

ASSESSMENT OF THE IMPACTS OF THE CONSERVATION OF PROTECTED
AREAS TO THE IMPROVEMENT OF LIVELIHOODS OF ADJACENT COMMUNITIES
OF THE NYUNGWE NATIONAL PARK, RWANDA

By

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Abstract of Thesis Presented to the Graduate School
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In many developing countries, outreach programs are used to provide benefits delivered from tourism to local people. Rwanda has developed park management policies that aim to avoid, reduce, and mitigate negative impacts that arise from the establishment and management of national parks on local residents. But little is known about local residents' perceptions and attitudes towards the conservation, and the benefits and costs arising from the implementation of these policies. This study, carried out in Banda and Rasano around Nyungwe National Park, assessed local communities' perceptions on the benefits and costs, and their attitude towards biodiversity conservation in the park. We used focus group discussion and household survey (semi-structured interview) methods to collect data in 182 households from July to August 2016.

Findings from this study showed that more than 85% of households have improved or slightly improved their well-being because of the park, and 95% have positive attitude towards the conservation of Nyungwe National Park. Clean water,

employment in the park and tourism related activities, school and health clinics are the major benefits of NNP to its surrounding communities.

Major sources of household income were comprised of on-farm, off-farm, and park-related products. The latter contributes 25% of the total annual income in Banda village. However, they count for 3% of total income per household in Rasano village. Crop raiding and restriction on access to the natural resources are major costs identified by respondents.

The findings, in studied villages, also showed that park-local community relationships are mixed. The perception of park-community relationships (74% - 90%) was positive possibly due to the regular communication to discuss park issues. However, 55% expressed that it is not easy for them to express their grievances in relation to the park. This is due to the long and centralized process to receive compensation for crops damaged by park animals.

Nyungwe funds many community projects with income generating potential. However, the success of these projects, especially income generating ones, is constrained by lack of managerial skills and lack of involvement of community beneficiaries in the process of project design, and development.

Finally, community projects: classroom and health clinic, livestock husbandry, paying for health insurance for poor people, clean water, and energy efficiency stoves were the most common community projects put forward and scored higher than 85% for future funding.

CHAPTER 1 INTRODUCTION

Introduction Background

Nyungwe National Park (NNP) is on the forefront in protecting the remaining biodiversity of the lower mountain rain forests remaining in East Africa, making it a priority for conservation in Africa (Plumptre, 2012). Today, the 2014 United Nations List of Protected Areas contains 209,429 landscapes covering 32,868,673 km², including 3.41% and 14% of the world's marine and terrestrial areas, respectively (Deguignet et al., 2014). Protected areas (PAs) management activities: enforcement, boundary demarcation, and direct compensation to local communities have been shown to be effective in wildlife conservation (Adams et al., 2004; Bruner et al., 2001), safeguard ecosystem goods and services, and introduce new livelihood options through expansion of tourism, recreation and aesthetic pleasure (Pullen et al., 2014).

However, some other authors suggest that the establishment and management of national parks distributes fortune and misfortune at the same time (Brockington et al., 2008). According to Adams et al. (2004), the creation of protected areas causes the foreclosure of future land use options, with potentially significant economic opportunity costs, and it can have substantial costs on livelihood opportunities foregone.

Following the declaration of the World Congress in Bali, which states that protected areas must be managed so that local communities, the nations involved, and the world community all benefit (Naughton-Treves, Holland, & Brandon, 2005), protected areas should strive to contribute to poverty reduction at the local level, and at the very minimum must not contribute to or exacerbate poverty (Franks & Small, 2016).

Following these claims, the management of protected areas has substantially broadened their mission: to protect biodiversity, and to directly provide benefits to local people. The justification of the shift from the total protection approach of conserving biodiversity toward an involvement of local residents in the management of PAs roots from the principal that protected areas in developing countries will survive only if they address human concerns (SCBD, 2008; Naughton-Treves, Holland & Brandon, 2005; Gibson & Marks, 1995). However, a key question today is to what extent the distribution of benefits can ensure the support of local communities for conservation initiatives.

In the context of national parks, where resources extraction is prohibited, outreach programs are used to provide benefits delivered from tourism to local people (Mulder & Coppolillo, 2005). Benefit sharing entails the provision of development-oriented facilities such as schools, health clinics, roads, and water services (Mulder & Coppolillo, 2005), direct payment, compensation for damages caused by wildlife, employment opportunities, and support to income generating projects, and ecosystem services (Gross-Camp et al., 2012).

Background of Protected Areas in Rwanda

While the creation of protected areas in Africa boomed in the 1960s, the establishment of protected areas in Rwanda was started earlier in 1918 by colonial regime, and in 1933 all remnants of mountain forests were set aside as protected forests (Masozera, 2002). Today, Rwanda, 26,338 km², has approximately 10% of its surface under protection as national parks.

- The Nyungwe National Park (1,019 km²), which is the largest remaining lower mountain forest in East Africa,

- The Volcanoes National Park (160 km²), which protects the critically endangered mountain gorillas (*Gorilla beringei beringei*) and golden monkey (*Cercopithecus mitis kandti*),
- The Akagera National Park (1,200 km²) with a mosaic habitat of savannah and wetland in eastern Rwanda, and
- The Gishwati – Mukura National Park (25.58 km²), which encompasses two forest remnants in western Rwanda.

Three (NNP, VNP, and Gishwati-Mukura NP) of these national parks are located in the Albertine rift region, the richest biological diversity region (Plumptre et al., 2004). The growing human population, limited land resources, civil war, and genocide against Tutsi (that resulted in massive occupation of protected areas for settlement), and poverty are major challenges for the management of protected areas in Rwanda (REMA, 2011).

Problem Statement

Rwanda, like many other developing countries, has developed park management policies that aim to avoid, reduce, and mitigate negative impacts that arise from the establishment and management of national parks on local residents. These policies enhance positive impacts to local people, and where appropriate, compensate property damage by wildlife (Kagarama et al., 2011).

The relationship between parks and people have focused on examining the socio-economic status of people living around Rwandan national parks (Plumptre et al., 2004; Bush et al., 2010), evaluating of community-based conservation around Nyungwe National Park (NNP) (Rutebuka et al., 2012), examining perceptions of tourism revenue sharing impacts on Volcanoes National Park (Munanura et al., 2016), measuring effectiveness, efficiency and equity in payments for ecosystem services (Martin et al., 2014), and evaluating forest dependence and its implications for protected area

management (Masozera and Alavalapati, 2004). However, data on the impact of Rwandan national parks on local people is still limited.

Relatively little information is available about the ways in which national park policies and management practices in Rwanda have impacted the livelihoods of people living in close proximity of them, and it is not understood how positive or negative impacts are distributed between and within relevant communities adjacent to these national parks.

The Rwandan government, non-government organizations (NGOs), and donors support wildlife related community projects/enterprises for their perceived development and conservation potentials. For instance, the Rwanda Development Board (RDB), a government institution which manage national parks, allocates 5% of annual tourism revenue to community projects/enterprises. Under this program, more than US\$1,200,269 was allocated to conservation-related community projects in three national parks for the six-year period from 2005 to 2010 (Kagarama et al. 2011). Yet, there is little information available concerning the success or failure of these projects or how they have contributed to the behavior change and attitude of local residents towards the conservation of the Nyungwe National Park (NNP), and the livelihoods of adjacent communities.

To fill this gap in knowledge, this study examines the perceptions of representatives from multi-stakeholder groups about the contribution of benefits from NNP to the community livelihoods at the household level. This information is crucial for identifying and understanding the impacts (both negative and positive) of the park on adjacent local communities. Nyungwe National Park managers and other local

stakeholders working with these communities, will use this information to promote positive impacts, and reduce negative impacts to communities who bear the costs of management of NNP.

Goal, Objectives, and Hypotheses

Goal and Research Questions

The goal of this study is to systematically investigate whether communities adjacent to NNP perceive positive or negative impacts from the park, and determine if the protection of Nyungwe National Park enhances the livelihoods of people living in its proximity. To address this problem, this study asked the following questions:

1. How do the relevant stakeholders perceive the impacts of NNP on local communities?
2. How are the benefits from the park diversified and distributed among and within communities adjacent to NNP?
3. What are the factors influencing the success or failure of community outreach projects/enterprises? and finally,
4. What are the perceptions of local communities regarding the contribution of NNP to the improvement of their livelihoods, as well as conservation?

Specific Objectives

The specific objectives are:

- Assess the perceptions of different stakeholders regarding the positive and negative impacts of NNP on local communities in terms of livelihood diversification and distribution
- Characterize the impacts of the park on the livelihoods of communities adjacent to Nyungwe National Park
- Identify factors influencing the success or failure of park-related community projects around Nyungwe National Park

Research Hypotheses

The research hypotheses are:

1. Benefits from the park have improved the livelihoods of households adjacent to Nyungwe National Park over the last five years through increased income, education, and improved well-being.
2. Communities who perceive that they benefit from NNP have positive attitudes towards its conservation. These park-related benefits are expected to be manifested in the form of jobs and employment, income generating community projects, and socio-economic infrastructure.
3. The benefits and costs from the park are equally distributed and diversified to adjacent households.

Significance of the Study

The effectiveness of protecting biodiversity and habitat in developing countries such as Rwanda depends on involvement of local communities, and consideration of their needs (Allendorf et al., 2006). In the effort to gain community support in the conservation of wildlife, conservation planners in Rwanda incorporate a component of local community needs into their conservation agendas. An understanding of what factors influence local residents' attitudes towards conservation can assist in managing their expectations.

Based on the predicted relationship between impacts of PAs on adjacent communities, and the attitudes and behaviors of local people (Ormsby & Kaplin, 2005), understanding how the management activities of NNP has affected local people's livelihood can help park managers to evaluate their conservation efforts, and therefore, direct their management actions to suit both wildlife and local residents.

Furthermore, understanding the perception and attached benefits is important because the distribution of the latter is an enabling condition for communities to engage in wildlife conservation (Anthony, 2007). It can reveal opportunities for improving relationships, and outreach programs as well as informing policy makers and park

managers. In this way, it can assist with prioritizing avenues for action including ways to maximize benefits to communities and to mitigate costs.

Thesis Overview

Chapter 1 describes background information of the study. It also explains the problem statement of this research project, research questions, overall goal, the specific objectives, and research hypotheses.

Chapter 2 describes a conceptual framework, and literature review on the topic of my interest. Furthermore, it describes background of the management and conservation of Nyungwe National Park.

Chapter 3 describes the study site and methodology used for sampling, data collection, and data analysis.

Chapter 4 presents the results and patterns of findings of household survey and focus group discussion. And finally,

Chapter 5 discusses the results from this research, summarizes the findings, and provides management recommendations for conservation of Nyungwe National Park.

CHAPTER 2
LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Key Terms and Concepts

Livelihood Framework

Ellis (1998) defines a household as the social group which resides in the same place, shares the same meals, and makes joint or coordinated decisions over resource allocation and income pooling. The term livelihood refers to the access of individuals to human, financial, social, physical, and natural capital also called assets (Christensen & Pozarny, 2008; Coad et al., 2008; Dubois, 2003; Bebbington, 1999). Food and Agriculture Organization (FAO) developed the livelihood framework, in which rural poor people can improve and maintain a livelihood based on a range of these capitals (Figure 2-1). The livelihood framework approach is commonly used to identify and prioritize actions for poverty reduction, but it can also be used to assess the significance or impact of interventions on people's livelihoods (Krantz, 2001).

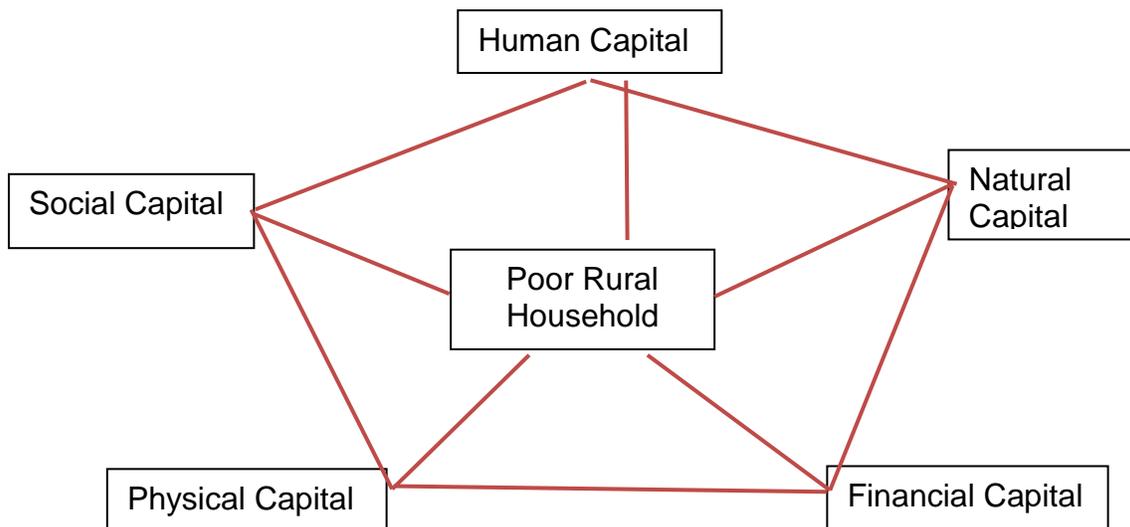


Figure 2-1. Livelihood framework based on assets. (Adapted from Christensen & Pozarny, 2008)

Livelihood Strategies and Diversification in Rural Areas

Many rural (poor) people maintain diversified livelihood strategies, which can be classified as “on-farm” and “off-farm” strategies for livelihood diversification (Barrett, Reardon & Webb, 2001; Ellis, 2000; Ellis, 1998), and park related products. Park-related products consist of salaries and wages in park and tourism related activities, and gifts and donations from the park and conservation organizations. On-farm income comprises both consumption-in-kind of on-farm output and cash income from output sold. Non-farm income, on the other hand, refers to non-agricultural income: labor payments, non-wage labor contracts, urban-to-rural remittances arising from within national boundaries, and international remittances.

Impacts of National Parks and Livelihoods

The benefits of parks comprise of safeguarding the ecosystems services such as clean air and clean water, employment opportunity, recreation, and tourism development (Pullen et al., 2014). For example, Madagascar gives back 50% of tourism revenue to local people under a revenue sharing scheme (Goodwin & Roe, 2001). Furthermore, in forested areas, for instance, it is estimated that 90% of the world’s poor depend on forests for at least a portion of their income. In Africa alone, 600 million people rely on forests and woodlands for their livelihoods (Coad et al., 2008).

Wildlife-human conflicts such as crop raiding and livestock predation (Mc Guinness & Taylor, 2014; Karanth et al., 2013; McShine, 2008; Butler, 2000; Michalski et al., 2006; Archabald & Naughton-Treves, 2001), and foregone access to the park’s natural resources (Naughton-Treves, 1998) are negative impacts on residents close to the parks.

Perception and Attitude of Local People Toward Conservation of Wildlife

Perception and attitudes of people in developing countries toward the conservation of biodiversity correlate with sociodemographic variables including age, gender, household income, household size, education, household income, and park-people relationship (Anthony, 2007). They also vary greatly at community scales. In developing countries, for example, where people's livelihoods rely on the extraction of natural resources, local people resent imposed conservation ideas and tend to hold negative attitudes toward wildlife conservation and park management authorities (Nepal and Weber, 1995). However, positive perception of benefits from the parks predicts people's attitude towards conservation (Ormsby & Kaplin, 2005).

Background of the Management and Conservation of Nyungwe National Park

Nyungwe National Park (NNP) is an afro-mountain rainforest, and was established as a natural reserve in 1933 to protect rich biodiversity. NNP ranges in altitude between 1600 and 2950 m a.s.l. and harbors more than 1,200 species of vascular plants, 280 species of bird, and 86 species of mammal including 13 species of primates such as the endangered eastern chimpanzee (*Pan troglodytes schweinfurthii*), and the near-threatened species: the owl-faced monkey (*Cercopithecus hamlyni*; Plumptre, 2012).

Nyungwe National Park is also a water catchment, which contributes 60% of the country's water throughout the year (MINITERE, 2003). Climate in Nyungwe is characterized by a wet season extending from September to May and shorter dry season from June to August with annual rainfall averages between 1,500 – 2500 mm (Plumptre, 2012). Nyungwe is among high populated areas with 456 people/km² (NISAR, 2012).

Human population increase, poverty, conversion of land for agriculture and resource extraction are major threats that NNP has experienced since its establishment as a forest reserve in 1933. For instance, twenty-one (21.8% of the park) has been converted into agriculture land during the 35-year period from 1960 to 1996 (Gapusi, 1998).

Since 1986, the Rwanda Development Board (RDB), formally Rwandan Office for Tourism and National Parks (ORTPN) was given a mandate of enforcing conservation regulations: effort to control illegal mineral extraction, hunting, and forest encroachment (Plumptre, 2012). The conservation of biodiversity of Nyungwe was strengthened when the Wildlife Conservation Society (WCS) started working in Nyungwe in 1986 with a focus on ecology applied research, tourism development, anti-poaching, and conservation education and outreach.

Today, various institutions and organizations work together with the Rwanda Development Board/Department of Tourism and Conservation (RDB) in management of Nyungwe National Park (Table 2-1).

Nyungwe National Park and Livelihoods of Local Communities

Tourism in the Rwandan national park is a major source of foreign income. In Nyungwe, main attractions are primate viewing, nature walks and bird watching with more than 10,000 tourists per year (Figure 2-2).

The government of Rwanda developed a policy of sharing revenue from tourism (ORTPN, 2005) with three objectives: (1) to reduce illegal activities, ensure sustainable conservation, and increase community responsibility for conservation (conservation impact objective); (2) to improve livelihoods by contributing to poverty reduction, to compensate for loss of access and/or crop damage, to provide alternatives to park

resources, and to encourage community based tourism (livelihood impact objective); and (3) to build trust, to reduce conflicts, to increase community participation in conservation, and to empower communities (relationship impact objective).

Since the implementation of the revenue sharing scheme, the Rwanda Development Board (RDB) has disbursed an amount of US\$582,344 to support 84 community projects around NNP with an average of US\$64,705 per annum for a period of 9 years from 2005 to 2014 (Figure 2-3). Fifty-eight (58%), 25% and 16% was allocated to socio-economic infrastructure projects, income generating projects, and conflict resolution related projects, respectively.

Table 2-1. Institutions and organizations in the management of Nyungwe National Park

| <u>Name</u> | <u>Role and responsibility</u> |
|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Governmental institutions</u> | |
| Rwanda Development Board (RDB) | Implementation of the day-to-day management activities: To protect park, enhance scientific research, promote ecotourism and sharing of benefits derived from tourism activities with the people living near national parks. |
| Ministry of Commerce, Industry, Investment Promotion, Tourism and Cooperatives (MINICOM) | MINICOM is responsible for initiating, developing, and administering programs aimed at promoting a balanced and viable growth tourism, and promoting ecotourism. |
| Ministry of Natural Resources (MINRENA) | Elaboration of environmental policy and oversee environmental issues |
| Rwanda Environmental and Management Authority (REMA) | REMA oversees implementation of biodiversity policy and environmental law, and ensures that sustainability is integrated in policies. |
| University of Rwanda | To train managerial staff, and contribute to the park management with scientific information |
| <u>Local non-governmental organizations</u> | |

Table 2-1. Continued

| Name | Role and responsibility |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Association for the Conservation of Nature in Rwanda (ACNR) | The major role of ACNR is to stimulate the interest and curiosity of people (youth) to the importance and conservation of biodiversity through the promotion of research and knowledge. |
| Rural Environment Development Organization (REDO) | REDO focuses on environmental sustainability: raising awareness about nature conservation, livelihood projects, education-based human rights interventions, and advocacy initiatives. |
| International Non-Governmental Organizations | |
| Wildlife Conservation Society (WCS) | WCS principal mandate is to ensure the long-term conservation of the biodiversity of Nyungwe. It focuses on building capacity (personnel and equipment), creating conservation awareness about the importance of the park to people living near the park, and providing scientific information for management of the park. |
| KAGENO | Kageno is a community development and focuses on creating community development activities and helping them protect their fragile environments including NNP. |
| Major funding organizations | USAID and UNDP/GEF |

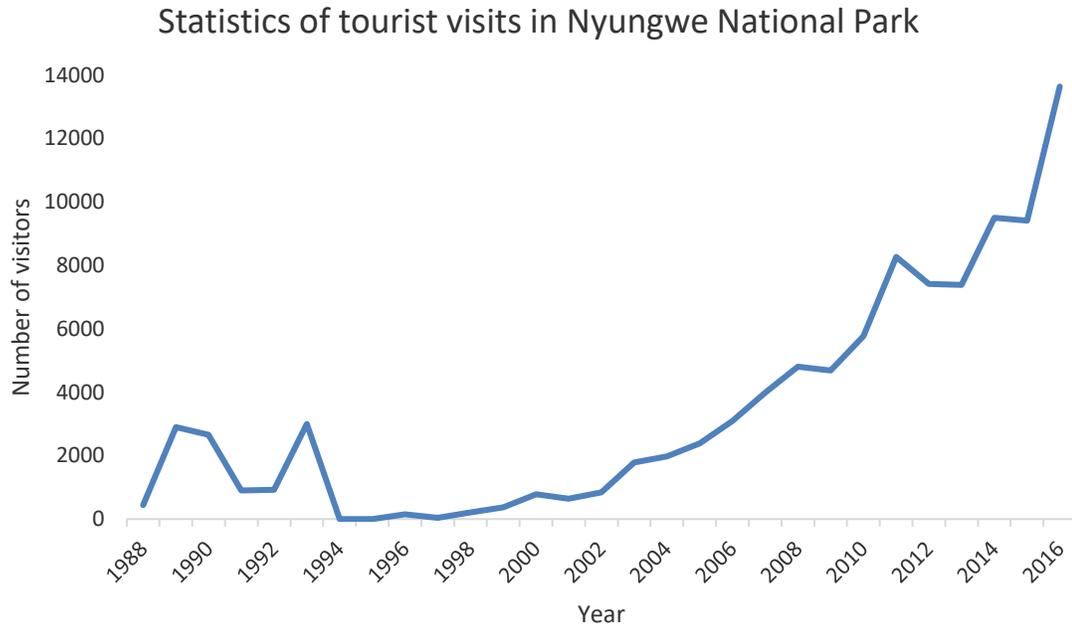


Figure 2-2. Statistics of tourists in Nyungwe National Park from 1988 to 2010 (Source: RDB)

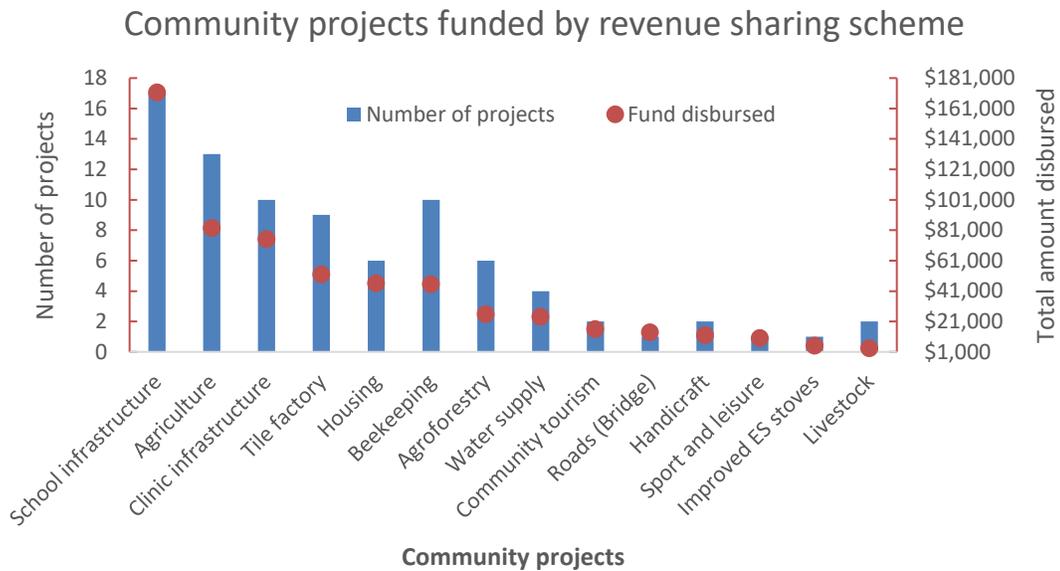


Figure 2-3. Number of community projects and the amount spent on each of them for a period of 9 years in NNP (Source: RDB).

CHAPTER 3 METHODOLOGY

Collaboration and Participatory Approach and Concept

This research applied a participatory approach design (Tress et al., 2005). It fostered collaboration with academic and non-academic professionals including park managers, local government, and local community representatives. Epistemologically, this research applied the “Pragmatic Worldview” (Creswell, 2014) philosophy to answer the research questions. I used a qualitative and quantitative mixed method research approach (Creswell, 2014) so that they complement each other. Moreover, I used a convergent parallel mixed methods model (Creswell, 2014; Figure 3-1): collecting both qualitative and quantitative data roughly at the same time, and integrating such information to interpret the results.

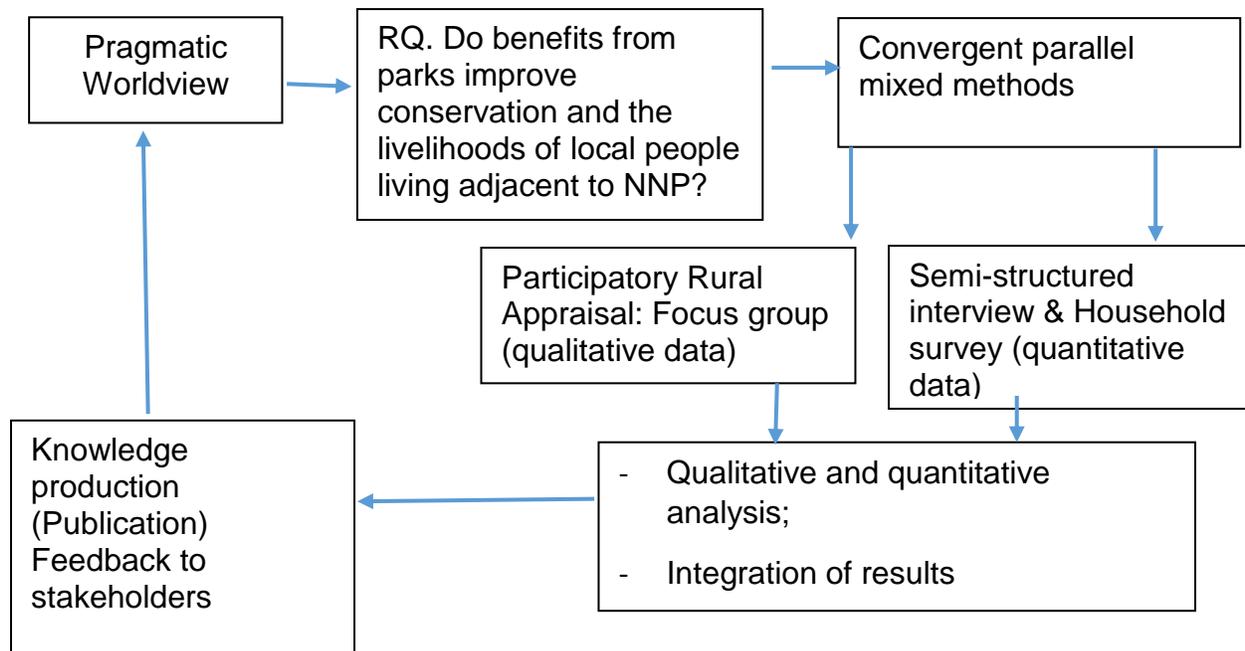


Figure 3-1. Epistemological position orienting this study (Adapted from Creswell, 2014)

Study Site

This study was carried out in Banda and Rasano cells (called village in this study) from Rangiro and Bweyeye administrative sectors (Figure 3-2) neighboring Nyungwe National Park in southwest Rwanda (latitude 2° 15' and 2° 55'S, longitude 29° 00' and 29° 30'E). Banda and Rasano villages are located in Nyamasheke and Rusizi districts respectively in the western Province. Table 3-1 contains major characteristics of Rangiro and Bweyeye sectors.

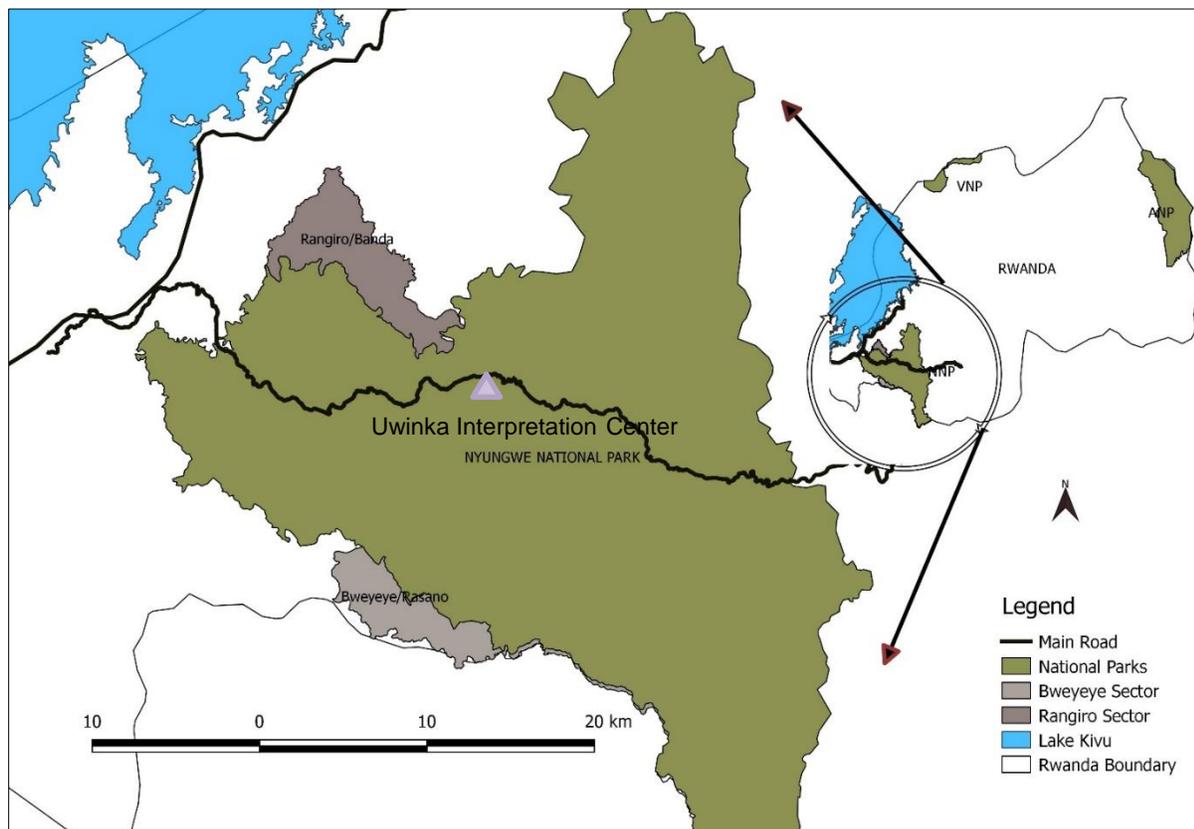


Figure 3-2. Location of study sites (Rangiro and Bweyeye), Rwandan national parks in general and Nyungwe National Park in particular

Table 3-1. Characteristics of our study areas (Rangiro and Bweyeye Sectors): Rangiro and Bweyeye are located northwest and southwest of Nyungwe National Park respectively

| Characteristic | Rangiro | Bweyeye |
|--------------------------------------------------------|---------------------|----------------------|
| Population* | 13,991 (53% female) | 11,695 (52% female) |
| No. of people who can write and read (>10 years old)* | 40% (33.6% female) | 34.3% (24.9% female) |
| Major occupation (>5 years old)* | 59% | 62.5% |
| Subsistence farmer (agri-livestock) | | |
| Mean size of household* | 4.9 people | 5 people |
| Clean water source* | 47% | 51.4% |
| Household without land* | 15.7% | 16.3% |
| People with bank account* | 21.2% (5.6% female) | 9.4% (0.6% female) |
| Access to credits/loan* | 5.6 % | 4.1% |
| Distance to the Uwinka Tourism Interpretation center** | 13 km | 32 km |
| Distance to the park headquarter** | ~40 km | ~70 km |
| Distance to the Kamembe town** | ~ 65 km | > 85 |
| Distance to the main road** | 13 km to main road, | 32 km |

** denotes source field data; * denotes source: NISAR (2012)

Relatively many people in Banda village (compared to Rasano) have a contract or casual work in tourism and park related activities: primate habituation and tracking, nature trail maintenance, primate guide, porter, and research. Main community cooperatives working with NNP:

1. The “Pilier de la Nature et Promotion du Tourism” (PNPT: 85 members), is a community-based tourism cooperative, which runs a campsite and contracts with the park to maintain nature trails in the park.
2. Kabeho Nyungwe is an ex-poacher cooperative (45 members), and its main activity is livestock-keeping. Wildlife Conservation Society (WCS) and Rwanda Development Board (RDB) support this cooperative through revolving funds.
3. The Women Cooperative (40 members) whose main activity is hand crafts and basket weaving, which are locally sold to tourists.

Kageno, a New York City-based non-profit international community development organization (<http://kageno.org>) has its local office in the Banda village. Kageno’s main activities and interventions: early age children education (kindergarten), health care, income generating activities, and conservation. In addition to employment, Kageno also provides food (porridge) and school uniforms for the school children.

Rasano village has relatively few people working in tourism and park related activities compared to its counterpart Banda village. The majority of financial support from the park in this village is through a tourism revenue sharing program (Table 3-2).

Table 3-2. Community projects supported by Nyungwe National Park in Bweyeye and Rangiro sectors

| Major community projects funded by the park and partners | Banda | Rasano |
|----------------------------------------------------------|-----------------|-----------------|
| Bee keeping project | 45 people** | 17 people** |
| Construction of Health Post* | whole community | whole community |
| Livestock (goat rearing) | 300 families** | 150 families** |
| Children classroom (2 classrooms) * | whole community | whole community |
| Park related long-term work contract | >20 people | ~3 people |
| Land for sand extraction | - | 35 people** |
| Maternity clinic and facilities | - | whole community |
| House for vulnerable people | - | 20 families |
| Energy efficiency stove | - | 100 households |
| Livestock project (pig rearing) * | 45 families** | - |
| Fruit project (Fashion fruit growing) | 150 people** | - |

Table 3-2. Continued

| Major community projects funded by the park and partners | Banda | Rasano |
|--------------------------------------------------------------|---------------|--------|
| Community-managed campsite * | 85 people** | - |
| Park trail maintenance (short-term work contract) * | 120 people** | - |
| Hand craft and basketry weaving * | 42 people** | - |
| Kiln for roofing tiles | 22 people** | - |
| Early children education, child feeding, and school uniform* | >300 children | - |
| Clean water* | 11,600 people | - |
| Pico-hydro power* | ~1000 people | - |

“*” Denotes the project implemented in study village; ** denotes community cooperative members

Research Sampling and Sample Size

Household Survey Sampling

I used household sampling (Newing et al., 2011) to collect data for this study. I used the purposive method/homogenous case sampling (Kemper et al., 2003) to sample districts, sectors and cell/village (Figure 3-3). I had a discussion meeting with park community conservation staff to decide districts, sectors and cells to be studied. We selected Banda village as the park management and tourism development influence zone, and Rasano village as a zone with little influence from management activities and tourism development. From each village, I randomly sampled 10% of households: 92 (100% of target sample) and 90 (92% of target sample) in Banda and in Rasano respectively.

Household Data Collection

I randomly selected a sample of 10% (182 households) from the list of households obtained from the sector office in such a way that each household had an

equal opportunity to participate in this survey. I used a quantitative questionnaire method through one-to-one interviews (Newing et al., 2011) with the interviewee freely responding to predefined questions (about 45 to 60 minutes). Respondents, 18 years old and above participated in the survey, and responded on behalf of the household. No selected households refused to respond to our interview. However, some selected households had shifted to other areas, so, we replaced the missing one with another randomly selected household in the same village (Newing et al., 2011).

I piloted and tested the developed questionnaire in 10 households before it was finalized and administered to the sampled households. We used electronic tablets and paper datasheets to collect data. Some tablets didn't work, and the battery charging system was limited in our study site, so we also used paper printed datasheets to collect data, and then we entered data into tablets.

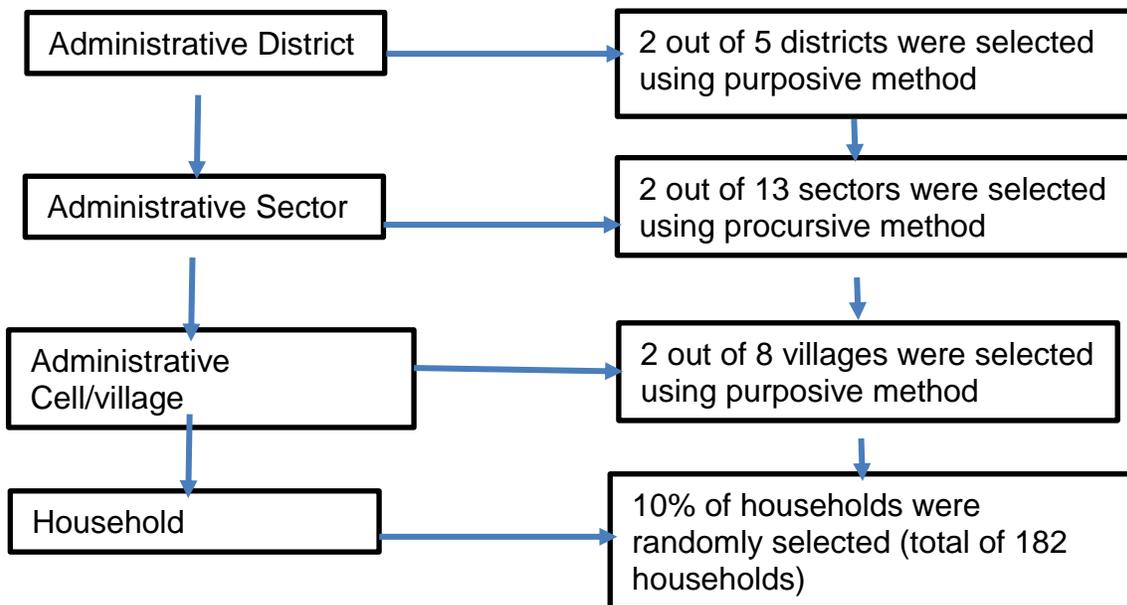


Figure 3-3. Procedure used to select study sites and households in the survey

Household Data Processing and Analysis

The data analysis approach in this study combines qualitative and quantitative information. Qualitative data which cannot be analyzed directly using statistics were processed and analyzed qualitatively (Newing et al., 2011). We used both descriptive, nonparametric, and parametric statistics (Ravid, 2014) to analyze quantitative data. I used RStudio software version 3.3.1 (R Core Team, 2016) to analyze data in this research. More specifically, I used Pearson's Chi-squared test, and Student t- test using Welch Two Sample t-test (Göb, McCollin, & Ramalhoto, 2007) for numerical data, and Mann-Whitney-Wilcoxon rank test for ordinal data.

Focus Group Discussion Data Collection

The Focus Group Discussions (Boateng, 2012) were based on a semi-structured group discussion to interview several respondents systematically and simultaneously. Participants were purposive selected on the criteria that they would be knowledgeable on the given topic and comfortable talking to the interviewer/facilitator, and to each other (Rabiee, 2004). Focus group discussion is applauded and widely used in recent times mainly because of its strength of convenience, economic advantage, high face-validity, and speedy results (Boateng, 2012; McLafferty, 2004).

Out of 18 people invited for focus group discussion, 13 (78%) people of which 23% were women responded to the invitation. The first focus group discussion comprised of 7 people (1 woman) with 6 community and 1 local government representative. Six people (2 women) from Rwanda Development Board (RDB), Wildlife Conservation Society (WCS) and New Forest Company (NFC) formed our second focus group discussion.

The researcher/facilitator explained the questions and the process for the focus group discussion. Each focus group identified positive and negative impacts of the park on communities, and the impacts were clustered into 3 to 4 major categories according to their homogeneity/similarity. We used the analytical hierarchy process (AHP; Saaty, 1990) to process and analyze focus group discussion data. I used the absolute scale (Figure 3-4) to measure the intensity of importance between elements/factors, and the consistency ratio (CR) as a measurement of the level of consistency. A pair-wise comparison using an absolute scale was carried out between the two focus group discussions. We repeated the same process to identify and compare factors which influenced success or failure of community conservation projects supported by the park. We used the following formula to measure the level of consistency: $CR = CI/RI$ whereby, CR = consistence ratio, RI = random consistence index, and CI = consistence index (Saaty, 1990). Only less than or equal to 10% consistence ratio (CR) was accepted in our analysis.

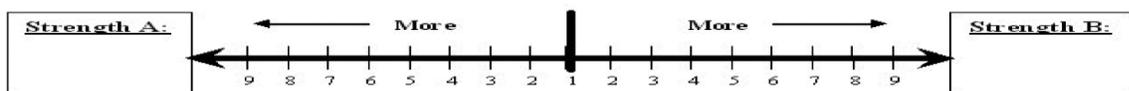


Figure 3-4. Example of a pairwise comparison absolute scale (source: Margles et al. 2010). Interpretation of scale based on importance of experience and judgement (Saaty, 1990): 1 = equal importance, 3= moderate importance of one over another, 5 = essential or strong importance, 7 = very strong importance, and 9 = extreme importance. 2, 4, 6, and 8 = intermediate values between the two adjacent judgements.

CHAPTER 4 RESULTS

Perception of Household on the Conservation of Nyungwe National Park and Livelihoods

Demography of Households in Banda & Rasano Communities

Human capital

On average, age of respondents was between 41 - 44 but varies from 18 to 88 years old (mean = 42.7, SD = 14.54). The sample showed more females in Banda (63%) but more males (55.6%) in Rasano. This is possibly due to the fact that males in Banda go to work in Kamembe town or Kigali city. The majority (78% and 83% of respondents for Banda and Rasano, respectively) considered themselves as subsistence farmers.

The average size of household was 5.1 in Banda (SD=2.24) and 5.46 in Rasano (SD=2.20) people per household, but the difference was not statistically significant ($t = -1.0516$, $df = 179.9$, $p > 0.05$). In Banda 49.4% ($x = 2.46$, $SD = 1.25$) and in Rasano 42.6% ($x = 2.45$, $SD = 1.22$) of people in a household are above 18-years-old with no significant statistical difference.

Less than 45% of people in a household can read: Banda (41%, $x = 2.12$, $SD = 1.80$) and Rasano (36%, $x = 1.98$, $SD = 1.69$) with no statistical difference between the two means. Less than 20% of households had a member in secondary school with none in university. None of the difference between villages are statistically significant. Malaria was: Banda (75%) and Rasano (80%) the biggest health concern of household members followed by diarrhea (32% and 38%) for Banda and Rasano, respectively (Table 4-1).

Natural capital

On average, the size of land/plot owned was: Banda (0.56 hectares SD = 0.58) and Rasano (0.48 hectares SD = 0.63) with no significant statistical difference. Fifty-six (56%) and 65% of households own land less than 0.5 hectares in Banda and Rasano, respectively. Similarly, (11% and 9%) households do not own land/plot in Banda and Rasano, respectively.

Financial capital

Mean annual income was higher in Banda (FRW 191,045, \$1 =FRW 780) than in Rasano (FRW 173,748) but with no significant difference. On-farm and off-farm income were higher in Rasano than in Banda with no significance statistical difference. However, park-related products were 10 times higher in Banda ($x = 48,415$) than in Rasano ($x = 4,768$) with significant statistic difference (<0.001).

Physical capital

Banda (91% and 80%) and Rasano (12% and 52%) have access to clean water and health care respectively with significant statistical difference ($p < 0.001$). In Banda (72% and 97%) and Rasano (55% & 96%) households have mud break houses and tine roofing respectively with no significant statistical difference. Nevertheless, more than 90% of households do not own a generator, solar panel/power, bicycle or motorbike, television or electricity. Household Income and Source of Income

I measured income by summing up household cash income and in-kind income (Income = cash income + in-kind income) for a period of one year. In-kind income includes crop production consumed in a household, in-kind external donations, natural resources collected from the wild/bush, and other non-monetary goods received in a

household. It excluded, however various kind of assets such as radio, telephone, land, houses, livestock, etc.

In this analysis, cash income refers to the collection of monetary earning by a household: wages and salaries, remittances, pensions, sale of crop products or the government grant (child grant, disability grants). Table 4-2 describes three categories of sources of income for a household.

Major sources of income include on-farm products (44%, $x = 83,345$ SD = 71,946) and (60%, $x = 203,702$, SD = 158,610) for Banda and Rasano, respectively with no statistically significance difference ($p > 0.05$). Park-related products (25%, $x = 86,995$, SD = 222,462 and 3%, $x = 4.768$, SD = 12,092) in Banda and Rasano respectively with significant statistical difference ($p < 0.001$). Off-farm products: Banda (31%, $x = 58,557$, SD = 86,995) and Rasano (37%, $x = 65,279$, SD = 110,291; $p > 0.05$; Figure 4-1).

Food from charity (55% and 22%), cash/donation (12% and 1%), local remittance (24% and 12%), government grant (55% and 22%), subsidized fertilizer (33% and 3%), and local remittance (25% & 12%) in Banda and Rasano respectively showed significant statistical difference ($p < 0.001$) (Table 4-1).

Eleven (11%) and (18%) of households are better-off with FRW 273,000 (~US\$360) Rasano and Banda respectively per year (Figure 4-2). Banda (29%) and Rasano (25%) household earn higher than an average (FRW 182,396) per household per year with no statistical difference.

Major Crops Grown and Livestock Reared in Banda and Rasano Villages

Beans (83% and 72%) followed by sweet potatoes (66% and 57%) were the most grown crop in Banda and Rasano, respectively. Cassava was frequently grown in Rasano (88%) compared to Banda (56%) with significant statistical difference ($\chi^2 =$

28.22, $df = 1$, $p < 0.001$; Figure 4-3). Few households grow cassava in Banda because of cassava mosaic diseases that spread in the area in previous years.

Major livestock kept were cattle (27% and 21%), followed by pigs (25% and 40%) and goats (18% and 22%) in Banda and Rasano respectively with no statistical difference. However, more than 32% of household in Banda and 23% of household in Rasano do not own livestock (Figure 4-3).

Food Security in Households

Staple foods in Rwanda consist of roots, tubers, banana, beans, sweet potatoes, cassava, maize and avocado fruits (Adekunle, 2007). The majority of people, in rural areas, eat twice a day. Porridge (sorghum or corn, sugar, and milk) is commonly taken for breakfast. Boiled beans, banana, maize bread, sweet potatoes or cassava and vegetable comprise lunch or dinner. Whereas milk can be consumed on daily basis, meat is rarely (two to three times per month) consumed in rural areas. Therefore, we did not expect meat to be consumed by many households in a meal on the previous day of the survey.

We asked respondents to confirm various food items in their meal in the previous day of the survey. Beans (81% & 60%), sugar (27% & 7.8%), fruits (19% & 7.8%), fish (22% & 41%), and meat (9.8% & 1%) were food consumed with significant statistical difference between villages. The greater percentage of small fish consumption in Rasano is due to the influence of being closer to the border with Burundi. However, a small number of households consumed milk, fruit, meat, egg and sugar (Figure 4-4).

A small number of household suffer from shortage of food, especially in Rangiro (9 months from June to February; Figure 4-5). Over 70% of households suffer from food shortage in April and May. However, food shortage persisted in June, July, and August

in up to 20% of households in Rasano village. This is possibly due to changes in rain patterns.

Table 4-1. Situation analysis in Banda and Rasano. Mean and standard deviation (SD) or number of household and percentage (%), and level of significance (p-value)

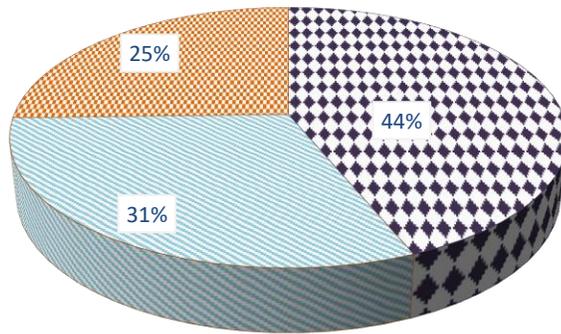
| Area characteristics | Banda (N=92) | Rasano (N=90) | P-value |
|--------------------------------------------------|-----------------|-----------------|---------|
| Village | | | |
| Age of respondents | 44.2 (SD=15.7) | 41.2 (SD=13.2) | 0.171 |
| Gender of respondents: | | | |
| Male | 34 (37%) | 50 (55.6%) | <0.05 |
| Female | 58 (63%) | 40 (44.4%) | |
| Substance farming | 72 (78.3%) | 75 (83.3%) | >0.05 |
| Employed part-time | 10 (10.9%) | 9 (10%) | |
| No formal education | 41 (44.6%) | 39 (43.3%) | >0.05 |
| Primary school education | 38 (41%) | 31 (34.4%) | |
| Some college education | 10 (10.9%) | 14 (15.6%) | |
| Number of years lived in the area | 36.2(SD16.2) | 36.6(SD16.7) | >0.05 |
| Human capital | | | |
| Size of household | 5.1 (SD=2.24) | 5.46 (SD=2.20) | >0.05 |
| Number of people who can read | 2.1 (SD = 1.8) | 1.9 (SD 1.69) | >0.05 |
| Number of people <18-year-old/HH | 2.87 (SD = 1.9) | 2.89 (SD = 1.9) | >0.05 |
| Number of people >18-year-old/HH | 2.46 (SD = 1.3) | 2.45 (SD = 1.2) | >0.05 |
| Number of people in primary school | 1.3 (SD = 1.4) | 1.5 (SD = 1.2) | >0.05 |
| Number of people in secondary school | 0.3 (SD 0.68) | 0.2 (SD = 0.5) | >0.05 |
| Malaria | 69 (75%) | 72 (80%) | >0.05 |
| Diarrhea | 30 (32.6%) | 35 (38.8%) | >0.05 |
| Natural capital | | | |
| Size of plot (Ha) | 0.56 (SD=0.58) | 0.48 (SD=0.63) | >0.05 |
| Household with land < 0.5 Ha | 51 (56.04%) | 60 (65.93%) | >0.05 |
| Household with land > 0.5 Ha | 40 (43.95%) | 30 (32.96%) | >0.05 |
| Landless | 10 (11%) | 8 (9.1%) | >0.05 |
| Financial capital | | | |
| Mean income per year (FRW) | 191,045 | 173,748 | >0.05 |
| On-farm products (FRW) | 83,345 | 103,702 | >0.05 |
| Off-farm products (FRW) | 58,557 | 65,279 | >0.05 |
| Park-related products (FRW) | 48,415 | 4,768 | <0.001 |
| Physical assets | | | |
| House roofing (iron sheet or tiles) | 90 (97.8%) | 87 (96.7%) | >0.05 |
| Easy access to clean water | 84 (91.3%) | 11 (12.2%) | <0.001 |
| Easy access to healthcare for the family members | 74 (80.4%) | 47 (52.2%) | <0.001 |
| House wall (mud bricks) | 67 (72.8%) | 50 (55.6%) | >0.05 |
| House wall (mud) | 24 (26.1%) | 39 (43.3%) | >0.05 |
| Radio | 53 (57.6%) | 49 (55.1%) | >0.05 |

Table 4-1. Continued.

| Area characteristics | Banda (N=92) | Rasano (N=90) | P-value |
|---------------------------------------|----------------|-----------------|---------|
| Village | | | |
| Telephone | 28 (35.6%) | 32 (35.6%) | >0.05 |
| Size of plot/land (Ha) | 0.56 (SD =0.6) | 0.48 (SD = 0.6) | >0.05 |
| On-farm products | | | >0.05 |
| Natural resource collection | 91 (98.9%) | 90 (100%) | >0.05 |
| Agriculture | 85 (92%) | 86 (95.5%) | >0.05 |
| Park-related products: | 57(61.9%) | 26 (28.8%) | <0.05 |
| Food from charity | 51 (55.4%) | 20 (22.2%) | <0.001 |
| Clothes from Charity | 22 (23.9%) | 21 (23.3%) | >0.05 |
| Cash from charity | 11 (12.0%) | 1 (1.11%) | <0.05 |
| Transport (lift to town or main road) | 10 (10.9%) | 1 (1.11%) | <0.05 |
| Sponsorship for education | 14 (15.2%) | 17 (18.9%) | >0.05 |
| Wages & salaries | 8 (8.7%) | 0 | |
| Off-farm products | 77(83.7%) | 49 (54.4%) | <0.05 |
| Government grant | 42 (45.7%) | 23 (25.6%) | <0.05 |
| Subsidized fertilizer | 31 (33.7%) | 3 (3.33%) | <0.001 |
| Local remittance - yr. | 23 (25.0%) | 11 (12.2%) | <0.05 |
| Crops and livestock (frequency) | | | |
| Beans | 77 (83.7%) | 67 (72.83%) | >0.05 |
| Sweet potatoes | 61 (66.30%) | 53 (57.61%) | >0.05 |
| Cassava & Other | 52 (56.52%) | 88 (95.65%) | <0.001 |
| Cattle | 25 (27.17%) | 20 (21.7%) | >0.05 |
| Pigs | 23 (25%) | 37 (40.22%) | >0.05 |
| Goats | 17 (18.48%) | 21 (22.83%) | >0.05 |

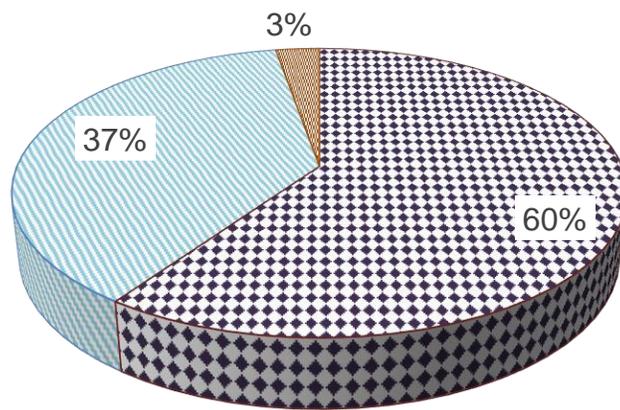
Table 4-2. Description of categories of the source of income for households

| Source of income | Description |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| On-farm income | - Earning of a household from farming products (consumed + sold) - Non-timber forest collection (either sold or used in households) |
| Park-related income | - wages and salaries earned from the park and/ or conservation related non-governmental organizations - gifts or donations from charities/conservation NGOs or tourists |
| Off-farm income | - wages and salaries (none park-related wages and salaries) - in-country remittance and self-employment - donation/assistance from government |



On-farm products
 Off-farm products
 Products related to the park

(a)



On-farm products
 Off-farm products
 Products related to the park

(b)

Figure 4-1. Diversification of income: (a) Banda (N=92) and (b) Rasano (N=90) villages

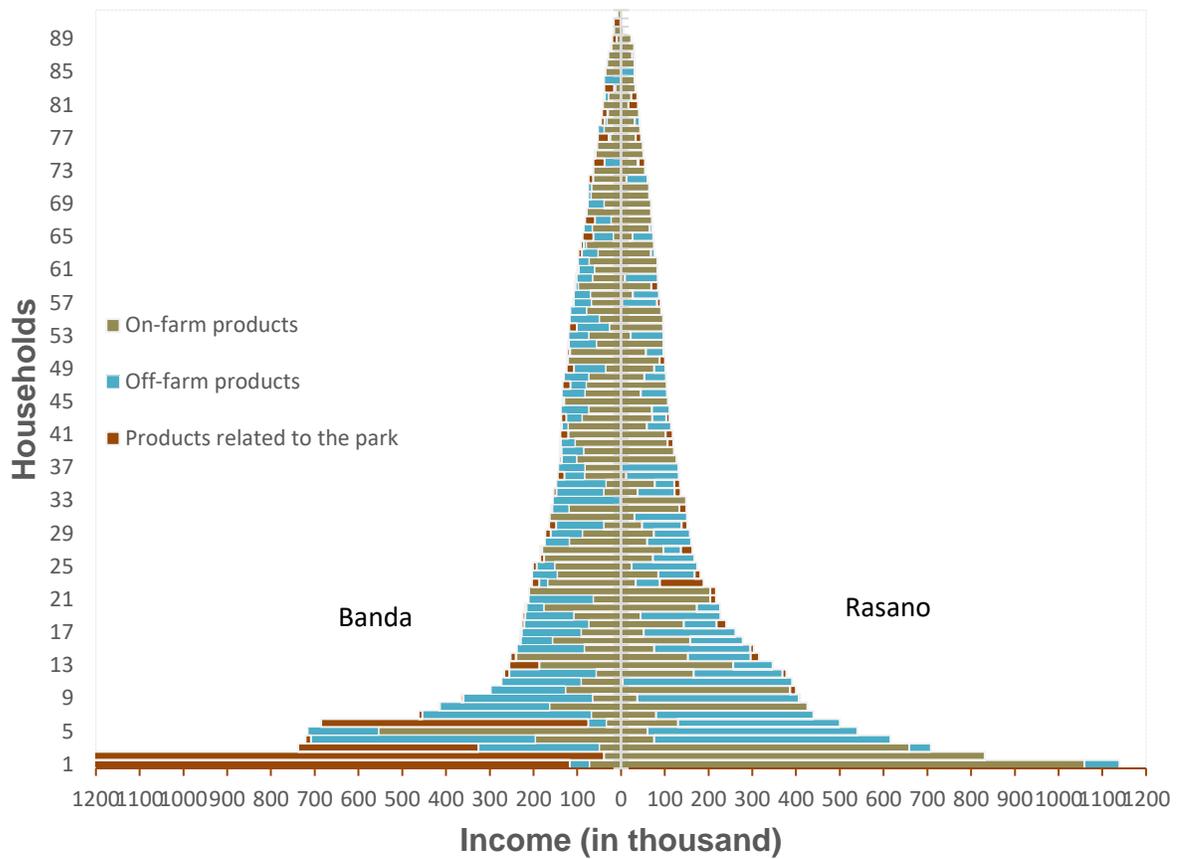
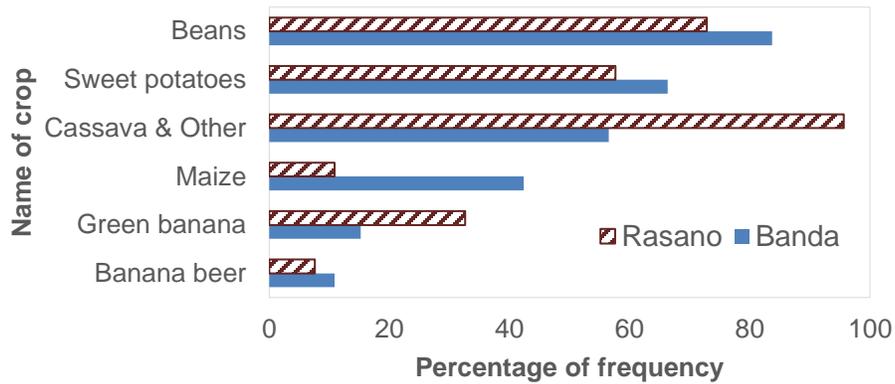
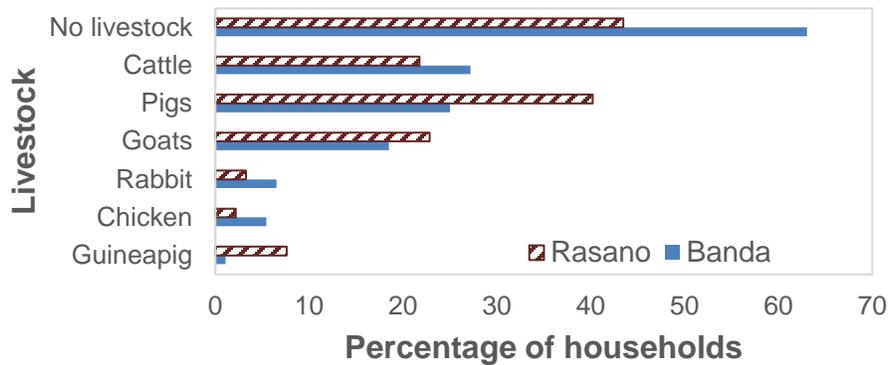


Figure 4-2. Income distribution in households in (left) Banda (N=92), and (right) Rasano (N=90) village. The average income per households in previous 12 months was 190,306 FRW (USD237.9) in Banda, and 173,748FRW (USD217.2) in Rasano.



(a)



(b)

Figure 4-3. (a) Major crops grown, and (b) livestock kept in Banda and Rasano villages

Perceptions on Benefits and Costs

Banda (90%) and Rasano (80.4%) perceived that the park either increased or slightly increased their wellbeing in the last 5 years. More than 95% have positive attitudes that the park should be conserved for the present and future generations (Table 4-3).

School children education, employment in tourism related activities, employment in the park, getting cash for the park, conservation education, access to market for their

products, donations and grant, and socio-economic infrastructure were perceived benefits from the park with significant statistical difference ($p < 0.001$) (Table 4-3). While Banda (91%) perceived that access to clean water is a benefit to them, Rasano (87% of respondents) contrasted this perception. This is because majority of households in Banda fetch water (tap water) in less than 20 minutes while in Rasano most of household fetch water in running streams and rivers (Figure 4-6).

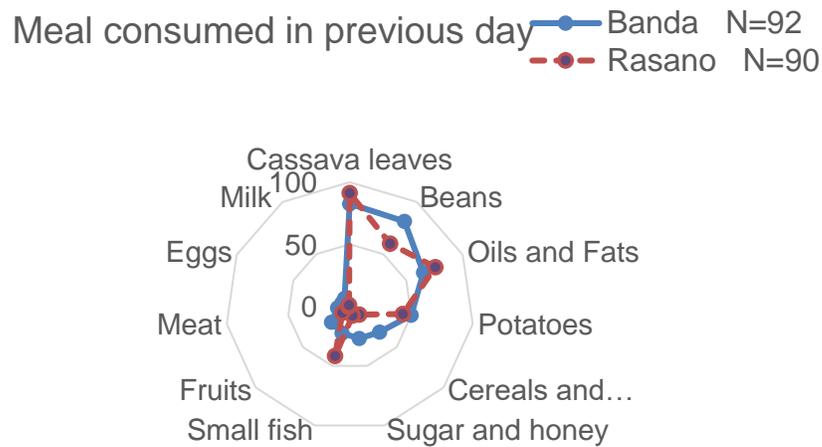


Figure 4-4. Percentage of food consumption in household in previous day of the survey

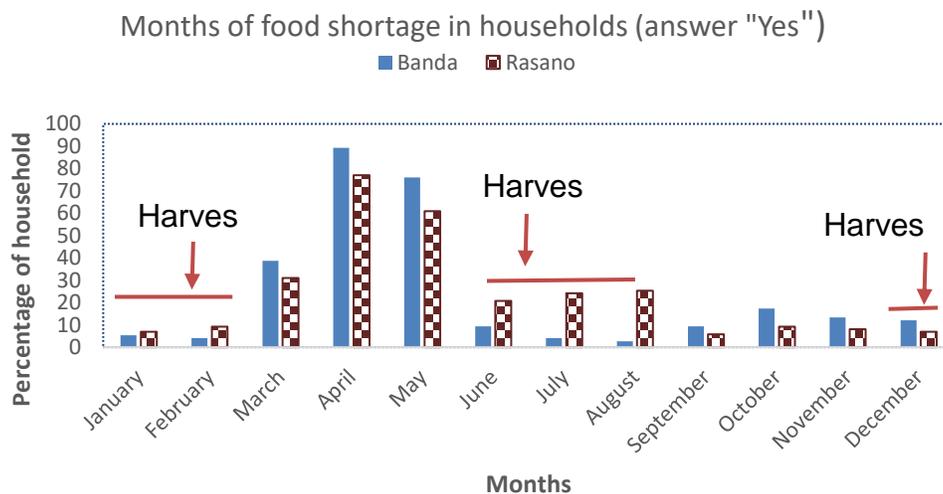


Figure 4-5. Months of food shortage in Banda (N=92) and Rasano (N=90) in previous 12 months. The percentage of households based on answer “Yes” to the question whether the household experienced food shortage in previous 12 months.

Table 4-3. Perceptions of households on benefits and costs of living near the NNP: percentage of aggregate responses (strongly agree or agree), mean and standard deviation of responses and are based on Likert scale (1 = strongly disagree to 5 = strongly agree, and 3 neutral), t- value, and level of significance

| Variables | % of households | | Responses (Mean and SD) | | W-value | p-value |
|----------------------------------------------|-----------------|--------|-------------------------|-------------|---------|---------|
| | Banda | Rasano | Banda | Rasano | | |
| | | | (N=92) | (N=90) | | |
| Benefits | | | | | | |
| Clean water | 95.7 | 31.1 | 4.67 (0.68) | 2.44 (1.17) | 7780.5 | <0.001 |
| Donation and grants | 81.5 | 67.8 | 4.15 (1.13) | 3.64 (1.25) | 5180 | <0.001 |
| Clean air | 80.4 | 77.8 | 4.09 (1.10) | 3.83 (1.18) | 4694 | >0.05 |
| Job in the park | 58.7 | 31.1 | 3.58 (1.22) | 2.86 (1.25) | 5441 | <0.001 |
| Getting cash from the Park | 79.3 | 42.2 | 3.83 (1.04) | 2.86(1.16) | 5974.5 | <0.001 |
| Job in tourism activities | 92.4 | 27.8 | 4.10 (0.54) | 2.54 (1.02) | 7163 | <0.001 |
| Market for product | 94.6 | 34.4 | 4.10 (0.59) | 2.60 (1.20) | 6787.5 | <0.001 |
| School and clinics | 91.3 | 78.3 | 4.34 (0.70) | 4.09 (0.87) | 5414.5 | <0.05 |
| Conservation education & training | 81.5 | 66.7 | 3.90 (0.80) | 3.50 (0.84) | 4746 | >0.05 |
| Infrastructure and services | 39.1 | 11.1 | 3.12 (0.91) | 2.27 (0.82) | 6210 | <0.001 |
| Costs | | | | | | |
| Crop raiding | 72.8 | 31.1 | 3.84 (1.52) | 2.46 (1.49) | 6008.5 | <0.001 |
| Restriction to natural resources | 44.6 | 55.6 | 3.02 (1.17) | 3.28 (1.45) | 3634 | >0.05 |
| Livestock predation | 7.6 | 11.1 | 1.68 (0.84) | 1.87 (1.01) | 3756 | >0.05 |
| Harassment by park rangers | 5.4 | 5.6 | 1.68 (0.80) | 1.71 (0.78) | 4026 | >0.05 |
| Park-Community relationship | | | | | | |
| Excellent relationship with the park | 89 | 74 | 4.35 (0.79) | 3.93 (0.91) | 5242.5 | < 0.001 |
| Park does a lot for us | 88 | 68 | 4.15 (0.73) | 3.63 (1.02) | 5272 | <0.001 |
| Regular meeting with park | 78 | 43 | 3.95 (1.12) | 2.96 (1.15) | 6057 | <0.001 |
| Easy to express grievances | 60 | 52 | 3.37 (1.40) | 3.20 (1.24) | 4536.5 | >0.05 |
| Attitude on conservation in future | 95 | 98 | 4.42 (0.58) | 4.62 (0.51) | 3411.5 | <0.05 |
| Project preference for future support | | | | | | |
| Clean water | 96 | 98 | 4.52 (0.67) | 4.67 (0.54) | 3695 | >0.05 |

Table 4-3. Continued

| Variables | % of households | | Responses (Mean and SD) | | W-value | p-value |
|-------------------------------------------|-----------------|--------|-------------------------|---------------|---------|---------|
| | Banda | Rasano | Banda (N=92) | Rasano (N=90) | | |
| Livestock rearing | 95 | 100 | 4.75 (0.67) | 4.81 (0.39) | 4213 | >0.05 |
| School and clinics | 86 | 90 | 4.42 (0.62) | 4.38 (0.61) | 4338 | >0.05 |
| Energy efficient stove | 93 | 95 | 4.15 (0.84) | 4.19 (0.58) | 4281 | >0.05 |
| Paying health insurance for poor people | 93 | 100 | 4.68 (0.69) | 4.66 (0.48) | 4573 | >0.05 |
| Improved agriculture (agriculture inputs) | 86 | 90 | 4.15 (0.91) | 4.18 (0.76) | 4273 | >0.05 |
| Guarding crops from wild animals | 85 | 61 | 4.24 (0.96) | 3.40 (1.28) | 5795 | <0.001 |
| Agroforestry (tree planting) | 76 | 68 | 3.74 (0.89) | 3.44 (1.06) | 4708.5 | >0.05 |
| Low Interest Loan (revolving fund) | 60 | 73 | 3.46 (1.31) | 4.09 (0.99) | 3021 | <0.001 |
| Community tourism | 55 | 41 | 3.42 (0.97) | 3.03 (1.05) | 4974.5 | <0.05 |
| Beekeeping development | 54 | 36 | 3.14 (1.26) | 2.63 (1.30) | 5005.5 | <0.001 |

Benefit of living near the park

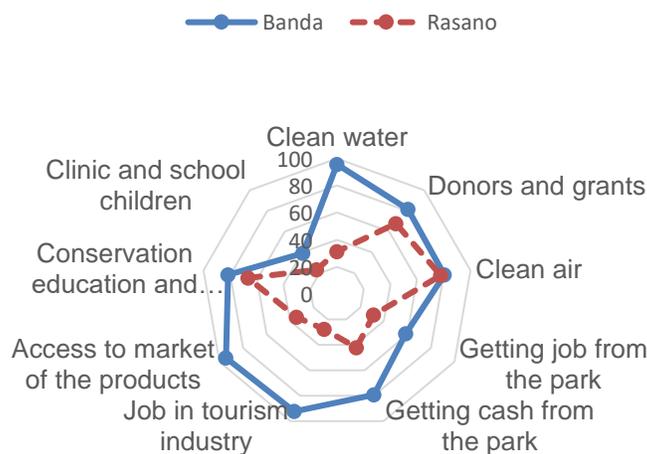


Figure 4-6. Percentage of respondents who strongly agree or agree on household benefits from the park (aggregate of responses “agree” & “strongly agree”).

Costs of Living Near the Nyungwe National Park

Banda (73% & 44%) and Rasano (31% & 55%) strongly agree or agree that crop raiding is a cost for their households with significant statistical difference ($p < 0.001$), followed by restricted access to natural resources (Figure 4-7). Surprisingly, Banda (18%) and Rasano (4%) said that bad behavior (polygamy) was related to the management of the park and tourism activities. People working in the park get wealth and marry many women.

Perception on Governance of the Nyungwe National Park and Local Communities

Banda (90% & 78%) and Rasano (76% & 43%) said that they have an excellent relationship with the park, and have regular meetings with the park with statistical significant difference (<0.001). Nevertheless, 60% and 52% agree or strongly agree that it is not easy for them to express their grievances (Figure 4-8). They said that it takes a long time to get compensation for their property (crops) damaged by wild animals from the park.

Furthermore, participants were asked to whom they would like to go (or where they go) if they need information about NNP and socio-economic opportunities. The majority of people go to local government for information about human-wildlife conflict, community development and small-scale business, and agriculture (Table 4-4). They go to the conservation awareness volunteer (ANICO) about revenue sharing. Nevertheless, 25% of respondents would not be interested in getting information about revenue sharing.

Costs of living near the park

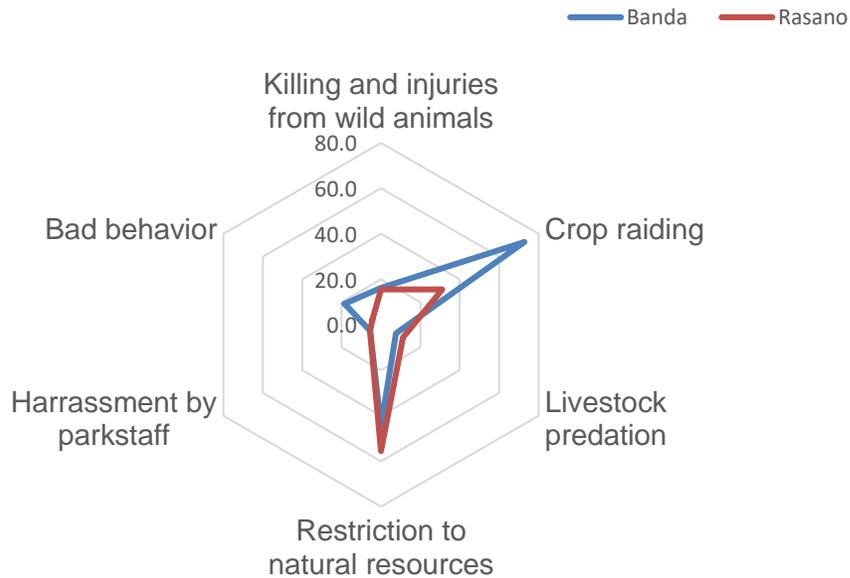


Figure 4-7. Percentage of respondents who strongly agree or agree on the costs of living near the park, Banda (N= 92) and Rasano (N=90).

Park-Community relationship

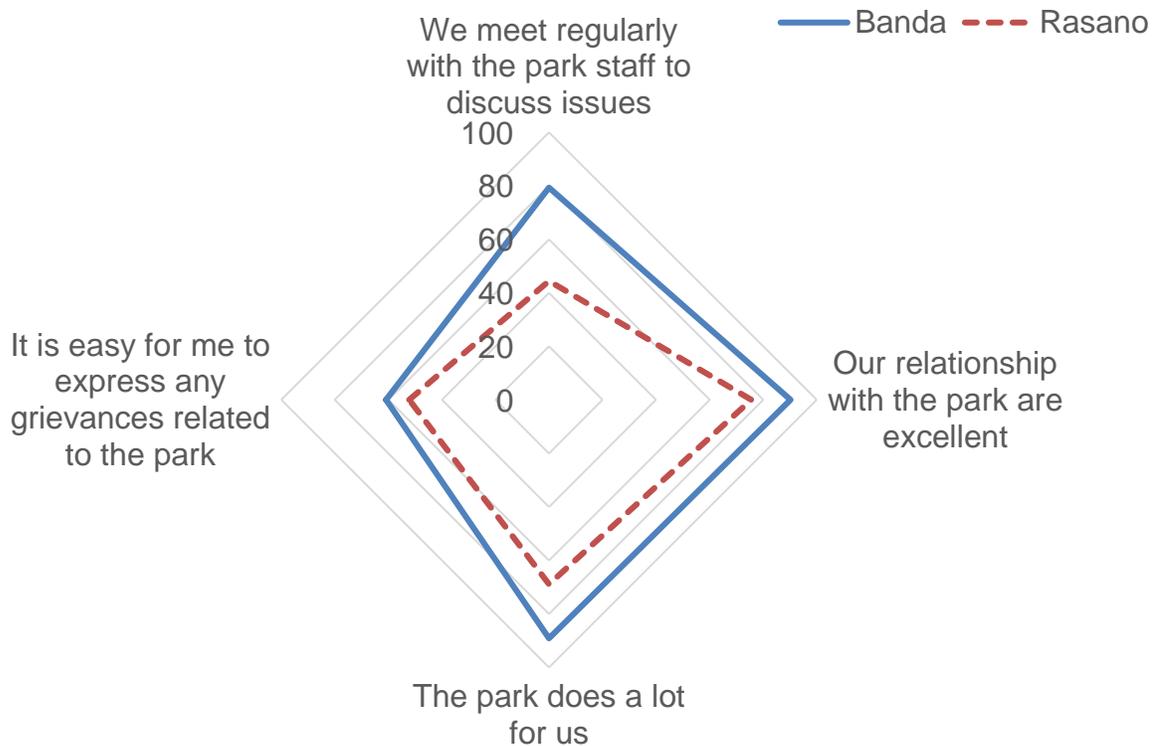


Figure 4-8. Perceptions on Park-Community relationship

Table 4-4. Source of information about governance of NNP: Number of respondents and percentage

| Major source of information | Village | ANICO | Local government officials and park | NGO | none | Relatives and friends | Opinion leaders | p-value |
|-------------------------------------------|---------|------------|-------------------------------------|------------|------------|-----------------------|-----------------|---------|
| Human wildlife conflicts | Banda | 44 (47.8%) | 31 (33.7%) | 6 (6.52%) | 2 (2.17%) | 1 (1.09%) | 6 (6.52%) | 0.011 |
| | Rasano | 31 (34.4%) | 47 (52.2%) | 0 (0.00%) | 6 (6.67%) | 1 (1.11%) | 3 (3.33%) | |
| Information on community development | Banda | 0 | 47 (51.1%) | 9 (9.78%) | 2 (2.17%) | 1 (1.09%) | 33 (36%) | 0.017 |
| | Rasano | 0 | 52 (57.8%) | 0 (0.00%) | 2 (2.22%) | 1 (1.11%) | 35 (39%) | |
| Information on small scale business | Banda | 3 (3.26%) | 55 (59.8%) | 3 (3.26%) | 17 (18.5%) | 10 (10.8%) | 4 (4.35%) | 0.014 |
| | Rasano | 0 (0.00%) | 70 (77.8%) | 0 (0.00%) | 12 (13.3%) | 7(7.7%) | 1 (1.11%) | |
| Information on agriculture product inputs | Banda | 1 (1.09%) | 68 (73.9%) | 9 (9.78%) | 9 (9.78%) | 3 (3.26%) | 2 (2.17%) | 0.007 |
| | Rasano | 0 (0.00%) | 79 (87.8%) | 0 (0.00%) | 8 (8.89%) | 2 (2.22%) | 1 (1.11%) | |
| Information on Revenue Sharing | Banda | 35 (38.0%) | 14 (15.2%) | 13 (14.1%) | 17 (18.5%) | 6 (6.5%) | 0 | <0.001 |
| | Rasano | 36 (40.0%) | 18 (20.0%) | 1 (1.11%) | 29 (32.2%) | 6 (6.67%) | 0 | |

Attitude and Preference of Community Projects in Future

Participants in this study used the “Likert scale” to express their choice about the potential community projects, which the park should fund in future. Overall, communities want everything on the project list. However, respondents’ attitude on community projects: low interest bank loan (revolving funds; $p=0.001$), community tourism projects ($p=0.01$), beekeeping development ($p= 0.008$), agroforestry ($p=0.04$), and guarding crop from wild animals varied between the two villages (Table 4-4). Beekeeping development (54% & 36%) and community tourism (55% & 41%) for Banda and Rasano respectively were the least preferred community projects (Figure 4-9). This is because most of the communities lack the required specific skills to run such projects.

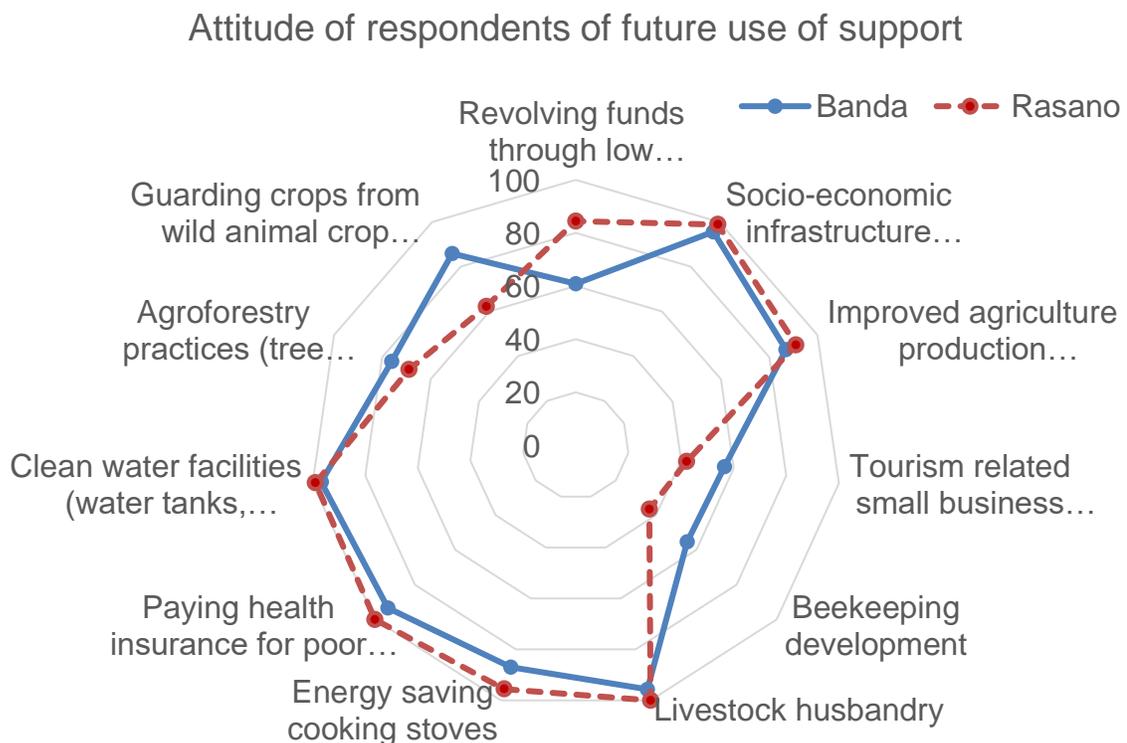


Figure 4-9. Attitude of respondents (percentage) on future community support by the park (aggregate response of “agree” and “strongly agree”). Banda N= 92 and Rasano N= 90

Factors that Influenced Success or Failure of Community Projects

Impacts of Nyungwe National Park (NNP) on local residents were assessed using focus group discussion (FGD) workshops. Major positive impacts identified include: ecosystem services: clean water, clean air, and local climate regulation (63% and 65% importance of priority), and socio-economic infrastructure (tourism revenue sharing). Likewise, crop raiding (54% and 51% importance of priority) was the most negative impact of the park on the surrounding communities (Table 4-5).

Furthermore, participation of beneficiaries in the process of selection and implementation of the community projects (55% and 25%), and adequate skills in managing community projects (35% and 59%) were major factors influencing the success of community funded projects.

Table 4-5. Positive and negative impacts of the Nyungwe National Park by priority of importance ranking

| Impacts | Community | | Park | |
|----------------------------------------------------------|----------------------|----|----------------------|----|
| | Rank/Priority vector | CR | Rank/Priority vector | CR |
| Positive impacts | | | | |
| Ecosystem services | 63% | | 65% | |
| Employment and income opportunity | 26% | 4% | 28% | 2% |
| Access to information on the park | 11% | | 7% | |
| Negative impacts | | | | |
| Crop raiding | 54% | | 51% | |
| Restriction for access to natural resources | 29% | | 11% | |
| Remoteness | 7% | 8% | 30% | 9% |
| Costs related to fire suppression in the park | 10% | | 6% | |
| Factors influenced success of community funded projects | | | | |
| Participation in selection of the projects | 56% | | 25% | |
| Long term support from the park and or local authorities | 9% | 6% | 16% | 6% |

Table 4-5. Continued

| Impacts | Community Rank/Priority vector | CR | Park Rank/Priority vector | CR |
|--------------------------------------------------------------------------------------------|--------------------------------------|----|---------------------------------|----|
| Factors influenced failure of community funded projects | | | | |
| Lack of skills to manage projects leading to mismanagement of projects | 48% | | 57% | |
| Lack of involvement beneficiaries in conception and implementation of the project | 19% | 8% | 25% | 9% |
| Creation of cooperative targeting funds | 16% | | 8% | |
| Corruption | 16% | | 10% | |

CHAPTER 5 DISCUSSION

Perception of Households on Benefits and Costs of NNP on Local Residents

National parks can bring benefits or costs to people living within or near them (Ellis, 1999). We used focus group discussion and household surveys to assess impacts of Nyungwe National Park on surrounding communities in 182 households in Banda and Rasano villages. Data showed mixed impacts of the park on household living next to Nyungwe National Park. More than 95% of respondents interviewed perceived the national park as a benefit to them, and have positive attitudes towards its conservation. The benefits to communities and households include classrooms, health clinics (health point), clean water, income generating activities (employment in park and tourism related activities, livestock), clean air, local climate regulation, conservation education and training, as well as funding opportunities.

However, remarkable differences were observed between the two villages. For example, access to clean water (Banda: 95% and Rasano: 31%), employment in tourism related activities (Banda 92% vs Rasano 27%) demonstrate significant differences ($p < 0.001$) between villages indicating that people in Banda benefit more than those in Rasano. This difference is explained by exposure to tourism and park management activities (Anthony, 2007). There was, in Banda, a higher number of people employed in park-related activities including long-term work contracts, casual labor contracts, community campsites, handicrafts, and donations from conservation organizations than its counterpart Rasano.

Overall, the higher perception of benefits and positive attitudes towards conservation in Nyungwe National Park were remarkably higher than those reported at

Kruger National Park (Stem et al., 2003), but in consistence with findings from India and Nepal (Karanth & Nepal, 2012). The large number of households perceiving park benefits and its important role in their livelihoods/well-being can predict positive people's relationships with the park, and positive attitude towards conservation (Allendorf et al., 2006).

Contrary, the costs of the park on local people's livelihood are also apparent. Focus group discussion and household surveys demonstrated that crop damage (30% to 72% of respondents) and restriction to non-timber natural resources (45% to 55%) are major costs perceived by households around Nyungwe National Park. Nevertheless, remarkable differences in crop raiding was observed between the two villages with a higher percentage of crop raiding in Banda ($p < 0.001$). A low number of households reporting crop raiding can be associated to the land use (type of crop grown) in relation to park boundary (Fungo, 2011). Many people in Rasano reported that they replaced crop with eucalyptus in their plots near the park boundary because eucalyptus are not palatable food for primates.

These findings are in consistence with other studies on crop raiding in forested areas: Cyamudongo forest, Rwanda (McShane, 2008), Gishwati forest, Rwanda (Mc Guinness & David Taylor, 2014), and Sulawesi, Indonesia (Riley & Priston (2010). The impact of crop raiding on attitudes of local communities towards national parks can undermine efforts to support conservation, even when the programs provide substantial economic benefits (Fungo, 2011).

Household Income Diversification

On-farm products (crops, firewood, and traditional medicine), park-related products (salaries and wages from park and tourism and conservation related activities, food and clothes from charity), and off-farm products formed major sources of household income. Diversification of source of income, especially park-products varied between villages ($p < 0.001$) with a higher percentage in Banda (25% vs 3%). Significant differences in most park-related variables including salaries and wages in Banda (8% vs 0%) can be explained by the tourism and park management influence zone. People living in a community where tourism exists (tourism exposure) are more likely to participate in tourism-associated benefits (Stem et al., 2003).

Park Relationship with Local People

The park-local community relationship is mixed in our studied villages. There was a positive perception of the park-community relationship (74% - 90%) with a difference between the two villages. People's positive perception on park management is a good opportunity for conservation because it influences positive attitudes to the conservation (Allendorf et al., 2006; Ormsby and Kaplin, 2005). Communities (47% to 52%) go to the local government (cell executive secretary and park staff) and conservation awareness volunteer for information about the management of the park (ANICO) indicating the level of trust established between communities and park managers. However, at least 55% felt that it was not easy for them to express their grievances when they face problems from the park. It takes time and it is a long process to get compensation for property damaged by wildlife. The process is too long and costly so that by the end, the process cost is greater than the compensation.

Factors Affected the Success or Failure of Community Project Funded by the Park

Focus group discussions pointed out a number of challenges for community projects funded by the park. These include: poor management, limited entrepreneurial skills, lack of involvement and participation in project design and implementation, and inadequate funding. Many community projects funded by the park, especially income generating projects, lack scrutiny for their feasibility and sustainability such as a business plan. Though the park funds the projects initiated by community members (community cooperatives), most of these projects were designed and written by few people without consultation/involvement of other members of the cooperatives, who are expected to implement these projects. Thus, there is a limitation of their participation in project conception, development and implementation.

Furthermore, poor management and limited entrepreneur skills hinder the success of the project even if they are well designed. Most management structures do not function: financial and accounting book, business plan, and transparency and accountability. Group discussion indicated that some community projects are dominated by a few individuals who were on the forefront at project conception, and they control and derive benefits from these projects. Even if management structure exists, managerial skills (e.g. marketing, business plan, etc.) and financial capacity are limited.

Preference and Choice of Potential Community Projects Funding

When asked their attitude on community projects which can be funded by Nyungwe National Park in the future, interviewees wanted every community project on the list. However, community projects: socio-economic infrastructure (classroom and health clinic), livestock husbandry, paying for health insurance for poor people, clean

water, energy saving stove, and agriculture inputs were the most common community projects put forward, with support from more than 85% of respondents.

On the other hand, community projects: beekeeping project and tourism-related small-scale business were less prioritized (less than 50%) by respondents. Although these projects are more conservation friendly and have considerable income-generating potential in many rural areas (Bradbear, 2009, Archabald & Naughton-Treves, 2001, Mehta & Kellert, 1998), they require special managerial skills and competence. However, these skills and competences are limited in studied villages. Beekeeping projects, for instance are among community projects that are doing better in other areas around Nyungwe (Hakizimana, pers. communication).

Conclusion and Management Recommendations

In many developing countries, benefit sharing has been used to compensate foregone access to natural resources in national parks. This study has shown that more than 80% of respondents have improved or slightly improved their livelihood because of the park, and 95% have a positive attitude towards conservation. Studied villages benefit from the park through ecosystem services (clean water and clean air), classroom and health clinics, and generating income from employment, small scale tourism business, and tourism revenue sharing projects funded by the park.

With regards to benefit distribution, the results demonstrated that people in Banda get benefits in various ways, but few households receive the benefits. In areas with high population density such as Nyungwe, it might be not easy for the park or tourism related activities to reach each household. However, benefit sharing should focus on interventions that reach many households at the same time. For example, the clean water project funded by Kageno demonstrated the value of Nyungwe as a water

catchment, thus enhancing positive attitude of many households toward the conservation of the park.

However, the impacts of Nyungwe on surrounding communities are mixed. While local residences perceived benefits, the results reveal that more than 50% of households incurred costs as well through crop raiding. The loss of access to natural resources was also a major cost of household living closer to the park.

Nyungwe National Park has funded various community income generating projects. However, lack of certain skills needed for management of projects constrained many of the park-funded community projects. These projects failed due to poor management, and insufficient expertise in project development and management. Therefore, the community projects require a full package which contains a grant that is accompanied by long-term technical support including acquired managerial skills, and entrepreneurial skills if these projects are to succeed.

We presented community projects according to local people's choice and priority. Implementing the project such as a classroom and health clinic will ensure a long-term solution to the challenge of conservation. However, income generating projects such as beekeeping and community tourism projects can generate income for households but these projects will require long-term technical support (e.g. market and marketing).

Finally, this study assessed perceived benefit and cost in two villages. We recommend extending a similar study to other villages in other sectors and districts. Likewise, economic impact is also another area to study in order to understand how such a biodiversity rich national park contributes to the local and national economy.

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BIOGRAPHICAL SKETCH

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