Sector and another from Uwinkingi Sector) being nearer while the other two cells are farther (Figure 1). The areas closest to the park are thought to have a greater influence on and from the park and this allowed a comparative study design.

Nyamagabe District has an area of 1090 Km^2. It has a humid tropical climate that is cooler because of its high altitude. It gets a lot of rain each year, between 1300 and 1450 mm, and the average temperature is a pleasant 18 degrees Celsius. However, the soil there is acidic and not very fertile, and erosion has made it worse. Farmers have been dividing their land into smaller and smaller pieces to grow more

crops. But this, along with not using the best farming methods, has reduced the land's productivity (Kiyani et al., 2017).

According to the Fifth Rwanda Population and Housing Census conducted in 2022, Nyamagabe District has 371,501 residents with 441 inhabitants/Km^2. Kitabi is one of the most populated sectors of Nyamagabe District. A little over half of the people living in Nyamagabe District are women, making up 52.4% of the population. Additionally, the district is mostly rural, with 89.1% of residents living in rural areas compared to only 10.9% living in urban areas. The majority of households in Nyamagabe District (86.9%) are involved in agriculture. The most cultivated crops include maize, sorghum, rice, beans, wheat, cassava, sweet potatoes, yams, soybeans, Irish potatoes, bananas, vegetables, and fruits (NISR,2023).

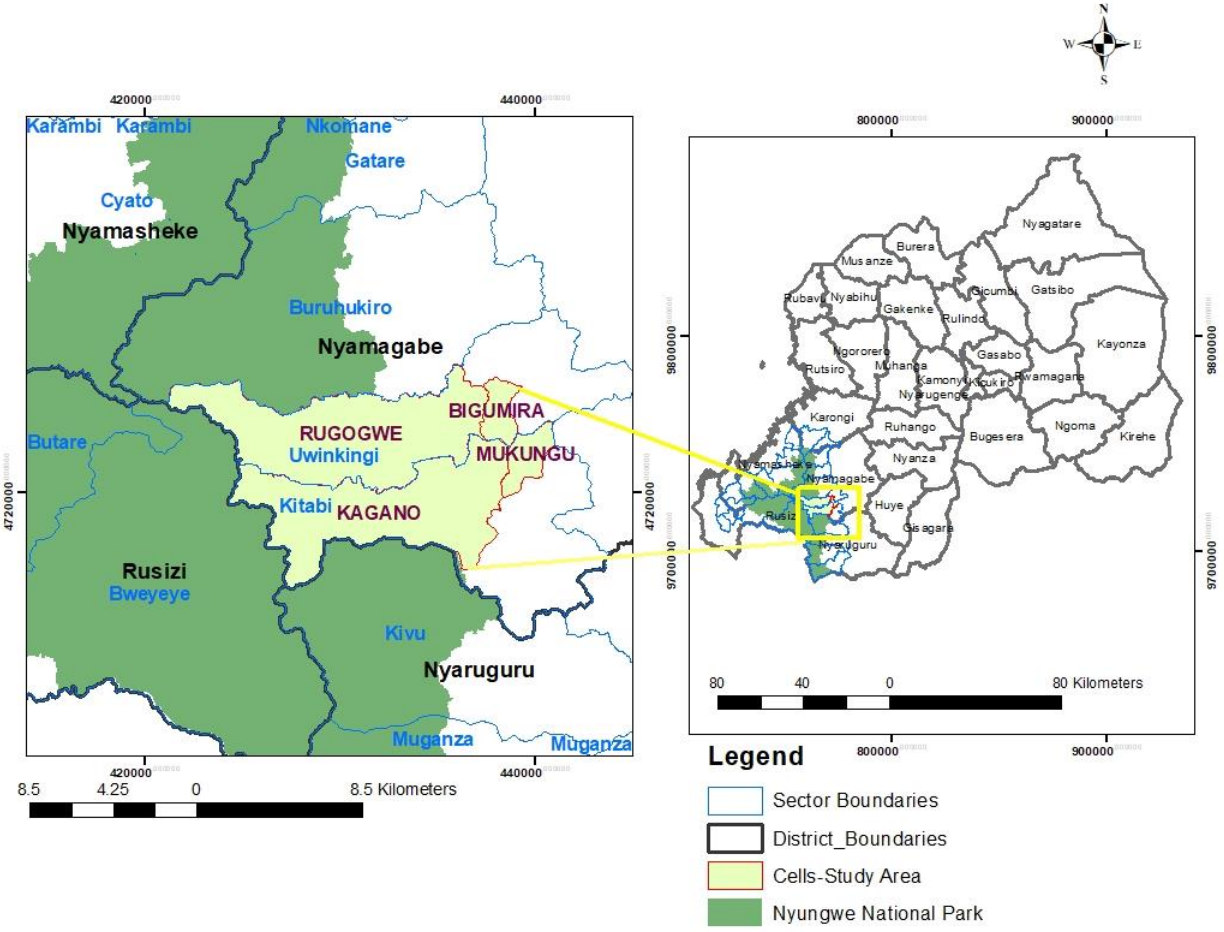

Figure 1: Map of the Study Area in Nyamagabe District, Rwanda. *Created by Pascaline NIYONSABA Ingabire, 2024*

2.2 Research design

Research design refers to the framework that guides the process of conducting research. It is a conceptual structure that helps researchers plan and carry out their studies effectively (Cooper & Schindler, 2014). Also, a research design is defined as a set of conditions for data collection and analysis that prioritizes relevance and efficiency (Selltiz et al., 1962 as cited in Kothari, 2004). Due to limited time and resources, the researcher adopted a cross-sectional survey design in this study. A cross-sectional study is a research design in which data is collected from many people at one time. Being both fast and cost-effective, cross-sectional studies are ideal for tackling many research questions within a short time frame (Thomas, 2023). This study focused on the opinions of communities on the contribution of protected areas in improving the livelihoods of adjacent local communities. This involved the use of both qualitative and quantitative research designs. The qualitative method helped to analyze the views or opinions of the respondents.

Also, the study used both primary and secondary data. Primary data were obtained from the field within the designed sample from the total population while secondary data were obtained from different consulted sources. The data were collected from different groups of respondents including local communities, and local leaders from two different sectors. In this study, different sampling techniques were used namely: Purposive Sampling Technique and Simple Random Sampling to ensure that the sample accurately represents the population of interest**.**

2.3 Data collection

2.3.1 Simple random sampling

The simple random sampling method ensures that all units in the sample have an equal chance of inclusion (Kumar, 2011). When the population is homogeneous, this technique yields more accurate and unbiased parameter estimates (Singh & Masuku, 2014). This technique was used because it gives every member of the population an equal chance of being selected for the sample and it reduces biases. The technique was used to get communities from the selected cells of Kagano, and Mukungu (of Kitabi Sector), as well as Rugogwe and Bigumira (of the Uwinkingi Sector) who were the key respondents in this study. The first house to begin data collection was chosen at random. The simple random sampling was used in this study due to the homogeneity of the population units.

2.3.2 Purposive sampling

This sampling technique involves selecting participants based on what the researcher is trying to learn and the specific goals of the study (Singh & Masuku, 2014). With this technique, participants are chosen

based on specific criteria determined by the researchers rather than random selection. Thus, it was used to get four local leaders of the selected sectors and their cells. These individuals have firsthand knowledge crucial to the research that wouldn't be available in published sources or elsewhere. In this study, simple random sampling was used to collect quantitative data, whereas purposive sampling was used to collect qualitative data.

In the context of selecting areas to sample in this study, the researcher deliberately selected specific sectors and cells based on their proximity to the Nyungwe National Park. This sampling approach helped to get relevant and meaningful data to address the research questions. Also, it helped me get valuable insights.

2.3.3 Sample size

In a research study, it is usually impractical to study the whole population, hence, researchers make use of a sample to select research subjects who would represent the whole research population. According to Dattalo (2008), a sample is a subset of a population's elements selected using a sampling strategy. The ideal sample is representative of the population. According to Kumar (2011), the sample size, denoted by the letter n, refers to the number of individuals who provide the required information. The size of a sample is critical in determining the statistical precision with which population values can be estimated.

The formula used to determine the sample size is based on the work of Yamane (1967). Here it is:

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

Where **N:** is the total population, **e**: stands for the sampling error (0.10), and **n**: is the total sample size.

This study was conducted in two sectors of Nyamagabe District which are Kitabi and Uwinkingi sectors. According to NISR (2023), the Kitabi Sector has a total population of 28,172 distributed in 6,600 households. While Uwinkingi Sector has a total population of 25,874 distributed in 6,295 households. So, the total number of households equals to 12,895. Therefore, from the data and equation above, we have:

$$\mathbf{n} = \frac{12895}{1+12895\,(0.10)^2} \mathbf{= 99.230 \sim 99\ households}$$

In this study, the number of households was the sample unit. Thus, the sample size is 100 respondents including local communities and local leaders.

In addition, to obtain individual respondents from the cells, I used the Javeau formula (1985), stated as follows:

$\mathbf{n_i = \frac{Ni * n}{N}}$,

where $\mathbf{n_i}$: the sample size in the stratum**,** $\mathbf{N_i}$: the size of the population in the stratum, **n**: the sample size of the study, and **N**: the size of the target population.

Therefore, from the data and equation above:

$\mathbf{n_i = \frac{6600 * 99}{12895}}$ **= 50.6 ~ 51 Respondents**

So, in Kitabi Sector, 52 respondents were provided questionnaires to fill out. This means that each cell had 26 respondents including their leaders and one official at the sector level.

$\mathbf{n_i = \frac{6295 * 99}{12895}}$**= 48.3 ~ 48 Respondents**

In Uwinkingi Sector, 48 respondents were given questionnaires to fill out. Each of the two cells had 24 respondents including their leaders.

2.3.4 Data collection instruments

Different research instruments or tools were used to gather information between April and May 2024. These included the questionnaire, semi-structured interview, observation, and documentation.

2.3.4.1 Questionnaires

Questionnaires consist of a series of written or electronic questions that participants are asked to answer (Kothari, 2004). The questionnaire is a versatile tool that can collect both qualitative and quantitative information (Singh, 2006). In this study, they consisted of both open-ended questions allowing respondents to provide detailed answers, and close-ended questions with predefined response options. 100 structured questionnaires were used to collect data from residents of two selected sectors of Kitabi and Uwinkingi in Nyamagabe District and their leaders.

They were administered to 96 respondents from randomly selected households from Kagano, Mukungu, Rugogwe, and Bigumira cells and to four respondents purposefully selected. According to Kothari (2004), structured questionnaires consist of specific, concrete, and predetermined questions presented in the same wording and order to all respondents. Standardization is used to ensure consistent

responses to the same set of questions. The format of the question, whether closed-ended or open-ended, must be predetermined and not formulated during the questioning process.

Surveys were carried out from house to house with the Head of the household or the wife or another adult person representing the household. Questionnaires were in both English and Kinyarwanda languages since most of the local communities do not understand English. The questionnaires covered respondents' demographics, benefits provided by NNP to improve the livelihoods of neighboring communities, the challenges encountered as a result of the park's existence, and suggestions to improve their livelihoods.

Once drafted, the questionnaire was pre-tested by administering it to a small group of people who answered the questions it contained. From this first confrontation with a minimum of a sample called to respond to the questionnaire, I analyzed the reaction to the content of the questions, whether they were clearly formulated, and whether or not they piqued the interest of the respondents. Then, the questionnaire was revised based on the results of this pre-test (Manescu, 2015).

2.3.4.2 Semi-Structured Interview

An interview is a type of focused conversation where two or more individuals interact either in person or virtually to collect data (Kumar, 2011). A semi-structured interview is an interview approach that uses both prepared open-ended questions and follow-up inquiries to delve deeper into specific topics and responses, allowing for a richer understanding of the participant's perspective (Campbell et al., 2013). This qualitative method was used with key informants who are four local leaders from the selected sectors and cells to gain deeper insights. The individual semi-structured interviews were conducted in Kinyarwanda, transcribed, and translated back into English.

2.3.4.3 Documentation

Document analysis entails a close examination of various written and electronic sources, such as reports, articles, letters, and historical archives, to extract information and gain insights.

2.3.4.4 Observation

Observation is one of the methods for acquiring primary data (Kumar, 2011). Unlike interview or survey methods using questionnaires, observation involves collecting information through observation by the investigator, rather than interviewing respondents (Kothari, 2004). Through observation, researchers methodically document participants' behavior, actions, and interactions within a particular

setting. Using this method helped to gain a deeper understanding of and confirm the information obtained through other research methods.

2.4 Data analysis

This study employed a computer-assisted approach, utilizing the Statistical Package for Social Sciences (SPSS) software, version 25, and Microsoft Excel, to analyze data using both quantitative and qualitative methods. This comprehensive analysis allowed me to not only process and describe the data but also draw meaningful conclusions from the study.

Microsoft Excel was used to compile data. I computed frequencies, minimum and maximum values. Data obtained were analyzed using descriptive statistics such as frequency, percentage, and average. As, for the bivariate data analysis, I used cross-tabulation to identify the relationship or association between the dependent variable and independent variables.

The Chi-square test of independence is a statistical method used to assess whether there is a significant association between categorical variables (Kothari, 2004). In this study, it was applied to determine if the primary sources of income of respondents varied significantly based on their proximity to Nyungwe National Park, to investigate whether respondents educational levels influenced their views on the park's benefits, and to determine if perceived challenges from the park varied significantly based on proximity. Significant differences between categorical variables were identified using chi-square (X^2) values at a 5% significance level, with associations considered significant when $P < 0.05$. Data were presented using tables and figures.

Chapter 3: RESULTS

3.1 Socio-demographic characteristics of the respondents

In this study, the respondents were 100 from the Kitabi and Uwinkingi sectors in Nyamagabe District. The study examined the socio-demographic characteristics of the respondents to assess their understanding, perspective, and awareness of the park's impact on the neighboring communities' livelihoods.

Gender represents the sex of the respondent. This study aimed to gather information on respondents gender in the field to prevent bias in the results. The study included both males and females, with 54% being males and 46% females. This could be because in Rwandan culture men traditionally assume the role of the head of the household. So, they were the ones questioned. However, even though most of the people surveyed in the study were men, the field data showed that women also actively shared their ideas, views, and knowledge about how protected areas contribute to improving their livelihood.

In this study, the researcher divided the respondents into five age groups, including, people of age 18 and older. Every category was represented in the sampling population.

Table 1: Distribution of the respondents by age group

Age group (Years)	Frequency	Percentage (%)
18 - 27	26	26.0
28 - 37	26	26.0
38 - 47	26	26.0
48 - 57	13	13.0
58 and above	9	9.0
Total	**100**	**100.0**

Most of the respondents in the study were between 18 and 47 years old (Table 1). In Rwanda, people in the official working age group are 16 years and above (NISR, 2023). This means that the majority (78%) of the respondents were physically and economically active. Most of the respondents were married in this study (Table 2) and most had at least a secondary education level (Table 3).

Table 2: Distribution of the respondents by marital status

Marital status categories	Frequency	Percentage (%)
Single	28	28.0
Married	66	66.0
Separated	3	3.0
Divorced	0	0.0
Widowed	3	3.0
Total	**100**	**100.0**

The five categories of recognized livelihood assets, or capitals, include labor, education, skills, and health in the case of human capital (Carney, 1998). People's level of education is one of the factors that affect how they perceive and interact with protected areas (Osunsina & Fagbeyiro, 2015). Education is often linked with awareness and knowledge about environmental conservation as well as sustainable practices.

Table 3: Distribution of the respondents by education level

Education level	Frequency	Percentage (%)
No formal education	19	19.0
Primary level	26	26.0
Secondary level	39	39.0
Diploma	8	8.0
Bachelor's degree	7	7.0
Others	1	1.0
Total	**100**	**100.0**

Table 4: Sources of income

Main source of income	Frequency	Percentage (%)
Agriculture	71	71.0
Beekeeping	6	6.0
Public service	12	12.0
Small business	4	4.0
Casual work	7	7.0
Total	**100**	**100.0**

The main source of income observed in the study area was agriculture (Table 4). Cells located farther from the park had a higher percentage (78%, n = 50) of people engaged in agriculture compared to

those closer to the park boundary (64%, n = 50). The Kitabi sector is renowned for its tea plantations, with the Kitabi Tea Factory being a major producer in the area. Other commonly cultivated crops in the region include Irish potatoes, beans, maize, bananas, sweet potatoes, and vegetables (including cabbages, carrots, and onions).

Public service included teachers, nurses, and local leaders, while casual work included cultivating other people's farms and getting paid, doing household chores, and repairing shoes, among others. When asked about other activities respondents did as an alternative source of income, 39.8% of responses were no other activity (none), 16.7% were livestock rearing, and 13% were agriculture.

The results showed that there is a significant association between proximity to the park and source of income (x^2=10.534, df=4, p=.032). Additional details on the breakdown of this result can be found in Appendix 4 (Table A3).

3.2 Views on the benefits of Nyungwe National Park to adjacent local communities

When asked if they receive any benefit from Nyungwe National Park, findings from questionnaires revealed that 99% (n = 100) of respondents recognized that Nyungwe National Park provides benefits to them. Also, 56% (n = 100) of respondents answered affirmatively when asked whether they or members of their community had economically benefited from tourism related to Nyungwe National Park (NNP). This is based on their perspectives, ideas, knowledge, and understanding of the park's importance. The average duration of residency for respondents living near the park was 27.2 years, while for those living farther away, it was 30.8 years.

Also, the results showed that there is an insignificant association between the level of education and view about benefits (x^2=.424, df=1, p=.515). Additional details on the breakdown of this result can be found in Appendix 4 (Table A6).

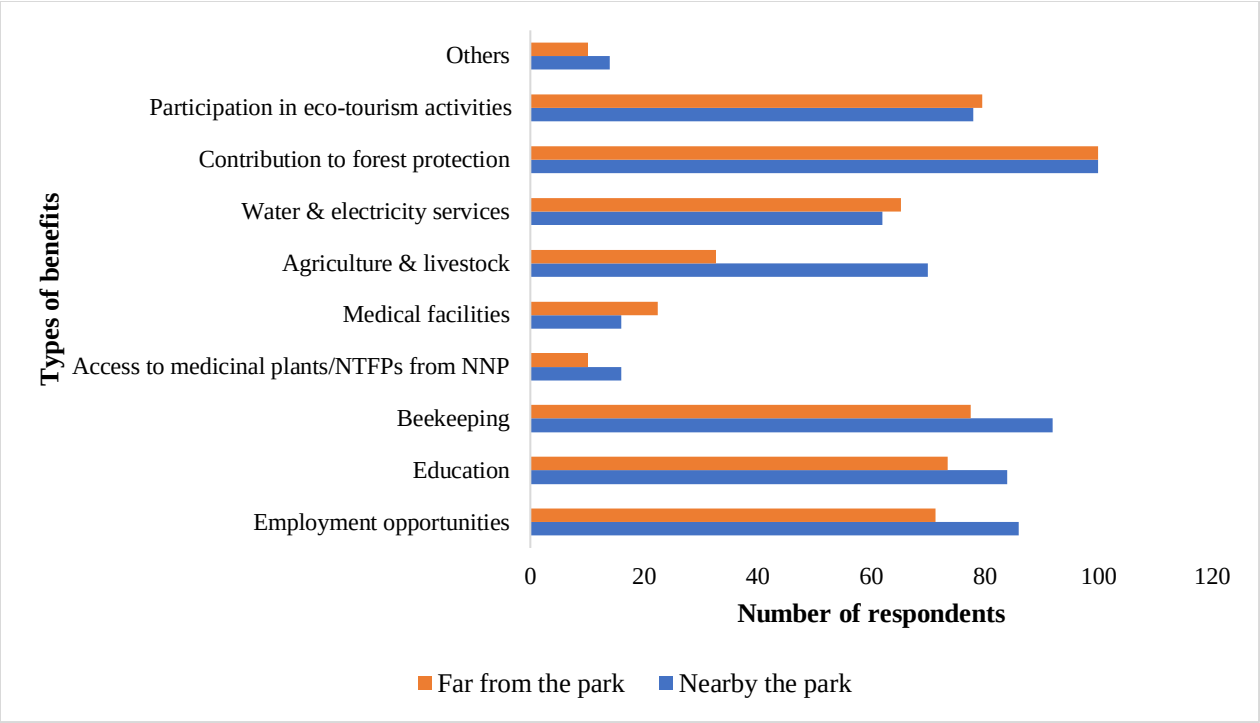

Figure 2:Types of benefits received by local communities from Nyungwe National Park, Rwanda

Figure 2 shows that nearby communities to the park perceived that contribution to forest protection (100%, n = 50), support in beekeeping (92%, n = 50), and employment opportunities (86%, n = 50) were the main benefits they get from the presence of NNP. Employment opportunities mentioned included casual work like trail making, cleaning the road passing through the park, and permanent jobs such as ranger and tracker. Other benefits included the construction of houses for poor families, the organization of competitions between cells, and the provision of agroforestry tree seedlings among others.

On the other hand, communities far from the park perceived that contribution to forest protection (100%, n = 49), participation in eco-tourism activities (79.6%, n = 49), and support in beekeeping (77.6%, n = 49) were the main benefits they get from the presence of NNP. In ecotourism activities, respondents reported that there are organized visits to the park where students and environmental club members engage in guided tours to learn about the park ecosystem. Other benefits included the provision of agroforestry tree seedlings and security among others.

The perceived benefits from Nyungwe National Park revealed that 100% (n = 99) of respondents from Kagano, Mukungu, Rugogwe, and Bigumira agreed that the presence of Nyungwe National Park benefits them by providing a favorable climate for their agricultural activities, contributing to rainfall,

and helping to maintain the area's climatic conditions stable. The study identified this as the most significant benefit of the park to the local communities (Figure 2). One respondent said," Ecosystem services like rain and fresh air are the only benefits we get from the park, other benefits don't reach all communities, especially Bigumira cell". Similarly, when asked whether they believe the benefits obtained from the park are distributed fairly, only 31% (n = 100) answered yes, while 69% said no.

Also, respondents reported that NNP management did provide improved cooking stoves to households found in the sectors neighboring the park to reduce illegal activities including collecting firewood. The priority was households under Ubudehe Category 1 (the poorest households, families that are unable to meet their basic needs without support) and Category 2 (households that can meet their basic needs but are still vulnerable).

In this study, 84.8% (n = 99) of respondents agreed that the park supports beekeepers by providing them with training to improve their knowledge and skills. Additionally, beekeeper cooperatives conduct their activities in the park's buffer zones. Respondents also mentioned that the park collaborates with other conservation partners to provide beehives and other beekeeping equipment such as hive tools, smokers, gloves, and protective clothing, among others, to the cooperatives. By supporting beekeeping activities, NNP not only contributes to sustainable livelihood development but also reinforces the importance of conservation and biodiversity protection.

When asked if communities near the park have access to medicinal plants and non-timber forest products (NTFPs) from the park, 86.9% (n = 99) said no. They reported that nothing is allowed to be removed from the park since it is protected. Unless you take those resources illegally, other community members will still report you. However, the park provided training to the traditional healer cooperatives.

The majority of the nearby communities (70%, n = 50) agreed that the park benefits their communities in agriculture and livestock by providing financial assistance. However, only 32.7% (n = 49) of distant communities agreed. Respondents mentioned that the park assists communities with livestock such as providing pigs to people who used to engage in illegal activities and helping beekeepers, among other activities. However, respondents from areas far from the park reported that cells near the park receive more benefits than those far away which could explain this distinction in responses.

3.3 Views on the challenges arising from the presence of Nyungwe National Park

When asked whether communities living near the Nyungwe National Park were facing any issues, 98% of the respondents (n = 50) in the areas close to the park indicated that they were, while only 60% (n = 50) of the respondents from cells farther away agreed. There was a statistically significant association between proximity to the park and challenges arising from NNP (x^2=21.760, df=1, p=.000). Additional details on the breakdown of this result can be found in Appendix 4 (Table A9).

Table 5: Challenges faced by local communities due to the presence of Nyungwe National Park, Rwanda

No	Issue/challenge faced due to the presence of NNP	Nearby the park		Far from the park		Total
		Frequency (n = 49)	Percentage (%)	Frequency (n = 30)	Percentage (%)	
1	Human injuries	3	2.5	3	4.3	**6**
2	Crops loss	46	38.3	23	33.3	**69**
3	Livestock loss	14	11.7	3	4.3	**17**
4	Limited access to resources	34	28.3	18	26.1	**52**
5	Displacement and land use restrictions	12	10.0	17	24.6	**29**
6	Environmental pressures	2	1.7	3	4.3	**5**
7	Others	9	7.5	2	2.9	**11**
Total		**120**	**100.0**	**69**	**100.0**	**189**

*** Multiple responses**

In the local communities of Kagano, Mukungu, Rugogwe, and Bigumira in the Kitabi and Uwinkingi sectors, crop loss and limited access to resources are cited as major challenges (Table 5). According to the study, 38.3% (n = 49) of the respondents in cells close to the park and 33.3% (n = 30) of the respondents in cells far from the park shared the same perspective on crop loss being the main issue in the study area. This was supported by the findings from the interview with local leaders. The main animals mentioned were baboons, chimpanzees, and vervet monkeys that raided various crops, including maize, sweet potatoes, Irish potatoes, peas, and cassava. Respondents from areas far from the park reported that wild animals do not reach their regions. However, some individuals have fields in cells closer to the park, such as in Rugogwe, and experience crop raiding. Additionally, there have been a few instances in Bigumira, mainly involving baboons and vervet monkeys raiding crops.

The second challenge identified by respondents was limited access to resources, with 28.3% (n = 49) in cells close to the park and 26.1% (n = 30) in cells far from the park. Respondents mentioned that

communities previously relied on park resources such as firewood, grasses, medicinal plants, bushmeat, honey, and water. Restrictions on hunting and gathering in park areas limited access to traditional food sources.

Displacement and land use restrictions were identified as challenges by 10% (n = 49) and 24.6% (n = 30) of the respondents close to and far from the park, respectively. Some communities who used to live in the buffer zone of the park were relocated (ex: from Subukiniro village), and agricultural activities are now prohibited in the proximity of the park, even though communities used to cultivate at the park boundary before. One respondent stated," We cultivated the land from the 1960s to 2000s, even after the park management forbade us, without receiving anything in return".

Additionally, goats and sheep have been reported as being killed by wild animals from NNP. In terms, of human injuries, respondents mentioned that there are no recent cases, but it has occurred in the past. For example, in Kagano, a baboon bit a child in the past. Regarding environmental pressures, respondents stated that tourists often leave non-biodegradable waste behind, which adds to our responsibilities in waste management despite generating revenue.

In other challenges mentioned, seven out of 49 respondents from cells close to the park and two out of 30 from cells far from the park mentioned beehives that are destroyed by wild animals, namely chimpanzees. The problem is that they are not compensated. Other issues mentioned were unemployment and the high cost of living around the park. One respondent stated that prices are high because goods are targeted towards tourists. Regarding unemployment, a respondent mentioned that jobs are scarce, and even the available ones are given to people outside the area.

Despite the various challenges that local communities face due to the presence of the park, when asked to rank their interactions with the park, 66% (n = 100) of respondents replied "Good", 22% said "Very good", and 5% said "Bad".

3.4 Views on the strategies to enhance the positive contributions of Nyungwe National Park to communities' livelihoods

The respondents, both from nearby and distant cells of Nyungwe National Park, provided various strategies to enhance the park's positive impact on local livelihoods. When asked whether the presence of the park could help improve the community's livelihood, 98% (n = 50) of respondents living close to the park and 96% (n = 50) of those living farther away confirmed this belief.

When asked how the presence of the NNP can help improve the community's livelihood, out of 97 respondents, 41.8% of responses were through the tourism revenue sharing program (emphasizing infrastructure development), 24.7% were through employment opportunities, and 15.8% were through ecosystem services.

Table 6: Suggested improvements to enhance the benefits to local communities

No	Suggested improvements	Nearby the park	Far from the park	Total	Percentage (%)
		Frequency (n = 50)	Frequency (n = 50)		
1	Provide employment to nearby communities	10	23	33	17.1
2	Increasing tourism revenue sharing	15	21	36	18.7
3	Improve compensation programs	20	3	23	11.9
4	Capacity building programs	9	15	24	12.4
5	Changing the way TRS programs are implemented	15	6	21	10.9
6	Involve communities in decision-making	4	0	4	2.1
7	More community awareness campaigns on conservation	4	6	10	5.2
8	Fencing the park to reduce human-wildlife conflicts	7	1	8	4.1
9	Participation in ecotourism activities	5	0	5	2.6
11	Prepare more meetings to gain community insights	4	4	8	4.1
12	Others	11	10	21	10.9
Total		**104**	**89**	**193**	**100.0**

*** Multiple responses**

Table 6 highlights the suggested improvements according to respondents to enhance the benefits of NNP to improve the communities' livelihoods. Out of 100 respondents, 36 suggested increasing tourism revenue sharing to benefit all villages (not some individuals), especially those near the park. They emphasized the need for infrastructure development, such as road rehabilitation, construction of health facilities, and provision of water and electricity, to enhance the quality of life.

The second main suggested improvement was to provide employment opportunities to nearby communities. This would promote more positive attitudes and support for conservation since jobs

would be given to people from nearby areas. Creating jobs would help communities, especially those who used to rely on the park's resources such as firewood and grasses. Providing more opportunities for local people would create a sense of ownership. One respondent even suggested that employment opportunities could be alternated among villages to ensure that all communities benefit. Another suggestion was to keep a record of all the people living very close to the park so that they could be given priority for job opportunities.

A total of 24 respondents suggested implementing more capacity building programs to enhance the abilities, skills, and knowledge of the communities around the park. The respondents recommended continuous training and workshops, particularly for youth and elderly people, focusing on creating projects to reduce reliance on park resources. Other suggested trainings included modern beekeeping, growing medicinal plant seedlings, and training park rangers on collaboration skills to improve their interaction with the communities. It's worth noting that 77% (n = 100) of the respondents said they had never participated in any training or capacity building programs funded/organized by the park when asked.

Moreover, 23 respondents suggested improving the compensation programs around the park. They reported that the current process is very long and complicated, causing some people to give up on their claims. Also, the authorities in charge don't work well with the communities. They stated that compensation should be done as soon as possible. However, it requires people to have phones to take pictures when animals are still damaging crops, and not everyone can afford smartphones. Additionally, most damages occur during the night, making it difficult to take pictures. It is also costly to bring the pictures to Kigali. Some respondents even said that the park no longer compensates for damaged crops. They recommended reviewing the compensation schemes due to the bureaucracy, as communities often don't receive compensation for their raided crops. They also suggested revising the implementation of the Special Guarantee Fund to prevent losses on the side of the communities. Because otherwise, communities become poorer as they cultivate for nothing because of wild animals.

The revision of the implementation of TRS programs was suggested by 21 respondents. Surprisingly, there were differing opinions on how to change the current system. Some respondents emphasized that tourism revenues should not be equally distributed, pointing out that people living very near the park suffer more and used to depend entirely on it. On the other hand, some argued that tourism revenues should be shared with all communities, as only a few currently benefit, mainly those who are financially well-off. Moreover, respondents from Mukungu and Bigumira, which are located farther from the park,

claimed that they do not receive any benefits and stressed the importance of ensuring that all surrounding villages receive their fair share of the benefits. Even residents from cells near the park highlighted that certain villages are left out, and financial assistance is provided unevenly, with some villages receiving more support than others. For instance, Kintobo Village in Kagano Cell, Kitabi Sector, is well taken care of.

The community recommended launching more awareness campaigns because some people still have a negative perception of the park and are unaware of its value. Additionally, eight respondents suggested holding more frequent meetings with the park to gather insights from the community and address their concerns for better collaboration. When asked how households learn about conservation, 69% (n = 100) said they participated in meetings, and 88% (n = 50) indicated radio as another means used. It was noted that respondents from areas far from the park expressed dissatisfaction with the infrequency of meetings with park staff. One respondent even proposed increasing the number of community conservation officers at the park to engage with a wider range of communities, as currently, there is only one officer responsible for Nyamagabe and Karongi districts.

The interview findings highlighted the presence of benefits, but they should be expanded to reach areas located farther from the park and those adjacent to it. Investing only 10% in community development projects in the tourism revenue sharing program is insufficient, as it does not cover all the villages. Additionally, not all submitted projects receive funding, as the process is highly competitive.

Chapter 4: DISCUSSION

According to Lindsay and Norman (2013), perception is how we understand the world around us. It involves forming an idea or opinion about something, based on our senses, past experiences, and what we already know. Respondents living near the park had an average residency of 27.2 years, while those farther away averaged 30.8 years, indicating long-term residency in the study area. Also, today's environmental problems highlight the significance of integrating gender perspectives into natural resource management (Fonjong, 2008). The gender of an individual affects their use of and reliance on natural resources. The study included both males and females. Additionally, people perceive natural resource management differently, based on how their livelihood depends on these resources. The study revealed various household activities, including agriculture, small businesses, public service, beekeeping, and casual work.

The results of this study showed that communities living next to Nyungwe National Park encounter various positive and negative effects that shape their attitudes and affect their livelihoods. The study found that NNP offers several advantages to local communities, such as contributing to forest protection, beekeeping, employment opportunities, education, and participation in ecotourism activities. However, challenges like crop loss, limited access to resources, displacement, and land use restrictions are obstacles to fully benefiting from the park and improving people's lives.

Agriculture was the main source of income observed in the study area. This result corroborates the findings from the Fifth Rwanda Population and Housing Census conducted in 2022, suggesting that most households in Nyamagabe District (86.9%) are involved in agriculture (NISR, 2023). This could be why crop loss was identified as the main challenge faced due to the presence of the park. Additionally, cells located farther from the park had a higher percentage of people engaged in agriculture compared to those closer to the park boundary. This result has some similarities to the findings of Mbise et al. (2021) which showed that most people living near the Saadani National Park, Tanzania, relied on fishing to make a living, while those living farther away from the park depended on agriculture. Also, the most common issue reported by people in the study area was crop raiding by elephants and monkeys.

Also, Mbise et al. (2021) discovered that the benefits primarily took the form of social-related projects, and most local communities (50%, n = 200) were unaware of these benefits due to their poor involvement and participation in conservation activities. Additionally, the authors found that education level significantly influenced the perception of the benefits gained from the park. In contrast, this study

found that 99% (n = 100) of respondents recognized that Nyungwe National Park provides benefits to them. Also, the findings revealed that there is a weak association between education level and perception of the benefits of the park.

A similar study was conducted to assess the contribution of Udzungwa Mountains National Park (UMNP) to the livelihood of neighboring communities in Tanzania (Mkumwena, 2016). The findings highlighted both the benefits and challenges for the local communities. Among the most pressing issues affecting the local communities in the study area were environmental issues such as waste disposal and the proliferation of plastic bottles which were found to be a major concern, along with other challenges including cultural deterioration, animal invasion, diseases, poaching, immigration, price fluctuations, alcoholism & drug abuse (Mkumwena, 2016). The differences in results could be attributed to various factors such as park characteristics, community characteristics, economic context, and environmental factors, among others.

A study by Umuziranenge (2019) on human-wildlife conflicts and the compensation scheme around Nyungwe National Park, Rwanda, found that crop raiding significantly impacts communities, leading to socio-economic and livelihood losses, food insecurity, and injuries. It also revealed widespread dissatisfaction with the compensation scheme due to its stringent requirements, complex procedures, frequent rejection of claims, undervalued payments, irregularities, and delays in compensation, prompting many affected individuals to abandon their claims. The findings highlighted the need for improvements in the compensation scheme.

My findings also align with those of Akayezu et al. (2022), showing that the tourism revenue sharing program has not fully succeeded in enhancing community well-being around Nyungwe National Park. Both qualitative and quantitative data suggest the program should focus on areas with greater need and reassess intervention priorities to achieve both poverty reduction and improved conservation outcomes in the park. Despite the above result, Akayezu et al. (2022), found that the funds designated for projects under the tourism revenue sharing scheme have risen between the two periods studied, 2005-2011 and 2012-2017. The highest investments have been made in projects supporting education, such as building classrooms, and basic infrastructure, like constructing houses for the poorest communities and relocating households living in the buffer zone of NNP. Less financial support was allocated to environmental conservation efforts, such as beekeeping and the propagation of bamboo or elephant grass, as well as to income-generating ventures like pottery and handcrafts.

According to Sabuhoro et al. (2017), the limitations of mountain gorilla tourism opportunities at Volcanoes National Park were linked to restricted access to tourism benefits, such as revenue sharing, high costs of living near the park, as well as a lack of community involvement in park management and decision-making. Similarly, Rwanyiziri (2011), as cited in Umuziranenge and Muhirwa (2017), highlighted that public involvement in natural resource management decision-making in Rwanda is low due to constraints like available resources, schedules, budgets, and staffing. This lack of participation underscores the need to involve communities more in decision-making and to restructure the tourism revenue sharing program with greater transparency to better benefit local communities.

Chapter 5: CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Key benefits identified from the Nyungwe National Park in this study included contributing to forest protection, beekeeping, employment opportunities, education, and participation in ecotourism activities. There are certain challenges that must be tackled to maximize the positive impact of Nyungwe National Park on the surrounding communities. Problems like crop loss, limited access to resources, and displacement and land use restrictions can hinder the potential for better livelihoods. Respondents proposed increasing revenue sharing from tourism, providing employment opportunities to nearby communities, implementing capacity building programs, and improving compensation around the park to enhance the benefits of NNP and improve communities' livelihoods.

The need for natural resource conservation is as pressing today as it has ever been. Conservation goals cannot be achieved without strong participation from local communities and all stakeholders involved in natural resource management. The relationship between protected areas and the livelihoods of local communities is a key consideration in conservation efforts. Therefore, policymakers and conservation managers need to involve local communities, ensuring their active participation in decision-making processes and fair sharing of benefits.

5.2 Recommendations

Based on the study's findings and conclusions, the researcher suggests the following:

- Ensure that protected areas meet the needs of local people and are effectively managed, it is essential to actively involve local communities in every stage of the process, from planning to decision-making. This approach will help to ensure that local communities' needs and perspectives are considered and to foster a sense of ownership and stewardship.
- Ensure that benefits from conservation efforts, such as tourism revenues and conservation grants, are distributed equitably among all communities neighboring Nyungwe National Park. This may involve restructuring the tourism revenue sharing program by increasing transparency, enhancing equity, and establishing strong monitoring and evaluation mechanisms to assess the impact of revenue sharing programs.
- Implement capacity building programs that provide education and training in conservation practices, sustainable agriculture, modern beekeeping, and tourism-related skills. These programs will empower local communities to benefit economically from protected areas. Additionally, increasing the frequency of meetings between Nyungwe National Park and nearby

communities, especially those not directly adjacent to the park, will help to gather valuable insights.

- Enhance the effectiveness of compensation programs for crop raiding. Compensation claims from farmers who lose crops should be processed swiftly to reduce financial hardship. The application process should be easy to understand and complete for everyone, regardless of education level or technology access. In addition to financial compensation, programs that help farmers earn money in other ways should be offered to create long-term solutions to crop raiding.
- Similar studies should be conducted around other protected areas in Rwanda (also, using districts other than Nyamagabe around NNP) to provide a different perspective and measure the extent of protected areas' contributions to local communities.

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LIST OF APPENDICES

Appendix 1. Questionnaire for the Respondents

My name is INGABIRE Pascaline NIYONSABA. I am a master's student at the University of Rwanda. The following questions are intended to gather data from the communities of Kitabi and Uwinkingi Sectors in Nyamagabe District. The purpose of this data collection is to understand how protected areas, specifically Nyungwe National, contribute to the improvement of the livelihoods of adjacent local communities. Please respond to the questions provided to the best of your ability. Your responses will be kept confidential, and the researcher will not reveal or disclose your identity under any circumstances. Thank you in advance.

Date ….....

Sector/Cell: ……

How long have you lived in this area? ……..

Latitude: …….. Longitude: …….

Section A: Demographic Information

1. Gender: Male ☐ Female ☐
2. Respondent age: 18-27 ☐ 28-37 ☐ 38-47 ☐ 48-57 ☐ 58yrs and above ☐
3. Marital status: Single ☐ Married ☐ Separated ☐ Divorced ☐ Widowed ☐
4. Level of education: a. None ☐ Primary level ☐ c. Secondary level ☐
   d. Diploma ☐ e. Bachelor's degree ☐ f. Others (specify) ☐ …….
5. Occupation: a. Unemployed ☐ b. Student ☐ c. Farmer ☐ Cattle keeper ☐
   Beekeeper ☐ f. Salesperson ☐ g. Public Serva ☐ h. Employed in Nyung ☐
   i. Others (specify) ☐ ……...

Section B: Questions related to the protected areas and the livelihoods of adjacent local communities

1. Have you heard about Nyungwe National Park or are you aware of it?

   Yes ☐ No ☐

if yes, since when? ……..

2. Do you think this park contributes to community development?

   Yes ☐ No ☐ Don't know ☐

3. What is your main source of income?

   a. Agriculture ☐

   b. Beekeeping ☐

c. Small business ☐

d. Public service ☐

e. Others (Please specify) ☐

……

4. What other activities do you do as an alternative source of income?

……...

5. Are your economic activities dependent on the park?

Yes ☐ No ☐ Don't know ☐

6. a. Do you receive any benefit from Nyungwe National Park? Yes ☐ No ☐

b. If yes, in what ways does the park benefit your village?

No	**Project type/Type of benefit**	**Yes**	**No**
1	Employment opportunities		
2	Education		
3	Beekeeping		
4	Access to medicinal plants or other resources such as NTFPs from the park		
5	Medical facilities (like health centers)		
6	Agriculture & livestock (like financial assistance)		
7	Providing water and electricity services		
8	Contribution to forest protection		
9	Participation in eco-tourism activities		
10	Others (Please specify)		

……

7. Do you think that the benefits obtained from the park are distributed fairly?

Yes ☐ No ☐

8. Who do you think benefits more from the park? i. RDB ☐ ii. Park management ☐

iii. Rich people ☐ iv. Poor people ☐ v. Women ☐ vi. Men ☐ vii. Young people ☐

viii. Old people ☐ ix. Don't know ☐ x. Others (Please specify) ☐ ……

9. Have you or members of your community benefited economically from tourism related to NNP?

Yes ☐ No ☐ Don't know ☐

10. Have you participated in any training or capacity-building programs funded/organized by the park?

    Yes ☐ No ☐

11. How does your household learn about conservation? i. By participating in the meeting ☐

    ii. From friends ☐ iii. Others (Please specify) ☐ ……

12. How would you rank your interactions with the park?

    i. Very good ☐ ii. Good ☐ iii. Neutral ☐

    iv. Bad ☐ v. Very bad ☐

13. a. Are you facing any issues living near the Nyungwe NP? Yes ☐ No ☐

    b. If yes, what is the issue/challenge among the following options:

    i. Human injuries ☐

    ii. Crops loss ☐

    iii. Livestock loss ☐

    iv. Limited access to resources ☐

    v. Displacement and land use restrictions ☐

    vi. Environmental pressures (e.g.: habitat destruction, pollution due to high levels of visitation)

    vii. Others ☐ ıse specify) ☐ ……

14. Do you feel that conflict resolution mechanisms between the park and the local community are effective? Yes ☐ No ☐

15. a. Would you say the presence of the park can help to improve the community's livelihood? Yes No ☐ ☐

    b. If yes, please explain how……

    ……

16. What improvements can be made to enhance the benefits of Nyungwe National Park and tourism activities for you?

……

……

……

Thank you for your cooperation!!

Appendix 2: Interview Questions to Local Leaders

1. What are the major economic activities that are typically carried out in this area?
2. How does the park ensure that the nearby communities benefit from its presence?
3. What are the challenges faced by local communities in this area due to the presence of Nyungwe National Park and tourism activities?
4. What steps can be taken to address those issues?
5. What strategies did the government use to boost the livelihood rate in the area?
6. What steps should the park management take to improve the livelihoods of cells neighboring Nyungwe National Park?
7. What is your opinion on the issue of benefits from the National Park?

Thank you for your cooperation!!

Appendix 3: Supplementary Tables

Detailed cross-tabulation of Proximity to the park and Source of income

Table A1: Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Proximity to the park * Source_of_income	100	100.0%	0	0.0%	100	100.0%

Table A2: Proximity to the park * Source_of_income Crosstabulation

			Source_of_income					
			Agriculture	Beekeeping	Casual activities	Public service	Small business	Total
Proximity to the park	Far	Count	39	0	1	7	1	50
		Expected Count	35.5	3.0	2.0	6.0	2.0	50.0
	Near	Count	32	6	3	5	3	50
		Expected Count	35.5	3.0	2.0	6.0	2.0	50.0
Total		Count	71	6	7	4	4	100
		Expected Count	71.0	6.0	7.0	4.0	4.0	100.0

Table A3: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	8.166[a]	4	.086	.083
Likelihood Ratio	10.534	4	.032	.059
Fisher's Exact Test	8.239			.071
N of Valid Cases	100			

a. 6 cells (60.0%) have an expected count of less than 5. The minimum expected count is 2.00.

Detailed cross-tabulation of Education and Benefits

Table A4: Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Education * Benefit	100	100.0%	0	0.0%	100	100.0%

Table A5: Education * Benefit Crosstabulation

			Benefit		
			No	Yes	Total
Education	Formal	Count	1	80	81
		Expected Count	.8	80.2	81.0
	Non Formal	Count	0	19	19
		Expected Count	.2	18.8	19.0
Total		Count	1	99	100
		Expected Count	1.0	99.0	100.0

Table A6: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.237[a]	1	.626	1.000	.810
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.424	1	.515	1.000	.810
Fisher's Exact Test				1.000	.810
N of Valid Cases	100				

a. 2 cells (50.0%) have an expected count of less than 5. The minimum expected count is .19.

b. Computed only for a 2x2 table

Detailed cross-tabulation of Proximity to the park and Challenges

Table A7: Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Proximity to the park * Challenges	100	100.0%	0	0.0%	100	100.0%

Table A8: Proximity to the park * Challenges Crosstabulation

			Challenges		
			No	Yes	Total
Proximity to the park	Far	Count	20	30	50
		Expected Count	10.5	39.5	50.0
	Near	Count	1	49	50
		Expected Count	10.5	39.5	50.0
Total		Count	21	79	100
		Expected Count	21.0	79.0	100.0

Table A9: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	21.760[a]	1	.000	.000	.000
Continuity Correction[b]	19.530	1	.000		
Likelihood Ratio	25.686	1	.000	.000	.000
Fisher's Exact Test				.000	.000
N of Valid Cases	100				

a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 10.50.

b. Computed only for a 2x2 table