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An Exploratory Study of Community Conservation Enterprises as a Model for Improving Community Livelihoods and Conservation of Mountain Gorillas Across the Greater Virunga Transboundary Landscape

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AN EXPLORATORY STUDY OF COMMUNITY CONSERVATION ENTERPRISES AS A MODEL FOR IMPROVING COMMUNITY LIVELIHOODS AND CONSERVATION OF MOUNTAIN GORILLAS ACROSS THE GREATER VIRUNGA TRANSBOUNDARY LANDSCAPE

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ABSTRACT

Greater Virunga Transboundary Landscape (GVTL) is highly known for its abundance of wildlife resources and mostly flagship and endangered species such as Mountain Gorillas. Despite this importance, parks across GVTL continue to face enormous pressure from neighboring communities who harvest park resources illegally. This illegal harvest has sparked off intense park-community conflicts, community resentment and continuous poaching. To reduce them, community conservation enterprises (CCEs) were established across GVTL. The belief was that these CCEs provide and enhance socio-economic benefits to local communities which will in turn improve their household livelihoods. This will ensure that communities, in theory, will be less dependent on park resources, thereby reducing park-community conflicts, resentment and poaching. However, little is known about these CCEs, and how much they have improved community livelihoods and contributed to conservation. This dissertation addresses this lack of empirical knowledge by analyzing the perceptions of resident communities regarding the impacts of CCEs across GVTL.

Two sites (Volcanoes and Mgahinga National Parks) out of the three in GVTL were selected for this study. A mixed methods approach was used for this research. This method took a two-phased approach. The first phase, included analyzing Ranger-based Monitoring (RbM) data recorded over a period of nine years (2007-2015). The second phase, included a face-to-face household survey interviews to examine residents' perceptions of illegal activities (*bamboo cutting, poaching, wood cutting, water collection, medicinal herbs and forest fires*) and household livelihood securities (*food,*

health, education and economic) between CCEs participants and non-participants. Findings regarding the perceptions of residents living adjacent to GVTL suggest that current illegal behavior has decreased compared to the past. However, RbM findings suggest that illegal activities are still a significant problem across GVTL. Further findings regarding the household livelihood security (HLS) suggest that community conservation enterprises have contributed significantly to the overall quality of life and in particular, to the food, health and economic security of residents living adjacent VNP compared to residents living adjacent to MGNP. This provides empirical evidence to support the view that CCEs have the potential to contribute significantly to household livelihood security.

DEDICATION

I dedicate this work to my late mother and father, Jolly B. Mpama and Titien Mpama for their love and inspiration. I also dedicate it to rangers, trackers and wardens who continue to put their lives on the line to protect Mountain Gorillas across the Greater Virunga Transboundary Landscape from extinction.

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I also want to thank the United States Fish and Wildlife Services (USFWS) for the financial support. Equally, I would like to thank Rwanda Development Board (RDB) and Uganda Wildlife Authority (UWA) for allowing me to conduct my research across Volcanoes National Park and Mgahinga Gorilla National Park. Additionally, I would like to thank the field staff at VNP including Mr. Proposer Uwingeli, Mr. Abel Musana, Mr. Kwizera Janvier, Mr. Oreste Ndayisaba, and MGNP including Mr. Masaba Christopher, Mr. Sunday Frank, Mr. Twinomugisha Deusdedit, Mr. Turinawe Moses, Mr. Ismael Bakebwa. I also extend my appreciation Mme. Valerie Akuredusenge, Mr. Mukiza John, Mr. Phillip, Mr. Mugisha Emmanuel, Mr. Phillip Sebagenzi, Mr. Twagirimana Innocent for their field help and all the 571 participants for their time and contributions.

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CHAPTER ONE

INTRODUCTION

Background to the Study

The Greater Virunga Transboundary Landscape (GVTL) (See Figure 1) is acknowledged globally for its high diversity of species, an abundance of large mammals, and high conservation value (Plumptre, Kujirakwinja, Treves, Owiunji, & Rainer, 2007). Across the African continent, the GVTL is believed to contain more terrestrial endemic, as well as threatened species, than any other eco-region, and therefore remains an important landscape for global conservation (Plumptre, Kujirakwinja, et al., 2007). Because of its species diversity and abundance, the GVTL is recognized as one of the world's important biodiversity eco-regions. It covers an area of approximately 450km^2 and ranges in altitude from 1,850m to 4,507m above sea level (Gray & Kalpers, 2005). GVTL is home to endangered mountain gorillas and is comprised of three national parks - Virunga National Park in the Democratic Republic of Congo (DRC), Mgahinga Gorilla National Park in Uganda, and Volcanoes National Park in Rwanda (Martin, Rutagarama, Cascao, Gray, & Chhotray, 2011). Although political borders separate the three national parks in GVTL, in reality, they constitute a complete ecosystem and act as free migration corridors for Gorillas and other wildlife species in the landscape.

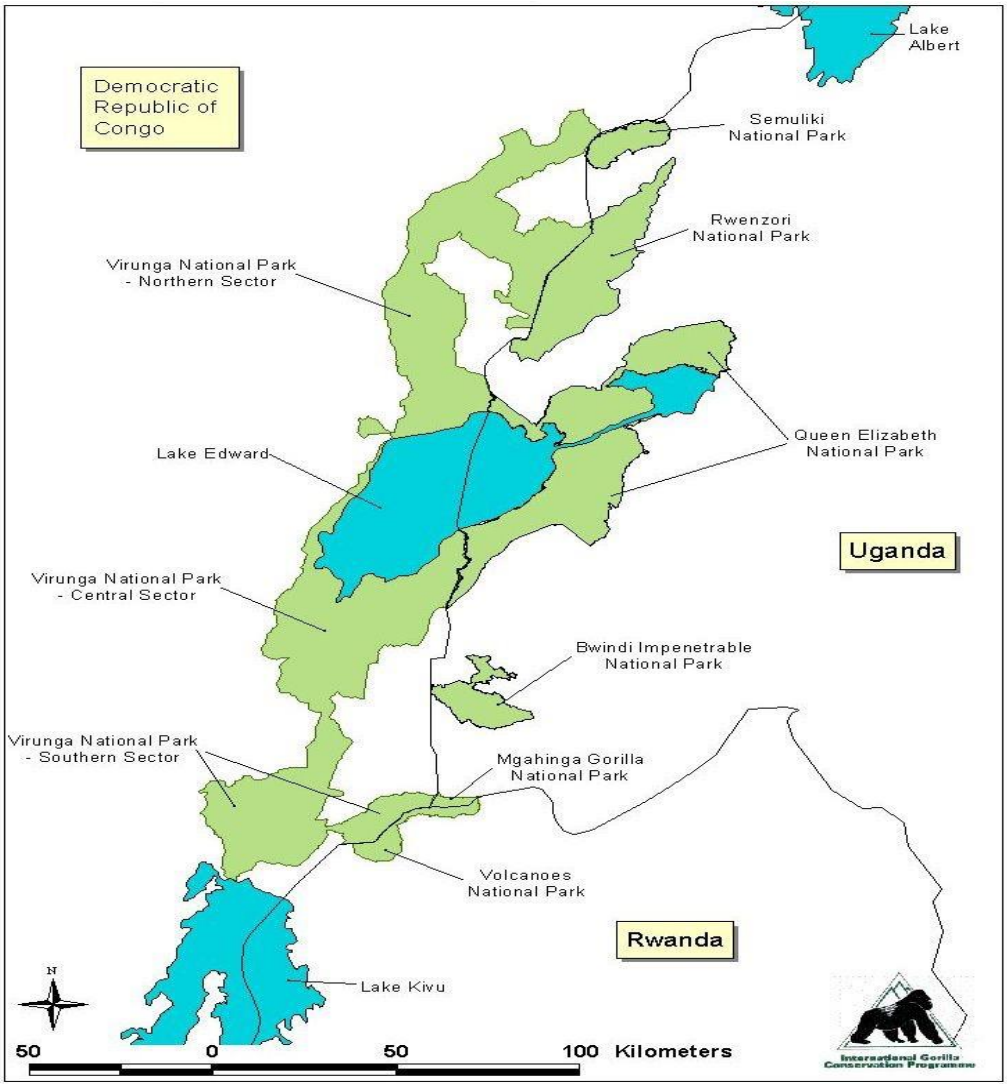

Figure 1.1: Map of Greater Virunga Transboundary Protected Areas and study sites (*Source: IGCP, 2007*)

Historically, most protected areas in the GVTL were among the first national parks in Africa. Virunga NP, in the DRC, and Volcanoes NP, in Rwanda, were established in 1925 (Nyiramahoro, Mapesa, Kyampayire, & Kintu, 2012). From 1930 to 1993 when most of these areas were accorded national park status, the abundance of wildlife flourished (Plumptre, Kujirakwinja, et al., 2007). Since 1993, as human populations increased, and the civil wars in Uganda, the DRC, and Rwanda occurred, pressure on park resources, such as subsistence hunting for bush meat and the encroachment on park lands for farming, led to a tremendous decline in wildlife populations and plant species in the GVTL (Nyiramahoro et al., 2012; Plumptre, Kujirakwinja, et al., 2007).

In a bid to reduce these conservation threats and to increase local communities' livelihoods and engagement in conservation, the GVTL governments, private sector organizations, and conservation NGOs, invested heavily in community conservation enterprise initiatives such as craft centers, cultural villages and community lodges (Nyiramahoro et al., 2012; Plumptre, Kujirakwinja, et al., 2007). A GVTL Secretariat was formed in 1991 as a partnership among the three countries to coordinate conservation across the Virunga landscape as well as to facilitate and support the development of programs to enhance livelihoods of residents living in communities adjacent to the parks (Nyiramahoro et al., 2012). To achieve this, a collaborative management mechanism for GVTL was put in place to develop community conservation enterprises, facilitate law enforcement, encourage monitoring and research, as well as to develop tourism (Nyiramahoro et al., 2012). The rationale behind investing in community conservation

enterprises was to improve the socio-economic livelihoods of local communities around the GVTL parks, to decrease their dependence on the park resources and thereby to reduce park-community conflicts. Although the interest in linking the livelihoods of people living adjacent to protected areas to community conservation enterprises has been increasing (Salafsky & Wollenberg, 2000), some challenges continue to pose impediments to the conservation of biodiversity in GVTL.

Statement of the Problem

Most protected areas in Africa, including those in the GVTL, face increasing pressures for park resources from adjacent communities (Martin, Rutagarama, Cascao et al., 2011; Plumptre, Kujirakwinja, et al., 2007) which has led to increased biodiversity loss (Bahuguna, 2000). With reasonable protection and little human pressure from the 1930s through the 1960s, wildlife populations were abundant in the Virunga NP (Plumptre, Kijirakwinja et al., 2007). This area recorded one of the highest biomass densities of wild animals on earth, at 314 tons/km^2 (Plumptre, Kujirakwinja et al., 2007). However, beginning in the early 1970s, poaching of wildlife for meat and ivory led to a major decline of wildlife and an increase in park encroachment across the region (Plumptre, Kujirakwinja, et al., 2007). Most of these protected areas in the GVTL are home to some of the world's most endangered species such as mountain gorillas (Plumptre, Davenport, et al., 2007). According to Schaller (1963), mountain gorilla numbers were estimated at 450 in 1963, and Weber and Vedder (1983) indicated that mountain gorillas had decreased to 250 by the late 1970s due to hunting and habitat loss. Despite this decrease, the 2003 census recorded an estimated population of 360 mountain

gorilla individuals accounting for an annual growth rate of 1.15% since the 1989 census (Gray et al., 2003). More to this, the 2010 census recorded an estimated population of 480 individuals accounting for annual growth of 3.7 increase since 2003 (Gray et al., 2013).

Despite this success, human pressure for park resources makes it a very challenging and difficult to conserve these pristine areas (Newmark, Leonard, Sariko, & Gamassa, 1993). This pressure is attributed to the inability of adjacent communities to support their household subsistence needs (Adams & Infield, 2003), due to land scarcity, high population pressure and poor agricultural productivity (Bush, Ikirezi, Daconto, Gray, & Fawcett, 2010). These challenges, therefore, push adjacent communities to illegally poach, harvest park resources, and engage in illegal activities that threaten the integrity of the parks in GVTL (Bush et al., 2010; Munanura, Backman, Moore, Hallo, & Powell, 2014).

In a bid to reduce poaching and provide more incentive-based stimuli at the community level, community conservation enterprises have been established and funded by the government, NGOs and private sector organizations. For example, from 1990 to 2009, the African Wildlife Foundation (AWF) invested more than US$ 11 million to start and support community conservation enterprises through crafts making, honey collection, agriculture, livestock, and building community lodges (Elliott & Sumba, 2011). The rationale behind investing in community conservation enterprises was to develop sustainable livelihoods, thus providing enhanced socio-economic benefits to local communities surrounding the GVTL parks. By doing so, communities, in theory, would

be less dependent on the park resources, thereby reducing poaching and park-community conflicts. However, this theoretical relationship has never been empirically tested to see whether it leads to improved livelihoods and provides much-needed incentives for conservation.

Purpose Statement

Therefore, the overarching purpose of this study was to investigate the efficacy of community conservation enterprises as a tool for improving the livelihoods of people living in communities across the GVTL while reducing illegal activities in the parks that threaten wildlife and their habitats.

Research Questions

Overarching Research Question

What has been the efficacy of community conservation enterprises in improving the livelihoods of people living in communities across the GVTL and reducing illegal activities (2007-2015)?

To begin to assess the overarching research question, more specific questions must be answered. They are:

Specific Research Questions

1. What are the perceptions of illegal behaviors among indigenous populations of the GVTL? (Chapter 2)
2. What are the perceived and actual impacts of indigenous populations on park resources in the GVTL? (Chapter 3)
3. What are the perceived impacts of community conservation enterprises (CCE's) on the household livelihood securities and trends in illegal behaviors among the resident communities adjacent to GVTL parks? (Chapter 4)

Site Descriptions and Background

This study was conducted in Volcanoes National Park and communities adjacent to the park in Rwanda, as well as in Mgahinga Gorilla National Park in Uganda. These protected areas are part of the three Virunga massif protected areas that make up the GVTL. Because of insecurity in DRC, Virunga National Park was not included as part of this research.

Volcanoes National Park

Volcanoes National Park (VNP) is located in northwestern Rwanda between latitude 1º 21' South and longitude 29º 44' East, bordering the DRC and Uganda to the north. VNP borders the four administrative districts of Burera, Musanze, Nyabihu, and Rubavu with twelve sectors of Cyanika, Rugarama, Gahunga, Nyange, Kinigi, Shingiro, Gataraga, Mukamira, Jenda, Bigogwe, Kabatwa, and Bugeshi. The sectors that are adjacent to the park are among the most densely populated parts of the country, with a population that exceeds 1,000 people per km^2, most of whom depend on agriculture (Bush et al., 2010).

Since its creation, VNP has experienced increasing pressure from adjacent communities for park resources as well as park land encroachment to grow food and cash crops like pyrethrum (Bush et al., 2010; Plumptre, Kujirakwinja, et al., 2007). Because of this, the park was reduced from its original size of $328km^2$ to its current size of $160km^2$ (Plumptre, Kujirakwinja, et al., 2007). In 1974, the management of the park was transferred to the *Office Rwandaise du Tourisme et des Parcs Nationaux* (ORTPN), which was created to ensure biodiversity conservation and promote scientific research

and mountain gorilla tourism (Plumptre, Bizumuremyi, Uwimana, & Ndaruhebeye, 1997). Despite some gains in park management at VNP, the park continues to experience serious human pressures from adjacent communities looking for park resources to supplement their livelihoods.

Mgahinga Gorilla National Park

Mgahinga Gorilla National Park (MGNP) is located in southwestern Uganda in Kisoro District, bordering Rwanda to the south and the DRC to the west (Adams & Infield, 2003). It covers an area of 33.7 km^2 and lies at latitude 1^o 23' South and longitude 29^o 39' East (Infield & Adams, 1999). MGNP is contiguous with Virunga National Park in the DRC and Volcanoes National Park in Rwanda. MGNP is home to three of the Virunga volcanoes - Mt Muhabura (4,127m), Mt Gahinga (3,474m), and Mt Sabyinyo (3,645m) (Adams & Infield, 2003). Administratively, MGNP borders three parishes of Gisozi, Rukongi, and Gitenderi of Nyarusiza and Muramba sub-counties in Bufumbira County, Gisoro district. The main purpose of establishing MGNP as a national park was to protect mountain gorillas, vulnerable populations of plants and animals endemic to the area as well as to conserve the park's other ecological resources (Adams & Infield, 2003; Infield & Adams, 1999).

From 1930 to 1941, the colonial government managed MGNP as a gorilla sanctuary, and then, from 1941 to 1991, it was turned into a game and forest reserve under the management of the game and forest departments (Adams & Infield, 2003; Plumptre, Kujirakwinja, et al., 2007). However, during that time, the park was heavily encroached for land and park resources, which led communities to settle inside the park

boundaries. In 1992, it was declared a national park by the government of Uganda and subsequently, more than 2,400 people were evicted (Adams & Infield, 2003; Plumptre, Kujirakwinja, et al., 2007). This led to resentment from local communities and the beginning of park-community conflicts.

Intervening External Factors

Despite the two protected areas being contiguous and having similar characteristics ecologically, there are four societal differences that exist between the two countries that can influence the findings of this study. As a result, it is important they are noted here.

First and foremost, in Uganda, and especially around MGNP, there is a complex challenge of water supply and demand. The area is characterized by low rainfall and volcanic soils that barely retain water which has caused water demand to outpace supply. Faced with increased household demand, the park management has allowed the resident community to harvest water inside the park. However, despite the fact that the landscape is the same, in Rwanda, large investments in water harvesting and water supply schemes (boreholes, standpipes and water tanks) have been put in place to increase water production and supply and avoid having communities to harvest water in the park which has been cited to increase illegal activities in the park.

Secondly, Uganda launched universal free primary education was introduced in 1997 to provide facilities and resources needed to enable every child to study primary school for free. However, parents were expected to contribute pens, exercise books, uniforms and labor and money for classroom construction which in most cases is beyond

their financial reach (Grogan, 2008). This hindered access to schools by children from poor families. With institutional financial constraints to deal with high education demand, hidden costs proving to be too high for poorer parents, and challenges of corruption, the quality of education from government schools dropped which led to a high drop-out rates (Grogan, 2008). In Rwanda, the universal primary education is entirely free and adequately planned. Local authorities ensure that all children in the areas of authority go to school and parents are clustered in welfare clusters and given help accordingly. With zero tolerance for corruption in Rwanda, universal free primary education has worked better compared to Uganda.

In Rwanda, community-based health insurance scheme (*Mutuelle de santé*) is mandatory and has helped significantly to mitigate household health shocks. Community health insurance increased from 27% in 2004 to 74% in 2007 and over 90% in 2017 which ensures efficient and effective access to health care (Woode, 2017). However, in Uganda, a national social health scheme was tabled before parliament in 2007, and it failed to make it through to parliament because of resistance from employers, trade unions, and workers representation. Since then, a significant number of the population in Uganda do not have health insurance like their counterparts in Rwanda.

Lastly, the ecotourism economies of each country are quite different in regard to the level of tourism development in each park. For example, the number of gorilla-based tourism opportunities in VNP is tenfold larger than those in MGNP. VNP has 10 gorilla families for tourism contributing over US$14 million annually (Sabuhoro, Wright, Munanura, Nyakabwa, & Nibigira, 2017) whereas MGNP has only one family for

tourism contributing less than US$ 500.000 (Adams & Infield, 2003; Archabald & Naughton-Treves, 2001). This has led to higher tourism investments and creation of more economic opportunities in Rwanda compared to Uganda.

Dissertation Structure

This dissertation is structured following an article-style format with five chapters.

Chapter One contains the introduction of the dissertation, including background to the problem. It outlines the purpose of the entire dissertation.

Chapter Two analyzes trends in prevalence of actual illegal activities across GVTL. Specifically, it investigates two critical research questions: 1) What are the residents' overall assessment of the severity of different types of illegal activities across GVTL? and 2) What are the perceptions of residents living in communities adjacent to the parks regarding the primary drivers of those illegal activities.

Chapter Three investigates three critical research questions: 1) What are the *perceptions* of residents living in communities adjacent to the parks regarding trends in the prevalence of illegal activities? 2) How do these perceptions differ between the two parks; and, 3) What are the *actual* trends of illegal activities in the parks over the last nine years based on data from the Ranger-based Monitoring Program?

Chapter Four investigates four critical research questions:1) What are the perceptions of GVTL residents regarding trends in satisfaction with overall quality of life and household livelihood securities? 2) What are the differences between CCE participants and non-participants regarding the perceived trends in satisfaction with quality of life and the four dimensions of household livelihood security? 3) What are the

perceptions of residents regarding the specific components of (contributors to) each dimension of household livelihood security across GVTL? and 4) What are the differences between CCE participants and non-participants regarding perceptions of trends in illegal behaviors?

Chapter Five**,** the final chapter, is a summary of results and findings from the three chapters. This chapter discusses implications of the study and provides recommendations for management, as well as future studies.

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CHAPTER TWO

PERCEPTIONS OF ILLEGAL BEHAVIORS AMONG INDIGENOUS POPULATIONS OF THE GREATER VIRUNGA TRANSBOUNDARY LANDSCAPE

Introduction

Globally, illegal activities within protected areas continue to threaten wildlife and are requiring an intensive investment of budgets and personnel to combat the organized criminal activity, both at an international and local scale (Adams, Aveling, & Brockington, 2004; Johannesen, 2007). In Africa, the scale of these illegal activities and protected area encroachments threatens the future of biodiversity (Muller & Guimbo, 2010; Vedeld, Jumane, Wapalila, & Songorwa, 2012). The literature attributes most of these problems to increasing poverty and the lack of alternative livelihoods among people neighboring protected areas (Clarke & de By, 2013; Eliason, 1999). Poverty and the lack of alternative livelihoods, coupled with increasing populations, results in protected areas becoming a target resource pool for local people as a means of survival (Adams & Infield, 2003; Clarke & de By, 2013). Local communities are left only with options of taking necessary risks to engage in destructive illegal activities and to depend on wildlife resources to supplement their meager livelihood resources (Gandiwa, Heitkönig, Lokhorst, Prins, & Leeuwis, 2013; Knapp, 2012).

The Greater Virunga Transboundary Landscape (GVTL) is acknowledged globally for its high diversity of species, an abundance of large mammals, and high conservation value (Plumptre, Kujirakwinja, Treves, Owiunji, & Rainer, 2007). The GVTL is also home to the last remaining populations of mountain gorillas (*Gorilla*

beringei beringei). This landscape straddles the borders of three countries - the Democratic Republic of Congo (DRC), Uganda, and Rwanda (Plumptre, Kujirakwinja et al., 2007). Within this landscape are the three protected areas of Virunga (DRC), Volcanoes (Rwanda) and Mgahinga Gorilla (Uganda) National Parks. These protected areas were among the first national parks in Africa, and following their creation, the abundance of wildlife flourished (Plumptre, Kujirakwinja, Treves, Owiunji, & Rainer, 2007). However, despite their national park status and the increase in wildlife numbers, the human populations surrounding the parks and their need for park resources increased tremendously and became a challenge to protected area managers (Bush, Ikirezi, Daconto, Gray, & Fawcett, 2010). Therefore, biodiversity conservation in the GVTL is strongly influenced by the poverty of local populations (Kangalawe & Liwenga, 2005; Sanderson, 2005).

To address these challenges in the GVTL, the governments, conservation partners and protected area managers invested heavily in law enforcement to contain the escalating numbers of illegal activities in protected areas (Martin et al., 2011; Plumptre, Kujirakwinja, et al., 2007). However, this policing approach has not been successful because the expected economic returns from illegal activities continue to outweigh the risks involved and costs of being arrested (Gandiwa, 2011; Holmern, Muya, & Røskaft, 2007). Recognizing this, the GVTL governments and management began exploring ways to integrate communities into the conservation planning process with the aim of reducing their reliance on park resources (Piel, Lenoel, Johnson, & Stewart, 2015). This approach

required conservation managers to think beyond protected area borders to incorporate adjacent communities in their planning (Salafsky, 2011; Salafsky & Wollenberg, 2000).

In this paper, we investigated GVTL residents' perceptions of illegal behaviors and what drives them. Specifically, we conducted an assessment of the severity of six different types of illegal behaviors and 39 items describing drivers of those six types of illegal behaviors found in the parks. Comparisons of perceptions of residents' living adjacent to each park were made.

Description of Research Locations

This study was conducted at Mgahinga Gorilla National Park in Uganda and Volcanoes National Park in Rwanda, both part of the Greater Virunga Transboundary Landscape. Mgahinga Gorilla National Park (MGNP) is located in southwestern Uganda bordering Rwanda to the south and the DRC to the west (Adams & Infield, 2003). It covers an area of 33.7 km^2 and is contiguous with Virunga National Park in the DRC and Volcanoes National Park in Rwanda. The main purpose of gazetting (i.e., establishing) the MGNP as a national park was to protect mountain gorillas, vulnerable populations of plants and animals endemic to the area, and other ecological resources (Infield & Adams, 1999). From 1930 to 1991, the park was heavily encroached for land and park resources, which led communities to settle inside park boundaries. However, in 1992, it was declared a national park by the government of Uganda and subsequently, more than 2,400 people were evicted (Infield & Adams, 1999). This led to the resentment from communities and the beginning of park-community conflicts (Adams & Infield, 2003). Despite this resentment, gorilla tourism in the park generates over US$ 249,776

(Ugandan Shillings: 891,950,096) annually (Archabald & Naughton-Treves, 2001) to the local economy.

Volcanoes National Park (VNP) is located in northwestern Rwanda, bordering DRC and Uganda to the north. VNP was created as the first national park in Africa in 1925 (Spinage, 1972). It contains three of the Virunga volcanoes - Mt Muhabura (4,127 m), Mt Gahinga (3,474 m), and Mt Sabyinyo (3,645 m) (Plumptre, Kujirakwinja et al., 2007). In 1974, the management of the park was assigned to the *Office Rwandaise du Tourisme et des Parcs Nationaux* (ORTPN), which was created to ensure biodiversity conservation and promote scientific research and mountain gorilla tourism (Plumptre et al., 2004). Since then, the park has continued to experience pressure from adjacent communities for resource extraction and community settlement (Plumptre et al., 2004). As a result, the park has been reduced from 328km^2 to 160km^2 (Plumptre, Bizumuremyi, Uwimana, & Ndaruhebeye, 1997). The four administrative districts, which border the parks are among the most densely populated parts of the country, with a population that exceeds 1,000 people per km^2, most of whom depend on agriculture (Bush, Ikirezi, Daconto, Gray, & Fawcett, 2010). Despite this reduction, the gorilla tourism in the park has grown significantly from generating US$ 281,333 in 2000 to US$14 million in 2015 (Sabuhoro, Wright, Munanura, Nyakabwa, & Nibigira, 2017).

Methods

Data collection was conducted through a general household survey among residents living in villages adjacent to the GVTL parks. Face-to-face household survey interviews were conducted as part of a larger study examining residents' perceptions of

illegal activities and livelihood security. The survey instruments contained both closed- and open-ended questions and took between 45 minutes and 1 hour to complete in order to minimize respondent fatigue (Roszkowski & Bean, 1990). This method was selected because of its ability to generate a higher response rate (Babbie, 2008), given the low levels of literacy in the communities around the two parks. We used local guides as field assistants who translated the questionnaires into *Kinyarwanda* in Rwanda and *Kifumbira* in Uganda (both of which are the prevalent languages/dialects).

Specific questions were included to assess residents' perceptions of the occurrence of illegal activities. First, residents were asked to rate the current severity of each of the six illegal behaviors in the parks, assigning the severity of the problem, using a 7-point Likert-type scale ranging from Very Low (1) to Very High (7). Next, respondents were asked to indicate their agreement/disagreement (1 = Strongly Disagree, 7 = Strongly Agree) with a series of statements describing reasons why members of their communities engaged in illegal behaviors.

Data Collection

The study surveyed heads of households residing in villages adjacent to the parks. The heads of households were chosen because they make household decisions and participate in illegal activities. A stratified sampling scheme was utilized to select survey participants based on whether residents had benefitted from community conservation enterprises, such as eco-lodges, crafts-making cooperatives, or cultural villages. Therefore, two sampling strata were used to select potential respondents. First, enterprise membership lists for each of the three types of community conservation enterprises were

used to select every ninth (9^{th}) household. If a person refused, was unable, or found to be ineligible to participate in the survey, the next household on the list was selected. Second, heads of households in villages that did not have community conservation enterprises were selected in the same manner, only from village membership lists provided by local parish authorities. This strategy was deemed sufficient to garner a minimum of 500 respondents from the communities surrounding the two parks. By the end of data collection, 605 heads of households had completed a survey.

Data Screening and Data Analyses

Data from household surveys were coded and entered into the Statistical Package for Social Science (SPSS) for analysis. Data screening involved cleaning data using Mahalanobis distance analysis to identify outliers (Tabachnik, Fidell & Osterland, 2001). By the end of data collection, a total of 605 heads of households had completed a survey. From the total sample of 605, 34 cases were identified as incomplete and contained outliers and were deleted from data used in subsequent analyses. This reduced overall GVTL sample size to 571 (94.4% response rate). Of the 571 respondents, 293 were from Rwanda (180 were participants of CCEs while 113 were non-participants) and 278 were from Uganda (167 were participants of CCEs while 111 were non-participants).

To compare residents' living adjacent to each park, independent samples t-tests were employed to compare mean scores for residents' overall assessments of each illegal behavior, and the scores assigned to each of the 39 items describing reasons why community members engaged in these six illegal activities. We then calculated Cohen's *d* to measure effect sizes of the standard differences found between residents living

adjacent to the two parks. The six categories of illegal activities were: poaching (6 items), water collection (7 items), wood cutting (7 items), setting fires in forest (6 items), bamboo cutting (7 items), and harvesting medicinal herbs (6 items).

Results

Study Population

The number of respondent households was almost evenly split between residents living in each country: 51.3% of respondents were from Rwanda and 48.7% were from Uganda. In total, 46.4% of respondents were males, while 53.6% were females. Most of the respondents (96%) were married and were in the age bracket of 30-39 years of age (32.4%). Education levels were very low; 41.5% of the respondents had no education at all, while 48.3% had only primary education.

A majority of respondents (85.8%) were farmers who had an annual income of less than US$ 500 (87.4%). Despite their low annual incomes, 9 out of 10 (91.6%) owned land, and 7 out of 10 (68.5%) owned livestock. Almost all (99.5%) had shelter. The most common type of shelter construction consisted of mud walls, with corrugated metal roofs. The average household consisted of 2 adults and 3-5 children. However, 80% of the respondents indicated the food they produced was not sufficient to meet the needs of their families. A summary of this community demographic information is provided in Table 2.1.

Table 2.1
Description of the study population characteristics across GVTL (n=571)

Variables	VNP		MGNP		Total	
	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Marital Status						
Single	3	1.0	6	2.2	9	1.6
Married	283	96.6	264	95.0	547	96.0
Divorced	7	2.4	8	2.8	15	2.6
Gender						
Male	140	47.8	125	45.0	265	46.4
Female	153	52.2	153	45.0	306	53.6
Age						
20-29	45	15.4	30	10.8	75	13.1
30-39	113	38.6	72	25.8	185	32.4
40-49	71	24.2	68	24.5	139	24.3
50-59	30	10.2	63	22.7	93	16.3
Above 60	34	11.6	45	16.2	79	13.8
Education						
No education	111	37.9	126	45.3	237	41.5
Primary education	159	54.3	117	42.1	276	48.3
Secondary education	20	6.8	33	11.9	53	9.3
Others	3	1.0	2	.8	5	0.9
Annual Household Income						
Between US$ 100-500	242	82.6	257	92.4	499	87.4
Between US$ 600-1000	51	17.4	21	7.6	72	12.6
Adults in the Household						
1-2 people	262	89.4	236	84.9	498	87.4
3-5 people	29	9.9	41	14.7	70	12.2
Above 5 people	2	.7	1	.4	3	0.5
Children in the Household						
No children	26	8.9	18	6.5	44	7.7
1-2 children	122	41.6	73	26.3	195	34.1
3-5 children	132	45.1	157	56.4	289	50.6
> 5 children	13	4.4	30	10.8	43	7.5

Residents' Perceptions of Illegal Behaviors

To assess residents' perceptions of the severity of illegal activities and the primary drivers of those illegal activities, we analyzed the pattern of responses reported for each question. When comparing the perceptions of illegal behaviors among residents living adjacent to each park, significant differences were reported among Ugandan residents (MGNP) and those living in Rwanda (VNP) (Table 2.2). Poaching ($p < .001$, Cohen's $d = .73$) and Bamboo cutting ($p < .001$, Cohen's $d = .85$) exhibited the largest and most meaningful differences; both were perceived to be higher in villages surrounding MGNP. Water collection ($p < .001$, Cohen's $d = .46$), and collecting medicinal herbs ($p < .001$, Cohen's $d = .22$), exhibited smaller, yet significant differences between parks, once again being higher in Uganda. In four of the six behaviors, residents living adjacent to MGNP viewed illegal behaviors as being more severe than their VNP counterparts. The exceptions were wood cutting which was found to be more severe in Rwanda, and setting fires in forest, where no significant difference between the two countries was found.

While it is interesting to examine differences in the severity of these activities between the two countries, it is important to note that the rating of each illegal behavior was very low on the 7-point scale, (i.e., Very Low (1); Very High (7)), regardless of where respondents lived. The highest level of illegal activity reported was only 2.68 on the 7-point scale, that being Bamboo cutting in MGNP. Poaching was reported as the second highest level of illegal activity ($\bar{x} = 2.32$), once again perceived as being more severe in Uganda.

Table 2.2
Residents' perceptions of illegal behaviors and drivers of illegal activities across GVTL

Illegal activities (Overall)[1] Illegal activities (Drivers)[2]	Volcanoes National Park		Mgahinga Gorilla National Park					
	$\bar{X}$	SD	$\bar{X}$	SD	*t*	DF	*p*	Cohen's *d*
Poaching (Overall)	1.62	.589	2.32	1.23	-8.70	569	<.001	.73
Because of social pressure	1.54	.684	2.24	1.44	-7.50	569	<.001	-0.63
To exercise their indigenous rights	1.35	.670	1.86	1.47	-5.27	569	<.001	-0.44
To get bush-meat to eat	2.25	.775	4.44	2.19	-16.03	568	<.001	-1.34
For bush-meat to sell	1.80	.689	4.67	2.37	-19.78	569	<.001	-1.66
To collect hides, skins, and ornaments	1.40	.641	1.73	1.31	-3.94	569	<.001	-0.33
In retaliation for non-compensation for crop damage by wildlife	1.55	.808	3.26	2.29	-11.94	569	<.001	-1.00
Water Collection (Overall)	1.61	.623	2.11	1.42	-5.46	569	<.001	.46
Because they lack water sources outside the park	1.57	.806	3.57	2.09	-15.24	569	<.001	-1.28
Because they lack clean drinking water outside the park	1.44	.832	3.16	1.93	-13.93	569	<.001	-1.17
Because water sources in the park are closer to their homes than other water sources	1.77	.770	3.29	2.15	-11.35	569	<.001	-0.95
Because water in our community is expensive	1.49	.612	1.83	1.23	-4.31	569	<.001	-0.36
Because water in the park is available throughout the year when in other sources is intermittent	2.21	.783	4.72	2.40	-16.96	569	<.001	-1.42
Because of traditional and cultural rituals	1.23	.559	1.65	1.23	-5.37	569	<.001	-0.45
To get water to sell	1.31	.507	2.12	1.43	-8.99	569	<.001	-0.75
Wood cutting (Overall)	1.63	.60	1.53	.77	1.70	569	.089	N/A
To use in fencing their households	1.37	.631	2.05	1.34	-7.85	569	<.001	-0.66
To use in agricultural farming	1.58	.711	1.65	1.16	- .975	569	. 330	N/A
To make household items like mortars	1.39	.534	1.59	1.05	-2.95	569	.003	-0.25

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Table 2.2
Residents' perceptions of illegal behaviors and drivers of illegal activities across GVTL

Illegal activities (Overall)[1] Illegal activities (Drivers)[2]	Volcanoes National Park		Mgahinga Gorilla National Park					
	$\bar{x}$	SD	$\bar{x}$	SD	*t*	DF	*p*	Cohen's *d*
To use in building their houses	1.63	.745	2.29	1.46	-6.88	569	<.001	-0.58
To get timber for sale	1.68	.678	2.65	1.69	-9.15	569	<.001	-0.77
To get firewood for cooking and heating	2.26	.885	3.22	1.85	-7.91	569	<.001	-0.66
To get firewood for sale	1.46	.621	3.05	1.93	-13.38	569	<.001	-1.12
Setting Fires in forest (Overall)	1.30	.49	1.25	.53	1.13	569	.259	N/A
Roasting bush meat	1.45	.598	1.86	1.56	-4.19	569	<.001	-0.35
Harvesting honey using fire	2.38	.804	4.28	1.90	-15.77	569	<.001	-1.32
Practicing cultural and ritual practices that involve fire	1.23	.548	1.93	1.59	-7.11	569	<.001	-0.60
Clearing bushes for hunting	1.25	.531	1.42	.926	-2.79	569	.005	-0.23
Burning bushes to attract animals for poaching	1.34	.528	1.56	1.07	-3.13	569	.002	-0.26
In retaliation for lack of compensation from animal crop raiding	1.55	.718	2.76	2.23	-8.75	569	<.001	-0.73
Bamboo Cutting (Overall)	1.63	.56	2.68	1.67	-10.17	569	<.001	.85
To use it in making baskets for home use	1.39	.624	3.10	1.70	-16.04	569	<.001	-1.34
To use it in making baskets for sale	1.28	.588	4.00	2.19	-20.52	569	<.001	-1.72
To use in house construction	2.01	.854	3.18	2.10	-8.81	569	<.001	-0.74
To use it in agricultural farming	1.77	.741	2.47	2.06	-5.50	569	<.001	-0.46
To feed their livestock	1.64	.734	1.31	.753	-5.40	569	<.001	-0.45
To use it in making chairs, tables and beds	1.72	.896	1.93	1.39	-2.09	569	.037	-0.17
To use it for fencing their homes	1.44	.698	3.17	2.12	-13.25	569	<.001	-1.11

continued…/

Table 2.2
Residents' perceptions of illegal behaviors and drivers of illegal activities across GVTL

Illegal activities (Overall)[1] Illegal activities (Drivers)[2]	Volcanoes National Park		Mgahinga Gorilla National Park					
	$\bar{X}$	SD	$\bar{X}$	SD	*t*	DF	*p*	Cohen's *d*
Medicinal Herbs (Overall)	1.36	.57	1.51	.81	-2.67	569	.008	.22
To get medicine for their household	1.60	.679	2.15	1.73	-5.04	569	<.001	-0.42
To get medicine for their livestock	1.99	.690	1.97	1.53	.15	569	.888	N/A
For cultural and traditional cleansing	1.45	.689	2.09	1.77	-5.78	569	<.001	-0.48
To get seedlings to plant outside the park	1.55	.756	2.14	1.64	-5.51	568	<.001	-0.46
To get dietary food supplement	1.22	.515	1.46	.952	-3.86	569	<.001	-0.32
To get medicinal herbs for sale	1.57	.725	2.59	2.17	-7.60	569	<.001	0.64

Where, 1 = Very Low, 7 = Very High.
Where, 1 = Strongly Disagree, 7 = Strongly Agree.

Residents' Perceptions of Drivers of Illegal Activities

The population of residents living adjacent to the two parks generally disagreed with the reasons posed to them regarding why members of their community engaged in illegal activities. The highest mean reported for any item was 4.72 on the 7-point scale ("because water in the park is available throughout the year"), still in the mid-range of agreement/disagreement among Mgahinga Gorilla National Park residents. However, it is instructive to examine those items where substantial numbers of respondents agreed with the reason for acting illegally, even though the overall mean was low.

Poaching

Data regarding the drivers associated with poaching indicated there were minor differences in residents' perceptions across GVTL. In MGNP, residents indicated that poaching is primarily driven by the need for bush meat to sell ($\bar{x}$ = 4.67), followed closely by the need for bush meat to eat ($\bar{x}$ = 4.44). In contrast, residents living adjacent to VNP indicated that poaching is primarily driven by the need for bush meat to eat ($\bar{x}$ = 2.25). Significant differences were found between the two parks regarding this item. Moreover, MGNP residents also indicated that community members engaged in poaching in order to retaliate for non-compensation for crop damage by wildlife ($\bar{x}$ = 3.26). In contrast, residents living adjacent to VNP were significantly less likely to indicate retaliation was a driver of poaching ($\bar{x}$ = 1.55, $p < .001$).

Water Collection

Analyses of data regarding water collection indicated that water collection was primarily driven by the availability of water in the park throughout the year when other water sources outside the park were intermittent. Perceptions of residents regarding the availability of water in the park throughout the year were significantly higher in MGNP ($\bar{x}$ = 4.72) than in VNP ($\bar{x}$ = 2.21). In MGNP, residents also tended to agree more that water collection is driven by the lack of other sources of water outside the park ($\bar{x}$ = 3.57, $p < .001$) as well as water sources in the park being closer to their homes than other water sources ($\bar{x}$ = 3.29). Residents living adjacent to VNP reported that having water sources in the park closer to their homes than other water sources ($\bar{x}$ = 1.77) and a lack

of other sources of water outside the park ($\bar{x}$ = 1.57) were secondary drivers of water collection in the park.

Wood Cutting

Data regarding wood cutting suggest that residents' perceptions were driven primarily by the residents' need to get firewood for cooking and heating. Residents living adjacent to MGNP expressed higher levels of collecting wood to use as firewood for cooking and heating ($\bar{x}$ = 3.22, $p < .001$) than residents in VNP ($\bar{x}$ = 2.26). Additionally, residents in MGNP pointed out that wood cutting in the park is also driven by residents' need to gather firewood for sale ($\bar{x}$ = 3.05) as well as the need to get timber for sale ($\bar{x}$ = 2.65). Whereas in VNP, residents highlighted the need for wood to get timber for sale ($\bar{x}$ = 1.68) and the need for wood in building their homes ($\bar{x}$ = 1.63) as additional drivers of wood cutting.

Setting Fires in Forest

Additionally, data on forest fires revealed that harvesting honey using fire is the main driver of setting fires in the forest across GVTL. These results indicated that residents in MGNP ($\bar{x}$ = 4.28, $p < .001$) were significantly more likely to agree that harvesting honey using fire was a reason for forest fires than residents' living adjacent to VNP ($\bar{x}$ = 2.38). Furthermore, residents in MGNP expressed the belief that forest fires also were caused by residents' retaliation for lack of compensation from animal crop damages ($\bar{x}$ = 2.76) as well as using fire to roast bush meat in the park ($\bar{x}$ = 1.86). Similarly, in VNP, forest fires were thought to be caused by residents' retaliation for lack

of compensation from animal crop damages ($\bar{x}$ = 1.55) and by residents using fire to roast bush meat in the park ($\bar{x}$ = 1.45).

Bamboo Cutting

Respondents indicated that bamboo cutting in MGNP is primarily driven by the need for bamboo to use in making baskets for sale ($\bar{x}$ = 4.00), whereas in VNP, residents reported that bamboo cutting is most often driven by the residents need to use bamboo in house construction ($\bar{x}$ = 2.01). Furthermore, data indicated that residents in MGNP also engage in bamboo cutting to use in house construction ($\bar{x}$ = 3.18) as well as to use in fencing their houses ($\bar{x}$ = 3.17) while in VNP residents cited cutting bamboo to use in agricultural farming ($\bar{x}$ = 1.77) and the need for bamboo to use in making chairs, tables and beds as secondary drivers of bamboo cutting.

Medicinal Herbs Collection

In MGNP, medicinal herbs collection was primarily driven by the need for residents to gather medicinal herbs for sale ($\bar{x}$ = 2.59) while in VNP medicinal herbs is mainly driven by the residents' need for medicinal herbs for their livestock ($\bar{x}$ = 1.99). Additionally, in MGNP, medicinal herbs collection is driven by residents' need to get medicine for their households ($\bar{x}$ = 2.15) as well as to get seedlings to plant outside the park ($\bar{x}$ = 2.14). Additionally, in VNP, medicinal herbs collection is driven by the residents need for medicine for their households ($\bar{x}$ = 1.60) as well as to get medicinal herbs for sale ($\bar{x}$ = 1.57).

Discussion

The typical profile of residents living adjacent to GVTL parks reveals that respondents were relatively young and family-oriented. Seven of every 10 residents were under 50 years of age, 96% were married, and 85 percent had children. However, they were poorly educated, and reported living on less than $500 USD per year. Almost all had a house, typically made of mud walls with a metal roof. Over 90% owned land and almost 70% owned livestock. However, over 80% of the respondents reported that the food they grew was insufficient to feed their families, requiring them to purchase additional food to survive.

Illegal behaviors were perceived to be significantly more prevalent among Ugandan residents living adjacent to MGNP, as compared to residents from Rwanda living around VNP. Perceptions among MGNP residents were significantly higher than their Rwandan counterparts in four of the six categories of illegal behaviors (exceptions were wood cutting and setting fires in forest). Poaching and bamboo cutting were the most prevalent problems reported by residents of both countries. Water collection and collecting medicinal herbs were perceived as smaller problems, but ones that exhibited significant differences between residents living adjacent to the two parks; residents living next to MGNP believed the problems were more severe than residents living next to VNP.

Respondents indicated the that reasons why community members engaged in illegal activities were generally related to subsistence. For example, respondents reported that the most significant reasons for poaching were to get “bushmeat to eat” or “sell.”

Additionally, cutting bamboo illegally was mainly for purposes of house construction, fencing, and making baskets for sale. Water collection activities were primarily driven by the fact that "water in the park is available throughout the year, where it is intermittent in other sources" outside the park.

Finally, it is important to point out that the prevalence of illegal activities reported were perceived to be relatively low, which is incongruent with the "common" thinking of most conservation professionals, who believe that illegal behaviors are still persistent (Munanura et al., 2017). Therefore, it is also not surprising that residents reported a general level of disagreement with statements posed to them regarding drivers of illegal behaviors.

Conclusions

This study sought to understand the perceptions of residents living in communities adjacent to the two parks regarding the severity of illegal behaviors and the drivers of those illegal activities across GVTL (Uganda and Rwanda). Comparisons were made between residents living adjacent to each park, which provided insights into differences being experienced in each country. Three major conclusions can be drawn.

First, the differences found in the perceptions of residents living adjacent to each park also may be influenced by the presence (or lack) of a tourism economy capable of providing alternative livelihoods for residents. The ecotourism economies of each country are quite different with regards to the level of development in each park and surrounding community. For example, the number of gorilla-based tourism opportunities in VNP is ten times larger than those in MGNP. VNP has 10 gorilla families for tourism, where MGNP has only one (Adams & Infield, 2003; Sabuhoro et al., 2017). Therefore,

gorilla-based tourism enterprises in Rwanda were more developed, raising awareness and economic incentives to protect park resources more than the tourism economy of MGNP

Secondly, across the African continent, empirical studies have demonstrated a correlation between households' inability to meet their needs and the increasing desperation from residents to illegally search for park resources (Knapp, 2012) and a correlation between poverty and increasing illegal activity (Munanura, Backman, Moore, Hallo, & Powell, 2014). Although these illegal activities threaten biodiversity conservation (Johannesen & Skonhoft, 2005; Rentsch & Damon, 2013), they remain the only livelihood alternative for residents to address their household needs (Munanura, Backman, Sabuhoro, Powell, & Hallo, 2017; Mukanjari, Bednar-Friedl, Muchapondwa, & Zikhali, 2013).

Finally, if this subsistence-driven human pressure for park resources is not addressed, then illegal activities will continue to threaten wildlife (Adams et al., 2004; Johannesen, 2007) and the future of biodiversity conservation suffer (Muller & Guimbo, 2010; Vedeld et al., 2012). With little means to find alternative livelihoods within local communities, protected areas become a target resource pool for the local people as a means of survival (Clarke & de By, 2013; Knapp, 2012). With the increase of resident populations adjacent to the parks, the pressure on park resources will continue to increase tremendously and pose a critical challenge to protected area managers across GVTL (Munanura et al., 2017). This calls for further research and for conservation managers to think beyond law enforcement and incorporate adjacent community current livelihood needs and challenges (Martin et al., 2011; Salafsky, 2011) in their planning to achieve sustainable conservation goals across GVTL.

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CHAPTER THREE

PERCEIVED AND ACTUAL IMPACTS OF INDIGENOUS POPULATIONS ON PARK RESOURCES IN THE GREATER VIRUNGA TRANSBOUNDARY LANDSCAPE

Introduction

In Africa, biodiversity conservation has been, and remains a critical challenge to both national governments and protected area managers (Johannesen, 2007; Wells & McShane, 2004). These challenges revolve mainly around illegal activities, park encroachment and community-wildlife conflicts from households living adjacent to protected areas (Fang, 2009; Kangalawe & Noe, 2012). Because of poverty and lack of resources, residents of local communities target protected areas for their livelihood needs, which include bushmeat, water, medicinal plants, construction materials and other resources where removal is detrimental to the park and its wildlife (Nyaupane & Poudel, 2011; Wells & McShane, 2004). Although these illegal activities threaten biodiversity conservation, with poverty constraints, local communities are left only with options of taking the necessary risks to engage in destructive illegal activities and depend on wildlife resources to supplement their meager livelihoods (Gandiwa, Heitkönig, Lokhorst, Prins, & Leeuwis, 2013; Knapp, 2012).

Poverty is a complex phenomenon and involves a multi-dimensional and dynamic process (Coulthard, Johnson, & McGregor, 2011; Potgieter & Schofield, 2010). It is widely defined and frequently measured in terms associated with economic well-being, incorporating income, consumption, and welfare. Others have defined poverty as a lack

of basic needs such as food, shelter, health, and sanitation (Coulthard et al., 2011; Vedeld Jumane, Wapalila, & Songorwa, 2012). On occasion, researchers have cast poverty in social exclusion terms, incorporating exclusion from economic, political, and civic activities (Potgieter & Schofield, 2010; Wagle, 2002).

In this paper, the researcher investigated two critical research questions: 1) What are the *perceptions* of residents living in communities adjacent to two parks regarding trends in the number and types of illegal activities? and, 2) What are the *actual* trends of illegal activities in the parks over the last nine years based on data from the Ranger-based Monitoring Program?

Description of Research Locations

This study was conducted at Mgahinga Gorilla National Park (MGNP) in Uganda and Volcanoes National Park (VNP) in Rwanda, both part of the Greater Virunga Transboundary Landscape (GVTL). MGNP is located in southwestern Uganda bordering Rwanda to the south and the DRC to the west (Adams & Infield, 2003). It covers an area of 33.7 km^2 and is contiguous with Virunga National Park in the DRC and Volcanoes National Park in Rwanda. The main purpose of gazetting (i.e., establishing) the MGNP as a national park was to protect mountain gorillas, vulnerable populations of plants and animals endemic to the area, and other ecological resources (Infield & Adams, 1999). From 1930 to 1991, the park was heavily encroached for land and park resources, which led communities to settle inside park boundaries (Infield & Adams, 1999). However, in 1992, it was declared a national park by the government of Uganda and subsequently, more than 2,400 people were evicted (Infield & Adams, 1999). This led to the resentment

from communities and the beginning of park-community conflicts (Adams & Infield, 2003). Despite this resentment, gorilla tourism in the park generates over US$ 249,776 (Ugandan Shillings: 891,950,096) annually (Archabald & Naughton-Treves, 2001).

VNP is located in northwestern Rwanda, bordering DRC and Uganda to the north. VNP was created as the first national park in Africa in 1925 (Spinage, 1972). It contains three of the Virunga volcanoes - Mt Muhabura (4,127 m), Mt Gahinga (3,474 m), and Mt Sabyinyo (3,645 m) (Plumptre, Kujirakwinja, Treves, Owiunji, & Rainer, 2007). In 1974, the management of the park was assigned to *Office Rwandaise du Tourisme et des Parcs Nationaux* (ORTPN), which was created to ensure biodiversity conservation and promote scientific research and mountain gorilla tourism (Plumptre et al., 2004). Since then, the park has continued to experience pressure from adjacent communities for resource extraction and community settlement (Plumptre et al., 2004). As a result, the park has been reduced from 328km^2 to 160km^2 (Plumptre, Bizumuremyi, Uwimana, & Ndaruhebeye, 1997). The four administrative districts, which border the parks are among the most densely populated parts of the country, with a population that exceeds 1,000 people per km^2, most of whom depend on agriculture (Bush. Ikirezi, Daconto, Gray, & Fawcett, 2010). Despite this reduction, the gorilla tourism in park has grown significantly from generating US$ 281,333 in 2000 to US$14 million in 2015 (Sabuhoro, Wright, Munanura, Nyakabwa & Nibigira, 2017).

Methods

Data were collected in two phases. The first phase consisted of a general household survey of residents living in villages adjacent to the GVTL parks. In the

second phase, Ranger-based Monitoring (RbM) data from the two parks were analyzed to determine the *actual* number and location of six (6) types of illegal activities over the 9-year period (2007-2015).

Phase 1 - Household Survey Interviews

Face-to-face household survey interviews were conducted as part of a larger study examining residents' perceptions of illegal activities, livelihood security, and community-conservation enterprises. This method was selected because of its ability to generate a higher response rate (Babbie, 2008), given the low levels of literacy in the communities around the two parks. The study surveyed heads of households residing in villages adjacent to the parks. A stratified sampling scheme was utilized to select survey participants based on whether residents had participated in a community conservation enterprise, such as eco-lodges, crafts-making cooperatives, or cultural villages. Therefore, two sampling strata were used to select potential respondents. First, enterprise membership lists for each of the three types of community conservation enterprises were used to identify potential households for inclusion in the study. We systematically selected every ninth (9^{th}) household from the list. If a person refused, was unable, or found to be ineligible to participate in the survey, the next household on the list was selected. Second, heads of households in villages that did not have community conservation enterprises were selected in the same manner. We used village membership lists provided by local parish authorities and again systematically selected every ninth (9^{th}) household from these lists. This strategy was deemed sufficient to garner a minimum

of 250 respondents from around each park with roughly half of these respondents having participated in a community-based enterprise initiative.

Phase 2 - Analyses of Ranger-based Monitoring (RbM) Data

In this phase, we utilized data collected as part of the Ranger-based Monitoring (RbM) Program from Rwanda's Volcanoes National Park and Uganda's Mgahinga Gorilla National Park. RbM is a program where rangers conduct patrols in the park on a daily basis with Global Positioning System (GPS) to collect geo-referenced data on illegal activity incidences in the park (Gray & Kalpers, 2005). The RbM Program was developed and implemented in 1997 across the entire GVTL to help park managers develop information on Gorilla movements and illegal activities (Gray & Kalpers, 2005). Rangers and park managers were trained in RbM data collection, and monitoring techniques and standardized data sheets were developed for rangers on patrol to record observed Gorilla movements and illegal activities encountered (Gray & Kalpers, 2005). RbM data recorded over a period of nine years (2007-2015) were analyzed in terms of trends in type, frequency, and geographic location of illegal activities.

For the purposes of this paper, frequency distributions of illegal activity data were compiled and trends in six illegal activities were analyzed over the 9-year period. To get the best picture of trends, data were analyzed in four ways. First, the significance of the problem of each specific illegal activity was examined by determining the proportional number of incidents of that illegal activity as a percentage of the total number of incidents reported. Second, general trends in illegal behaviors were examined by comparing the change in the number of incidents reported in 2007 versus 2015. Third, the

most recent year (2015) was compared to the 9-year mean. Finally, the intensity of illegal behaviors was determined by assessing the number of incidents relative the size of the park (i.e., incidents/ km^2).

Data Screening and Data Analyses

By the end of data collection, a total of 605 heads of households had completed a survey. Data from household surveys were coded and entered into the Statistical Package for Social Science (SPSS) for analysis. Data screening involved cleaning data using Mahalanobis distance analysis to identify and remove outliers (Tabachnik, Fidell & Osterland, 2001). From the total sample of 605, 34 cases were identified as incomplete or contained outliers and were deleted from data used in subsequent analyses. This reduced overall GVTL sample size to 571 (94.4% response rate). Of the 571 respondents, 293 were from Rwanda (180 were participants of CCEs while 113 were non-participants) and 278 were from Uganda (167 were participants of CCEs while 111 were non-participants).

To determine perceived trends in illegal activities, respondents were asked to rate the *current* prevalence of illegal activities overall, and then for six (6) selected illegal activities on a 7-point Likert scale ranging from Very Low (1) to Very High (7). Next, to establish a measure of trends in illegal activities, respondents also were asked to rate their perceptions of illegal activities at a fixed point of time in the past using the same 7-point scale. The differences reported between a resident's perception of the prevalence of illegal activities currently, versus in the past, was used as an index of perceived change (trend) in illegal activities. Independent samples t-test were used to compare perceptions

of illegal behaviors currently, versus in the past[1], between the two parks. We then calculated Cohen's *d* to measure effect sizes of the standard difference between two means of the residents between parks (VNP and GMNP).

Results

Study Population

The number of respondent households was almost evenly split between residents living in each country: 51.3% of respondents were from Rwanda and, 48.7% were from Uganda. In total, 46.4% were males, while 53.6% were females. Most of the respondents (96%) were married and were in the age bracket of 30-39 years of age (32.4%). Education levels were very low; 41.5% of the respondents had no education at all, while 48.3% had only primary education.

A majority of the respondents (85.8%) were farmers who had an annual income of less than US$ 500 (87.4%). Despite their low annual incomes, 91.6% owned land, and 68.5% owned livestock. Almost all 99.5% had shelter. The most common type of shelter construction consisted of mud walls, with corrugated metal roofs. The average household consisted of 2 adults and 3-5 children. However, 80% of the respondents indicated the food they produced was not sufficient to meet the needs of their families. A summary of this community demographic information is provided in Table 3.1.

[1] Respondents who were participants of a community-conservation enterprise were asked to rate their perceptions of illegal activities during the year they joined the CCE. Respondents from villages not having a CCE (non-participants) were asked to rate the prevalence of illegal activities 5 years past.

Table 3.1
Description of the study population characteristics across GVTL (n=571)

Variables	VNP		MGNP		Total	
	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Marital Status						
Single	3	1.0	6	2.2	9	1.6
Married	283	96.6	264	95	547	96
Divorced	7	2.4	8	2.8	15	2.6
Gender						
Male	140	47.8	125	45	265	46.4
Female	153	52.2	153	45	306	53.6
Age						
20-29	45	15.4	30	10.8	75	13.1
30-39	113	38.6	72	25.8	185	32.4
40-49	71	24.2	68	24.5	139	24.3
50-59	30	10.2	63	22.7	93	16.3
Above 60	34	11.6	45	16.2	79	13.8
Education						
No education	111	37.9	126	45.3	237	41.5
Primary education	159	54.3	117	42.1	276	48.3
Secondary education	20	6.8	33	11.9	53	9.3
Others	3	1	2	0.8	5	0.9
Annual Household Income						
Between US$ 100-500	242	82.6	257	92.4	499	87.4
Between US$ 600-1000	51	17.4	21	7.6	72	12.6
Adults in the Household						
1-2 people	262	89.4	236	84.9	498	87.4
3-5 people	29	9.9	41	14.7	70	12.2
Above 5 people	2	0.7	1	0.4	3	0.5
Children in the Household						
No children	26	8.9	18	6.5	44	7.7
1-2 children	122	41.6	73	26.3	195	34.1
3-5 children	132	45.1	157	56.4	289	50.6
Above 5 children	13	4.4	30	10.8	43	7.5

Current and Past Perceptions of Residents Regarding the Trends of Illegal Activities

We assessed the *current* and *past* perceptions of heads of households living adjacent to protected areas to determine trends in illegal behaviors. As can be seen in Table 3.2, residents' perceptions of illegal behaviors *in the past* were much higher than perceptions of behaviors *currently*, particularly among residents living adjacent to VNP. The overall measure of the prevalence of *past* illegal behaviors was high for residents living adjacent to VNP ($\bar{x}$ = 5.99). Residents living next to MGNP also reported a high prevalence of illegal behaviors in the *past* ($\bar{x}$ = 5.41). Bamboo cutting and poaching were reported as the most prevalent illegal activities. Overall, and with respect to each individual category of illegal activity, VNP residents reported significantly higher levels of illegal behaviors than did residents living adjacent to MGNP. In every category, VNP residents believed illegal behaviors in the past were significantly higher than MGNP residents.

In contrast, the perceptions of illegal activities currently were much lower than how they were perceived in the past ($\bar{x}$ = 1.61 and 2.18 for VNP and MGNP, respectively). Ironically, with two exceptions (wood cutting and setting fires in forest), the *current* perceptions of VNP residents were significantly lower than those reported by MGNP residents, even though they were reported to be significantly higher in the past. Once again, bamboo cutting and poaching were the activities believed to be most prevalent, but, even so, they were reported to be significantly lower among VNP residents.

Table 3.2
Residents' current and past perceptions of illegal activities by parks across GVTL

	Illegal activities	Volcanoes National Park		Mgahinga Gorilla National Park					
		$\bar{x}$	SD	$\bar{x}$	SD	*t*	DF	*p*	Cohen's *d*
Current Perceptions	Overall	1.61	.607	2.18	1.14	-7.49	569	<.001	.63
	Poaching	1.62	.589	2.32	1.23	-8.70	569	<.001	.73
	Water Collection	1.61	.623	2.11	1.42	-5.46	569	<.001	.46
	Wood Cutting	1.63	.60	1.53	.77	1.70	569	.089	N/A
	Setting fires in forest	1.30	.49	1.25	.53	1.13	569	.259	N/A
	Bamboo Cutting	1.63	.56	2.68	1.67	-10.17	569	<.001	.85
	Medicinal Herbs	1.36	.57	1.51	.81	-2.67	569	<.008	.22
Past Perceptions	Overall	5.99	1.02	5.41	1.57	5.23	569	<.001	.44
	Poaching	5.88	1.11	5.09	1.84	6.28	569	<.001	.53
	Water Collection	5.85	1.13	4.37	1.76	12.04	569	<.001	1.00
	Wood Cutting	5.71	1.16	3.87	1.55	16.13	569	<.001	1.35
	Setting fires in forest	5.20	1.21	3.36	1.43	12.60	569	<.001	1.06
	Bamboo Cutting	6.17	1.01	4.79	2.12	10.04	569	<.001	.84
	Medicinal Herbs	5.01	1.32	2.94	1.69	16.31	569	<.001	1.37

Where, 1 = Very Low, 7 = Very High

Trends in Illegal Activities Across GVTL

When both measures of current and past perceptions are combined to assess changes or trends in illegal behaviors, an interesting picture emerged. Given that VNP residents reported the higher levels of past behaviors than MGNP residents, it was somewhat surprising that their perceptions of current behaviors were lower than those reported by people residing in proximity to MGNP. Therefore, larger improvements in behaviors were reported by residents living around VNP than those living around MGNP (4.33 and 3.23, respectively; $p < .001$). Large, meaningful size effects also were reported (Cohen's $d = 3.68$). Significant differences were found with each of the six illegal

behaviors, with VNP residents reporting significantly larger improvements ($p < .001$) than MGNP residents in each case (Table 3.3). Bamboo cutting ($d = 7.64$) and water collection ($d = 6.55$) exhibited the largest size effect differences.

Table 3.3
Residents' perceptions of trends in illegal activities by parks across GVTL

Illegal activities	Volcanoes National Park					Mgahinga Gorilla National Park						
	Current Perceptions		Past Perceptions			Current Perceptions		Past Perceptions				
	$\bar{x}$	SD	$\bar{x}$	SD	Δ	$\bar{x}$	SD	$\bar{x}$	SD	Δ	*t*	DF
Overall	1.61	.607	5.99	1.02	4.33	2.18	1.14	5.41	1.57	3.23	44.00	569
Poaching	1.62	.589	5.88	1.11	4.22	2.32	1.23	5.09	1.84	2.86	40.44	569
Water Collection	1.61	.623	5.85	1.13	4.24	2.11	1.42	4.37	1.76	2.26	78.10	569
Wood Cutting	1.63	.60	5.71	1.16	4.03	1.53	.77	3.87	1.55	2.34	41.98	569
Setting fires in forest	1.30	.49	5.20	1.21	3.9	1.25	.53	3.36	1.43	2.11	37.04	569
Bamboo Cutting	1.63	.56	6.17	1.01	4.54	2.68	1.67	4.79	2.12	2.11	91.08	569
Medicinal Herbs	1.36	.57	5.01	1.32	3.65	1.51	.81	2.94	1.69	1.43	54.42	569

Where, 1 = Very Low, 7 = Very High.

Actual trends in prevalence and distribution of Illegal activities across GVTL (2007-2015).

As can be seen in Table 3.4, the *actual* number of incidents reported for six types of illegal activities were analyzed: (1) poaching, (2) water collection, (3) wood cutting, (4) forest fires, (5) bamboo cutting, and (6) medicinal herbs collection. Over the 9-year period, a total of 4,802 and 1,741 illegal incidents were reported in VNP and MGNP, respectively.

Poaching

Among the six types of illegal activities in VNP, poaching was, by far, the most prevalent illegal activity; 77% of all illegal activities reported over the nine years were related to poaching. The general trend in poaching in VNP over the 9-year period was upward. The number of incidents reported in 2015 was 77% higher than the number of incidents reported in 2007. In 2015, the number of poaching-related incidents exceeded the 9-year average by over 57%. When poaching incidents were calculated relative the size of the park, poaching incidents in VNP averaged slightly over 23 incidents/ km^2.

A similar trend was found in MGNP where 81.5% of the illegal incidents were poaching-related. The trend-line of poaching incidents in MGNP over the 9-year span was generally flat (Figure 3.1). There was a 67% increase in the number of incidents reported from 2007-2015, but this statistic is slightly misleading. Note that poaching was highest in the 2009 and 2010 (221 and 255, respectively), and peaked again in 2013 and 2014 (192, 209). But, by 2015, the number of incidents had dropped by more than half (102). If one examines the intensity of poaching activities in MGNP, it was greater than the intensity in VNP, averaging over 42 incidents per km^2.

Table 3.4
Trends in six illegal activities in two GVTL parks over a 9-year period (2007-2015)

Volcanoes National Park

Illegal activities	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total Incidents	%	Avg/Yr	% change 2007-2015	2015: Mean	Incidents/ Km^2
Poaching	366	455	61	348	315	646	422	433	647	3,693	77	410.33	77	+236.67	23.08
Water Collection	18	113	0	94	120	139	41	43	107	675	14	75.00	494	-32.00	4.22
Wood Cutting	11	3	5	27	25	39	33	37	17	197	4.1	21.89	55	-4.89	1.23
Forest Fires	0	0	7	12	0	0	0	0	0	19	0.4	2.11	0.00	-2.11	0.12
Bamboo Cutting	10	55	10	3	8	7	5	5	4	107	2.2	11.89	-60	-7.89	0.67
Medicinal Herbs	13	55	0	13	0	14	16	0	0	111	2.3	12.33	-100	-12.33	0.69
Total	418	681	83	497	468	854	517	518	775	4,802	100	85	85		

Mgahinga Gorilla National Park

Illegal activities	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total Incidents	%	Avg/Yr	% change 2007-2015	2015: Mean	Incidents/ Km^2
Poaching	61	98	221	255	161	120	192	209	102	1,419	81.5	157.67	67	-55.67	42.11
Water Collection	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NC
Wood Cutting	4	5	2	4	0	9	13	2	18	57	3.3	6.33	350	+11.67	1.69
Forest Fires	0	0	10	10	0	0	0	0	0	20	1.1	2.22	0	-2.22	0.59
Bamboo Cutting	12	8	13	6	9	12	13	19	15	107	6.1	11.89	25	+3.11	3.18
Medicinal Herbs	21	9	24	11	18	25	13	7	10	138	8	15.33	-52	-5.33	4.09
Total	981	120	270	286	188	166	231	237	145	1,741	100	193.44	48		

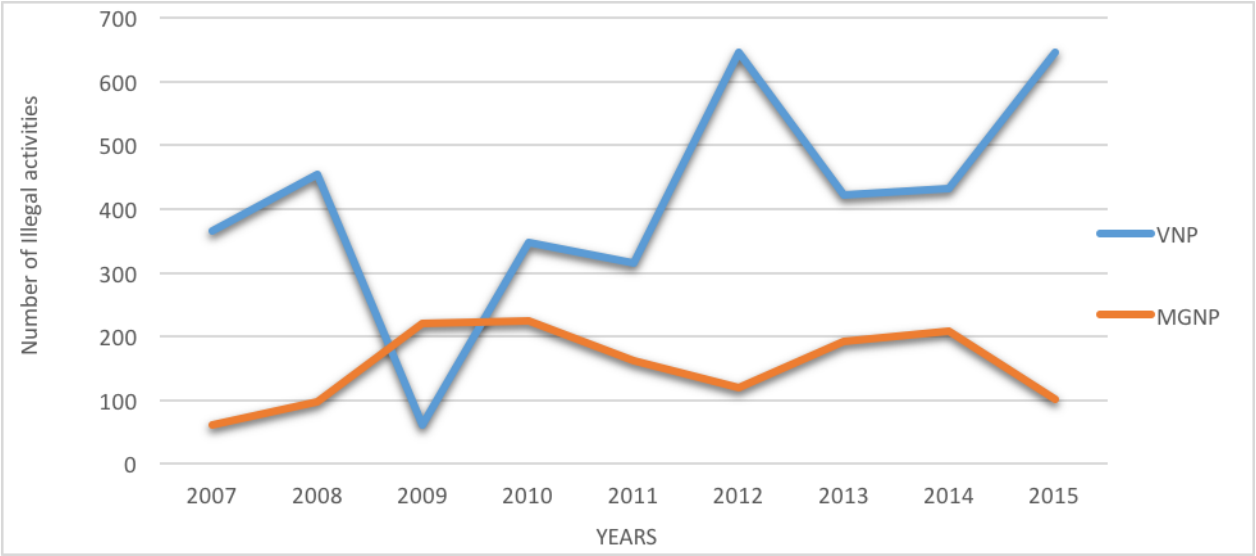

Figure 3.1: Poaching trends in Volcanoes and Mgahinga Gorilla National Parks from 2007-2015

Other Illegal Activities

Even though poaching activity dwarfs all other illegal behaviors in both parks, water collection and wood cutting have increased in VNP over the 9-year period, accounting for 14% and 4.1% of all illegal incidents, respectively. A total of 675 incidents of water collecting were reported, producing the second highest number of incidents / km^2 of all illegal activities in VNP (4.22 incidents/ km^2). (NOTE: Water collection is not illegal in MGNP therefore no incidents were reported).

In MGNP, collecting medicinal herbs (8.0%) and bamboo cutting (6.1%) were the second and third most prevalent illegal activities reported. However, they accounted for only slightly more than 2% of all illegal incidents in VNP. In addition, setting fires in

forest were basically negligible, except for two years (2009-2010), where 19-20 fires were reported in each park. No setting fires in forest were reported in any other year.

Conclusions

This study had two primary objectives. The first was to investigate the current and past perceptions of residents living in communities adjacent to the parks in order to establish a trend-line regarding illegal activities. The second was to analyze the actual incidents of illegal activities in the parks across GVTL over a 9-year period and compare these data.

Overall, respondents perceived the prevalence of illegal behaviors to be decreasing. Currently, they reported that illegal behaviors were somewhat low, while illegal behaviors in the past were perceived to be much more significant. Respondents living adjacent to VNP reported lower current perceptions of illegal behaviors, and higher past perceptions. This indicates larger improvements in behavior over time, than reported by their counterparts living around MGNP. Rwandan residents reported changes in illegal behaviors of more than four points on the 7-point scale. And, while Ugandans did not report changes that large, significant improvements were observed overall ($\Delta = 3.23$) and in poaching ($\Delta = 2.86$).

In contrast, when we examined the actual number of illegal incidents occurring in the parks over the past nine years through data produced by the Ranger-based Monitoring Program (RbM), a much different view of illegal behaviors was found. By all objective measures, poaching continues to be a persistent problem and significant threat to the integrity of biodiversity in the parks. Among the six types of illegal activities analyzed in

VNP, poaching was, by far, the most prevalent illegal activity; 77% of all illegal activities reported were related to poaching. The general trend in poaching in VNP over the 9-year period was upward. The number of incidents reported in 2015 was 77% higher than the number of incidents reported in 2007. In 2015, the number of poaching-related incidents exceeded the 9-year average by over 57%. When poaching incidents were calculated relative to the size of the park, poaching incidents in VNP averaged slightly over 23 incidents/ km^2.

A similar trend was found in MGNP where 81.5% of the illegal incidents were poaching-related. However, the trend-line of poaching incidents in MGNP over the 9-year span was sporadic, but generally flat. There was a 67% increase in the number of incidents reported from 2007-2015, but this statistic is slightly misleading. Poaching was highest in the 2009 and 2010 (221 and 255, respectively), and peaked again in 2013 and 2014 (192, 209). But, by 2015, the number of incidents had dropped by more than half (102). If one examines the intensity of poaching activities in MGNP, it was greater than the intensity in VNP, averaging over 42 incidents per km^2.

Regarding other illegal activities, indeed some have decreased over time. Forest fires, for example, were reported only in 2009 and 2010 (in both parks) and have not been reported since. Bamboo cutting, wood cutting, and collecting water and medicinal herbs were also down in VNP when comparing the incident rate reported in 2015 to the 9-year mean. MGNP also reported a reduction in the number of incidents involving the collection of medicinal herbs.

Discussion

Analyses of perceptions of the prevalence of illegal incidents indicated that residents believed illegal behaviors have decreased significantly over the past five years (or since they joined a community conservation enterprise), which is contrary to most professional thought. On the other hand, residents' perceptions of illegal activities were generally high in the past which is consistent with overall views expressed by professionals working with biodiversity conservation throughout Africa and particularly within the GVTL (Nyiramahoro, Mapesa, Kyampayire, & Kintu, 2012; Plumptre, Kujirakwinja, et al., 2007). Further, significant differences were reported between residents living adjacent to the two parks, with VNP residents perceiving illegal behaviors to be more prevalent than their MGNP counterparts.

Surprisingly, however, perceptions of the current levels of illegal activities were significantly lower among residents surrounding both parks. This divergence from "current professional thinking" regarding the perceived severity of illegal behaviors in GVTL could be attributed to several factors, which are methodological, psychological, and socio-economic in nature. First, from a methodological standpoint, the instrument and question wording may not have performed well in this culture, particularly when asking about very sensitive topics like illegal behaviors. While we attempted to assuage fears of respondents by asking about why "members of their communities" engaged in illegal behaviors (rather than ask about their personal activities), there is undoubtedly some level of social desirability bias in this data-respondents do not want to admit to performing illegal acts.

Second, residents may fear prosecution by law enforcement officers and have a general distrust of government. Over the years, governments in the region have been corrupt, unstable and prone to administering severe punishment when citizens do not comply with governmental edicts. In some cases, as parks were established, indigenous peoples have been physically removed from land within park boundaries and forced to relocate. Therefore, residents may be psychologically disposed to avoid reporting illegal activities to authorities.

Third, since illegal activities are often committed individually and in isolation of other community members, residents might be looking at the severity of illegal activities based on their personal behavior and lack of exact knowledge of crime and other illegal behaviors happening in the park. In most communities, illegal activities are not common knowledge, but rather the work of a small group of individuals whose activities are mostly shielded from the public eye.

Regardless of the prevalence of illegal activities, most of these activities were certainly a response to existing household challenges in dealing with poverty and efforts to meet their subsistence and household needs. This is consonant with several empirical studies that have demonstrated a correlation between poverty and increasing trends in illegal activities (Kangalawe & Noe, 2012; Munanura, Backman, Moore, Hallo, & Powell, 2014). Therefore, addressing trends of illegal activities across GVTL, particularly incidents related to poaching, will require a combination of continued diligence in law enforcement and efforts to enhance local livelihoods, including food, health, education

and economic security. Law enforcement alone, will provide only a partial solution, resulting in impoverished peoples continuing to risk prosecution in order to live.

Park management, therefore, must work with communities and support them in tapping into alternative livelihoods, and finding ways to meet subsistence needs. Some of this may be accomplished through initiatives to increase livestock production, grow bamboo outside the park, and find year-round sources of clean drinking water. Unless these basic needs for protein, water and shelter are met, illegal activities are likely to continue.

In summary, park and protected area managers must continually monitor illegal behaviors on the ground with systems such as the Ranger-based Monitoring Program. Survey data, while useful in determining the causes and/or motivations for undertaking illegal activities, cannot replace on-the-ground monitoring programs. In fact, using both methods of data collection is probably superior to dependence upon a single method. Therefore, to successfully mitigate illegal behaviors, park managers must concern themselves with the welfare of residents surrounding their park and involve community residents as full-share stakeholders in park management decision-making.

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CHAPTER FOUR

COMMUNITY CONSERVATION ENTERPRISES AND THEIR IMPACTS ON LIVELIHOOD SECURITY AMONG THE RESIDENT COMMUNITIES ADJACENT TO GREATER VIRUNGA TRANSBOUNDARY LANDSCAPE PARKS

Introduction

For the last three decades, developing countries have focused on developing community- based conservation enterprises as a model for conservation through improving the livelihoods of local communities (Espinosa & Jacobson, 2012; Stone & Stone, 2011). The main purpose of these efforts was to ensure that communities benefit from tourism as an incentive for conservation (Kiss, 2004; Mas & Th, 2016). The literature suggests that if communities benefit from protected areas, they will participate in their management and advocate for their protection (Agrawal & Gibson, 2001). There is a need, therefore, for including community stakeholders in comprehensive park and tourism management planning. This inclusion should help incentivize community members, encouraging them to focus more on getting benefits from community conservation enterprises (CCEs) than engaging in illegal behaviors that destroy the very resources they depend upon (Kiss, 2004; Salafsky, 2011).

In a bid to reduce community pressure on both parks (VNP and MGNP) and provide more conservation-based incentives at the community level, community conservation enterprises have been established and funded by government, NGOs and private- sector organizations. For example, from 1990 to 2009, African Wildlife Foundation (AWF) invested more than US$ 11 million to start and support community

conservation enterprises through crafts making, honey collection, agriculture, livestock, and building community lodges (Elliot & Sumba, 2011). The potential of community conservation enterprises to contribute significantly to household livelihoods is seen as a better way of bringing direct household income that will help community members mitigate threats to livelihood related to food, health, education, and financial factors (Nepal & Spiteri, 2011). Household livelihood strategies can be centered around four components of livelihood security: food, health, education and economic (Échevin, 2013; Munanura, Backman, Moore, Hallo, & Powell, 2014). Looking at household livelihood security through these four lenses offers a new approach to analyzing the impacts of community conservation enterprises on livelihood security among resident communities (Stone & Stone, 2011). This framework will help park managers, community leaders, and development partners capitalize on the advantages of community conservation enterprises for improving community livelihoods, while encouraging conservation-oriented lifestyles, thus reducing community impacts on park resources (Gillingham & Isalm, 2004).

Conceptual Framework: Household Livelihood Security (HLS)

CARE (2002) developed a household livelihood security model that has been used extensively throughout the developing world to measure the impacts of community development initiatives (Gillingham & Isalm, 2004), as well to as identify the level of livelihood constraints and insecurities affecting households (Carney, 2003). This framework also has been adopted by many non-governmental organizations and development agencies to evaluate and assess community and households' ability to meet

basic needs (Scoones, 2009). While the CARE model of household livelihood securities is clustered into five fundamental attributes of livelihoods: (a) food, (b) health, (c) education, (d) economic, and (e) empowerment (Scoones, 2009), for the purposes of this research, only four household securities were utilized - food, health, education and economic. These four dimensions of household livelihood security were selected because they are the foundation of community conservation enterprises (CCEs) across the GVTL (See Figure 4.1).

Food Security

The 1996 FAO Food Summit defined food security as having "…*physical, social, economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*." For households to have food security, three elements—availability, accessibility, and utilization—have to be incorporated (Barrett, Reardon, & Webb, 2001). Without food security, households become vulnerable and unable to sustain their livelihoods (Shariff & Khor, 2008). In Africa, many countries have not achieved food security and are not able to meet their population's basic needs (Bricker & Bucks, 2016). This is partly because many parts of the continent are affected by high population growth, and natural disadvantages like temperature extremes, unproductive land, pests, and diseases. Food insecurity in a household affects many things, among which are the health of household members, children's education, and the ability of members to be self-sustaining citizens (de Souza Bittencourt, Chaves dos Santos, de Jesus Pinto, Aliaga, & de Cassia Ribeiro-Silva, 2013). For a household to be food secure, it must produce enough food and make sure that household members have

sustainable access to food sources throughout the year (Dilley & Boudreau, 2001).

Health Security

Emerging and re-emerging health challenges and disease outbreaks have continued to threaten the health security of people and societies throughout Africa (Langlitz, 2015). Without health security, communities and households will be plagued by diseases and malnutrition. And, even though malnutrition has decreased globally (Wang, 2003), in Africa, malnutrition cases involving underweight and stunted children have increased over the past two decades (Wolicki, Nuzzo, Blazes, Pitts, Iskander, & Tappero, 2016). This unhealthy state of existence is caused mainly by poverty, poor sanitation, and lack of basic needs such as food and clean water. These challenges call for local governments to devise policies and invest in health infrastructure that will ensure health security for citizens (Herington, 2016). Health infrastructure, such as hospitals, clinics, and pharmacies, will decrease the vulnerability of households to disease outbreaks, increase intervention to deal with health emergencies, and help people access medical services (Frenk & Gómez-Dantés, 2011; Herington, 2016).

Education Security

Access to education is an important factor in poverty alleviation and livelihood security (Anangisye, 2011). Education allows people to make informed decisions regarding the complex issues that affect them (Chimombo et al., 2009). Literature suggests that, as education levels increase, a household's economic opportunities, wages, and economic well-being tend to increase (Dee, 2004). Furthermore, increased schooling helps households make efficient and effective consumption choices based on facts

(Lewin, 2009). Despite the importance of education and the fact that education was proclaimed as a universal basic human right by the 1948 Universal Declaration of Human Rights, access to education is affected mostly by households' inability to afford school fees (Chimombo et al., 2009) as well as the conflicting need for children to perform farm labor (Anangisye, 2011).

Economic Security

In Sub-Saharan Africa, poverty is increasing with people living below the poverty line of US$1 per day; poverty is found predominantly in rural areas (Kempe, 2011). To lessen the impact of poverty, small-scale enterprises have been identified as a source of income and employment to increase household economic security (Lee & Cheng, 2009). For a household to be economically secure, it has to provide basic needs for the household members, which depends entirely on a household's economic activities that generate income (Fox & Sohnesen, 2016). Economic security, therefore, guarantees that households can cope with severe livelihood challenges and that they will be able to anticipate and recover from the outcomes of those challenges (Bricker & Bucks, 2016). Community conservation enterprises, such as community lodges, cultural villages, and crafts centers, have been hailed as a better option for economic security of communities across the GVTL (Manyara & Jones, 2007; Sabuhoro, Wright, Munanura, Nyakabwa, & Nibigira, 2017).

In this paper, the researcher investigated four critical research questions: 1) What are the perceptions of GVTL residents regarding trends in satisfaction with overall quality of life and household livelihood securities? 2) What are the differences between

CCE participants and non-participants regarding the perceived trends in satisfaction with quality of life and the four dimensions of household livelihood security? 3) What are the perceptions of residents regarding the specific components of (contributors to) each dimension of household livelihood security across GVTL? and 4) What are the differences between CCE participants and non-participants regarding perceptions of trends in illegal behaviors? [Note: This latter research question draws heavily from Chapters 2 and 3 which focused exclusively on illegal behaviors. For an in-depth understanding of that aspect of the overall study, readers are encouraged to reference those chapters].

Description of Research Locations

This study was conducted at Mgahinga Gorilla National Park (MGNP) in Uganda and Volcanoes National Park in Rwanda (VNP), both part of the Greater Virunga Transboundary Landscape (GVTL). MGNP is located in southwestern Uganda bordering Rwanda to the south and the DRC to the west (Adams & Infield, 2003). It covers an area of 33.7 km^2 and is contiguous with Virunga National Park in the DRC and Volcanoes National Park in Rwanda. The main purpose of gazetting (i.e. establishing) the MGNP as a national park was to protect mountain gorillas, vulnerable populations of plants and animals endemic to the area, and other ecological resources (Infield & Adams, 1999). From 1930 to 1991, the park was heavily encroached for land and park resources, which led communities to settle inside park boundaries (Infield & Adams, 1999). However, in 1992, it was declared a national park by the government of Uganda and subsequently, more than 2,400 people were evicted (Infield & Adams, 1999). This led to the resentment

from communities and the beginning of park-community conflicts (Adams & Infield, 2003).

Volcanoes National Park (VNP) is located in northwestern Rwanda, bordering DRC and Uganda to the north. VNP was created as the first national park in Africa in 1925 (Spinage, 1972). It contains three of the Virunga volcanoes - Mt Muhabura (4,127 m), Mt Gahinga (3,474 m), and Mt Sabyinyo (3,645 m) (Plumptre, Kujirakwinja, Treves, Owiunji & Rainer, 2007). In 1974, the management of the park was assigned to *Office Rwandaise du Tourisme et des Parcs Nationaux* (ORTPN), which was created to ensure biodiversity conservation and promote scientific research and mountain gorilla tourism (Plumptre et al., 2004). Since then, the park has continued to experience pressure from adjacent communities for resource extraction and community settlement (Plumptre et al., 2004). As a result, the park has been reduced from 328km^2 to 160km^2 (Plumptre, Bizumuremyi, Uwimana, & Ndaruhebeye 1997). The four administrative districts, which border the parks are among the most densely populated parts of the country, with a population that exceeds 1,000 people per km^2, most of whom depend on agriculture (Bush, Ikirezi, Daconto, Gray, & Fawcett, 2010).

Community Conservation Enterprises in the GVTL

In a bid to reduce community pressure on both parks (VNP and MGNP) and provide more conservation-based incentives at the community level, community conservation enterprises have been established and funded by government, NGOs and private- sector organizations. For example, from 1990 to 2009, African Wildlife Foundation (AWF) invested more than US$ 11 million to start and support community

conservation enterprises through crafts making, honey collection, agriculture, livestock, and building community lodges (Elliot & Sumba, 2012).

Community conservation enterprises are defined as "*a commercial activity, which generates economic benefits in a way that supports the attainment of conservation objectives*" (Elliott & Sumba, 2011, p.4). The rationale behind the development of these community conservation enterprises across GVTL is that once communities benefit directly from the existing mountain gorilla tourism, then they will be less likely to participate in illegal activities. The CCE model followed the earlier Community-Based Natural Resource Management (CBNRM) programs such as Communal Areas Management for Indigenous Communities (CAMPFIRE) in Zimbabwe and Administrative Management Design (ADMADE) in Zambia, that aimed at increasing direct economic benefits to advance conservation objectives (Elliott & Sumba, 2011). The CCE model assumes that by investing in a single enterprise, such as a community lodge, a crafts center or cultural village adjacent to a tourism destination management area with high volumes of tourists, community products would have ready-made markets, thereby generating constant revenues streams to communities.

In both Rwanda and Uganda (VNP & MGNP), CCE revenues distributed directly to adjacent communities, or directly to community residents, came from four different revenue streams. By examining them closely, one can understand the differences in size and scope currently existing in the communities surrounding each park.

a) Community Lodges. In 2006, a high-end community lodge (Sabyinyo Silverback Lodge) was built in Rwanda. The lodge charges US $1100 full board per person

per night in high season and US $470-910 full board per person per night in low season. Built in partnership with USAID, AWF and managed on behalf of the community by a private sector partner, the lodge is owned by the communities of Kinigi and Nyange. In 1994, Amajyambere Iwacu Community Camp in Uganda was established by families that were displaced as a result of gazetting the park. The camp charges between $ 25-80 full board per person per night

b) Crafts Centers. Kinigi Community Commercial Complex (KCCC) in Musanze, Rwanda and Rwerere Community Centre for Tourism (RCCT) in Kisoro, Uganda were developed by a conservation NGO (GVTC) to facilitate community members in arts and crafts cooperatives to display their handicrafts in a one stop center where tourists would be able to access them easily.

c) Cultural Villages. Iby'Iwacu Cultural Village and Kinigi Cultural Village in Kinigi, Rwanda, and Batwa Village in Kisoro, Uganda, were developed in 2006 by private sector and conservation partners to develop community-based tourism and showcase community's traditional culture to tourists visiting each park.

d) Revenue Sharing. Each park contributes a portion of the revenues derived from gorilla permits to villages surrounding the park. These monies have typically gone toward developing community-based assets, such as schools, health clinics, public latrines, electricity, etc.

As can be seen in Figure 4.1, the number of tourists visiting annually is much higher in VNP than in MGNP. As a result, the impacts of gorilla tourism are much more significant in Rwanda than Uganda. This is attributable to VNP (160km^2) hosting more

than 10 families of gorillas for visitation compared to MGNP (33.7 km^2) hosting only one group of gorillas. This has led to more tourism investments and higher revenue generation in VNP compared to MGNP and therefore, this likely has limited the benefits MGNP communities receive from tourism.

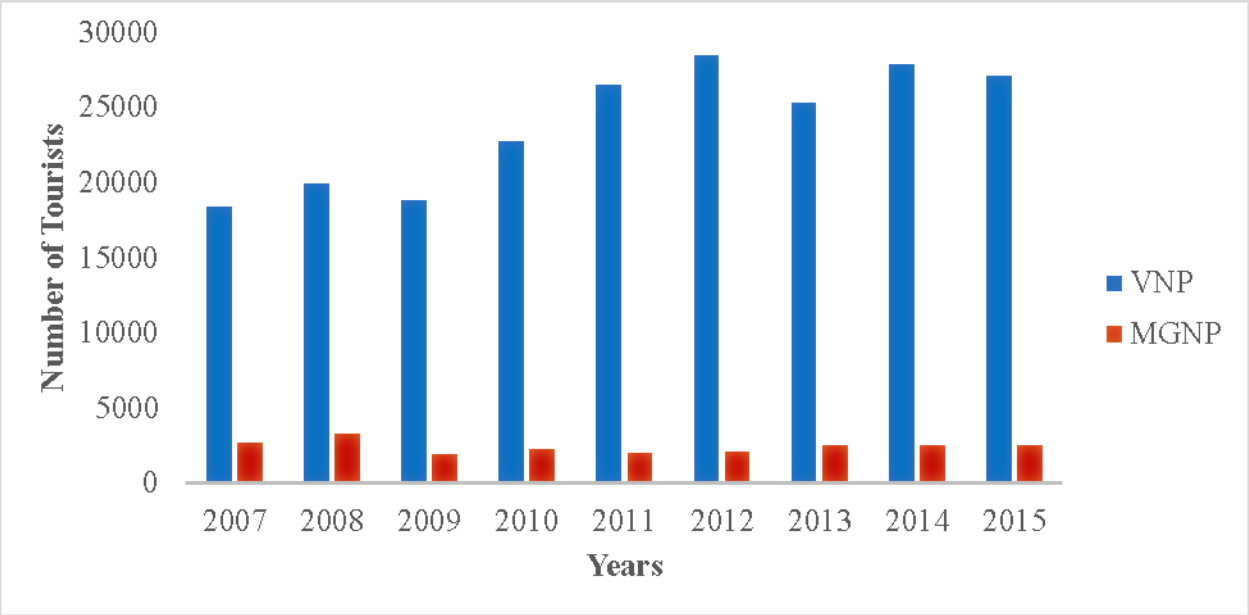

Figure 4.1: Trends in tourism numbers at Volcanoes and Mgahinga Gorilla National Parks 2007-2015

Methods

Data were collected in this study through a general household survey of residents living in villages adjacent to the GVTL parks. Face-to-face household interviews were conducted as part of a larger study examining residents' perceptions of illegal activities and livelihood securities. The survey instruments were semi-structured questionnaires containing both closed- and open-ended questions. Interviews were kept between 45 minutes and 1 hour in length to reduce respondent fatigue (Roszkowski & Bean, 1990). This method was selected because of its ability to generate a higher response rate (Babbie, 2008), given the low levels of literacy in the communities around the two parks. We trained local guides as field assistants who translated the questionnaires into *Kinyarwanda* in Rwanda and *Kifumbira* in Uganda.

One section of the survey instrument was developed around the framework adapted from CARE (2002). Its primary focus was to assess satisfaction with overall quality of life, and with the four dimensions of livelihood security (food, health, education and economic securities) (see Fig. 4.2). These constructs, currently and in the past, were assessed using 7-point Likert scales (1 = not satisfied, 7 = completely satisfied). Additionally, potential components of the four dimensions of HLS were assessed using 7-point Likert scales (1 = Strongly disagree, 7 = Strongly agree).

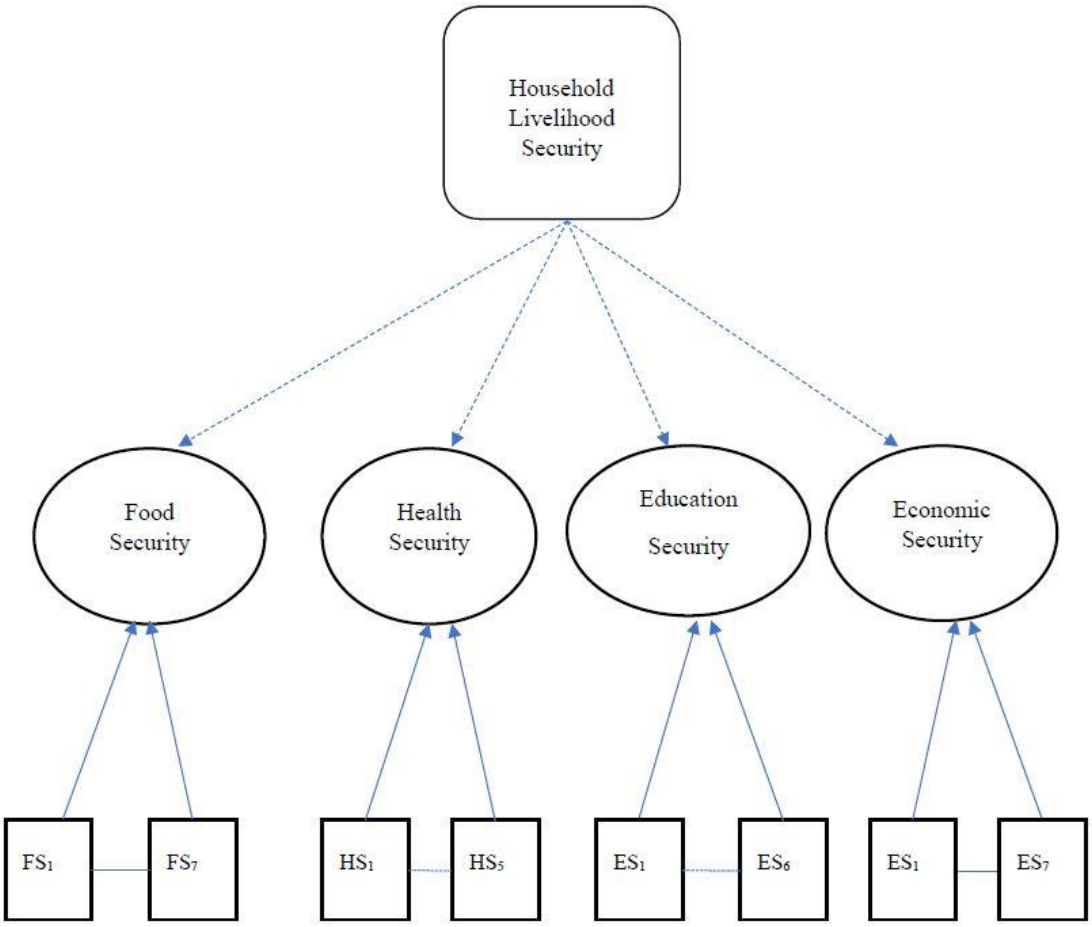

Figure 4.2: Hypothesized model of household livelihood security

Data Collection

A stratified sampling frame was utilized to select survey participants based on whether residents had participated in community conservation enterprises, such as eco-lodges, crafts-making cooperatives, or cultural villages. Therefore, two sampling strata were used to select potential respondents. First, enterprise membership lists for each of the three types of community conservation enterprises were used to select every ninth

(9^{th}) household. If a head of a household refused, was unable, or found to be ineligible to participate in the survey, the next household on the list was selected. Second, heads of households in villages that did not have community conservation enterprises were selected in the same manner, only from village membership lists provided by local parish authorities. Face-to-face household survey interviews were conducted over a two-month period in 2016. This strategy was deemed sufficient to garner a minimum of 500 respondents from the communities surrounding the two parks.

Data Analyses

To determine perceived trends in household livelihoods security, respondents were asked to rate the overall satisfaction with their quality of life *currently*, and then for four (4) selected dimensions of household livelihood security on a 7-point Likert scale ranging from (1) Not satisfied to (7) Completely satisfied. Next, to establish a benchmark from which to assess trends in household livelihood security, respondents also were asked to rate their perceptions of quality of life and the four dimensions of household livelihood security at a fixed point of time in the past[1] using the same 7-point scale. The differences reported between residents' perceptions of the quality of life currently, and their perceptions of their quality of life in the past, were used as an index of perceived change (trend) in quality of life. Independent samples t-tests also were used to compare perceptions of household livelihood security between the two parks, as well between participants and non-participants of community conservation enterprises. We then

[1] Respondents who were participants of a community-conservation enterprise were asked to rate their perceptions of their household livelihood securities (food, health, education and economic) during the year they joined the CCE. Respondents from villages not having a CCE (non-participants) were asked to rate their perceptions of household livelihood securities (food, health, education and economic) 5 years past.

calculated Cohen's *d* to measure effect sizes of the standard difference between two means of the residents between parks (VNP and GMNP) as well as between participants and non-participants of community conservation enterprises across GVTL.

In addition, we examined the level of agreement/disagreement with each of the 25 items describing specific components of household livelihood securities. The four dimensions of household livelihood securities (HLS) were: food (7 items), health (5 items), education (6 items), and economic (7 items). Residents' level of agreement/disagreement with components or contributors to each dimension of household livelihood security was assessed using a 7-point Likert scale, ranging from (1) Strongly disagree to (7) Strongly agree.

Results

Study Population

By the end of data collection, a total of 605 heads of households had completed a survey. From that total, 34 cases were identified as incomplete and contained outliers and were deleted from data used in subsequent analyses. This reduced overall GVTL sample size to 571 (94.4% response rate). Of the 571 respondents, 293 were from Rwanda (180 were participants of CCEs while 113 were non-participants) and 278 were from Uganda (167 were participants of CCEs while 111 were non-participants).

Therefore, the number of respondent households was almost evenly split between residents living in each country: 51.3% of respondents were from Rwanda and 48.7% were from Uganda. In total, 46.4% were males, while 53.6% were females. Most of the respondents (96%) were married and were in the age bracket of 30-39 years of age

(32.4%). Education levels were very low; 41.5% of the respondents had no education at all, while 48.3% had only primary education.

Most respondents (85.8%) were farmers who had an annual income of less than US$ 500 (87.4%). Despite their low annual incomes, 9 out of 10 (91.6%) owned land, and 7 out of 10 (68.5%) owned livestock. Almost all (99.5%) had shelter. The most common type of shelter construction consisted of mud walls, with corrugated metal roofs. The average household consisted of 2 adults and 3-5 children. However, 80% of the respondents indicated the food they produced was not sufficient to meet the needs of their families. A summary of this community demographic information is provided in Table 4.1.

Table 4.1
Description of the study population characteristics across GVTL (n=571)

Variables	VNP		MGNP		Total	
	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Marital Status						
Single	3	1.0	6	2.2	9	1.6
Married	283	96.6	264	95	547	96
Divorced	7	2.4	8	2.8	15	2.6
Gender						
Male	140	47.8	125	45	265	46.4
Female	153	52.2	153	45	306	53.6
Age						
20-29	45	15.4	30	10.8	75	13.1
30-39	113	38.6	72	25.8	185	32.4
40-49	71	24.2	68	24.5	139	24.3
50-59	30	10.2	63	22.7	93	16.3
Above 60	34	11.6	45	16.2	79	13.8

continued…/

Table 4.1
Description of the study population characteristics across GVTL (n=571)

Variables	VNP		MGNP		Total	
	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Education						
No education	111	37.9	126	45.3	237	41.5
Primary education	159	54.3	117	42.1	276	48.3
Secondary education	20	6.8	33	11.9	53	9.3
Others	3	1	2	.8	5	0.9
Annual Household Income						
Between US$ 100-500	242	82.6	257	92.4	499	87.4
Between US$ 600-1000	51	17.4	21	7.6	72	12.6
Adults in the Household						
1-2 people	262	89.4	236	84.9	498	87.4
3-5 people	29	9.9	41	14.7	70	12.2
Above 5 people	2	.7	1	.4	3	0.5
Children in the Household						
No children	26	8.9	18	6.5	44	7.7
1-2 children	122	41.6	73	26.3	195	34.1
3-5 children	132	45.1	157	56.4	289	50.6
Above 5 children	13	4.4	30	10.8	43	7.5

Residents' perceptions regarding trends in satisfaction with overall quality of life and household livelihood security.

Of the four groups of households (participants and non-participants, living adjacent to each park), significant improvements in the overall quality of life were reported by three of the four groups, the exception being non-participants living adjacent to VNP. For the two groups of participants, the level of satisfaction with their overall quality of life improved almost two points on the 7-point scale (Table 4.2). Significant, but more modest improvements also were reported by non-participants living outside of

MGNP (Δ = 0.87*).* However, non-participants living outside VNP reported only marginally improved levels of satisfaction with their overall quality of life (Δ = 0.23, n.s.).

Next we examined the perceived changes in the four dimensions of livelihood security indices in the same manner. Significant improvements in *food, health, education* and *economic* security were reported by participants living around VNP, and by both participants and non-participants living adjacent to MGNP. The largest gains were found in *education* security reported by both participants groups (Δ = 2.31, 2.27). Again, a difference of over two points in residents' satisfaction with *health* security was found among participants living adjacent to VNP (Δ = 2.12). Further, while significant improvements were reported in *health* and *education* security among non-participants living outside of VNP, *food* and *economic* securities improved very little (Δ = 0.08, 0.16, respectively), undoubtedly contributing, at least partially, to the minimal improvement in overall quality of life reported by this group of respondents.

Table 4.2

Perceptions of trends in overall quality of life and household livelihood securities, by CCE participants and non-participants

Volcanoes National Park, Rwanda

		Current		Past						
Category	Household Livelihoods Security (HLS)	$\bar{X}$	*sd*	$\bar{X}$	*sd*	Δ	*t*	DF	*p*	Cohen's *d*
Participants	Overall Quality of Life	4.09	1.150	2.14	1.218	1.95	17.32	179	<.001*	2.58
	Food Security	4.00	1.182	2.25	1.378	1.75	13.02	179	<.001*	1.94
	Health Security	4.54	1.265	2.42	1.259	2.12	18.50	179	<.001*	2.76
	Education Security	4.89	1.303	2.58	1.294	2.31	20.18	179	<.001*	3.01
	Economic Security	3.89	1.145	2.19	1.366	1.70	13.65	179	<.001*	2.04
Non-Participants	Overall Quality of Life	3.72	1.221	3.49	1.542	0.23	1.18	179	0.239	N/A
	Food Security	3.56	1.260	3.48	1.632	0.08	.399	112	0.691	N/A
	Health Security	4.13	1.632	3.53	1.582	0.60	3.18	112	<.002*	0.60
	Education Security	4.89	1.365	3.42	1.355	1.47	10.13	112	<.001*	1.91
	Economic Security	3.54	1.337	3.38	1.655	0.16	.765	112	0.446	N/A

Mgahinga Gorilla National Park, Uganda

		Current		Past						
Category	Household Livelihoods Security (HLS)	$\bar{X}$	*sd*	$\bar{X}$	*sd*	Δ	*t*	DF	*P*	Cohen's *d*
Participants	Overall Quality of Life	4.09	1.325	2.15	1.166	1.94	11.76	166	<.001*	1.85
	Food Security	3.75	1.293	2.50	1.439	1.25	9.17	166	<.001*	1.42
	Health Security	3.66	1.215	2.54	1.488	1.12	8.41	166	<.001*	1.30
	Education Security	4.74	1.488	2.47	1.366	2.27	9.00	166	<.001*	1.39
	Economic Security	3.34	1.195	2.26	1.359	1.08	7.79	166	<.001*	1.20
Non-Participants	Overall Quality of Life	3.83	1.250	2.96	1.314	0.87	5.62	166	<.001*	0.87
	Food Security	3.60	1.238	2.47	1.271	1.13	7.23	110	<.001*	1.39
	Health Security	3.47	1.400	2.34	1.164	1.13	8.42	110	<.001*	1.60
	Education Security	3.76	1.223	2.34	1.179	1.42	11.62	110	<.001*	2.21
	Economic Security	3.23	1.136	2.25	1.140	0.98	6.90	110	<.001*	1.31

Δ = differences between current and past means, where, 1 = Not satisfied, 7 = Completely satisfied.

* $p < .05$

Residents' perceptions regarding the specific components of each dimension of household livelihood security (HLS).

To probe residents' perceptions of the four dimensions of household livelihood security more deeply, we asked respondents to agree or disagree with statements describing possible components of (contributors to) each dimension. Respondents rated their levels of agreement/disagreement with 25 statements, across the four dimensions, on a 7-pt Likert-type scale ranging from (1) Strongly disagree to (7) Strongly agree. For example, we asked respondents to rate their level of agreement/disagreement with the Food Security statement, "We eat three meals a day regularly." We then examined the pattern of responses for each question and compared mean scores between residents living adjacent to each park using an independent samples t-test and Cohen's *d* (Table 4.3).

Food Security

Residents living adjacent to VNP and MGNP strongly agreed with the food security component of "We buy salt for cooking regularly" (VNP: $\bar{X}$ = 6.74 and MGNP: $\bar{X}$ = 6.82) as well as "We use of wood to cook food regularly" (VNP: $\bar{X}$ = 6.66 and MGNP: $\bar{X}$ = 6.70). However, residents strongly disagreed with the food security component, "We eat meat regularly" (VNP: $\bar{X}$ = 1.52 and MGNP: $\bar{X}$ = 1.48). In contrast, residents living in around MGNP were significantly more likely to disagree strongly that "We eat three meals a day regularly" (VNP: $\bar{X}$ = 3.43 and MGNP: $\bar{X}$ = 1.89).

Health Security

Data regarding health security dimension indicated that residents around MGNP were more likely to disagree with health security components than their counterparts living adjacent to VNP. For example, residents living adjacent to MGNP were less likely to agree with the health insurance component ($\bar{X}$ =2.09) compared to residents adjacent to VNP ($\bar{X}$ = 6.31). It is important to note that in Rwanda, health insurance is mandatory; it is not required in Uganda. Furthermore, residents across MGNP were significantly less likely to agree that they had "access to clean water" ($\bar{X}$ = 2.11) as compared to residents living adjacent to VNP ($\bar{X}$ = 5.11) ($p < .001$). Similarly, residents adjacent to MGNP reported significantly lower levels of agreement that they had "access to health care services" ($\bar{X}$ = 3.28) than residents around VNP ($\bar{X}$ = 4.09).

Education Security

Residents in both parks expressed similar perceptions regarding education security. They reported similar views regarding having "access to schools" ($\bar{X}$ = 3.89 and 3.81, for VNP and MGNP, respectively). However, differences were reported regarding residents' ability to "afford school fees", and both groups reported a general degradation of agreement about school fees as the level of education increased. For example, residents adjacent to VNP revealed stronger agreement that they could "afford fees for primary school" ($\bar{X}$ = 6.04) than residents around MGNP ($\bar{X}$ = 3.62) ($p < .001$). When queried about fees for secondary schools, the level of agreement dropped precipitously ($\bar{X}$ = 2.65, $\bar{X}$ = 1.89 for VNP and MGNP, respectively). Their perceptions of their ability to "afford university fees" was even lower ($\bar{X}$ = 1.26, $\bar{X}$ = 1.25 for VNP and MGNP, respectively).

Economic Security

Respondents in both parks reported relatively low levels of agreement with components of economic security. With the exception of stating they agreed that they could "afford to buy clothing," respondents living adjacent to both parks reported little agreement with statements that they "own enough land for agriculture" ($\bar{X}$ = 2.52, $\bar{X}$ = 2.63 for VNP and MGNP, respectively) or "own enough livestock" ($\bar{X}$ = 2.01, $\bar{X}$ = 1.90 for VNP and MGNP, respectively). Further, having "financial savings," the "finances to deal with hardships," and "access to loan and finance facilities" were rated significantly higher among Rwandan residents than Ugandan. But, in both cases, the level of agreement was generally below the mid-point of the 7-point scale, indicating that neither group of respondents felt they could weather economic trouble if it occurred.

Table 4.3
Residents' perceptions of selected components of household livelihood securities by park

Household Livelihood Securities (Overall)[1] Household Livelihood Securities (Components)[2]	Volcanoes National Park		Mgahinga Gorilla National Park					
	$\bar{X}$	*sd*	$\bar{X}$	*sd*	*t*	DF	*p*	Cohen's *d*
Food Security (Overall)	3.83	1.23	3.69	1.27	1.32	569	.179	N/A
We eat preferred food regularly.	3.44	1.16	3.69	1.45	-2.29	569	<.001*	-0.19
We eat three meals a day regularly.	3.43	1.31	1.89	1.15	14.91	569	<.001*	1.25
We eat meat regularly.	1.52	.894	1.48	.831	.559	569	.363	N/A
We eat fruits and vegetables regularly.	4.49	1.17	4.23	1.63	2.21	569	<.001*	.18
We use wood to cook food regularly.	6.66	.823	6.70	.780	-.533	569	.282	N/A

continued…/

Table 4.3
Residents' perceptions of selected components of household livelihood securities by park

Household Livelihood Securities (Overall)[1] Household Livelihood Securities (Components)[2]	Volcanoes National Park		Mgahinga Gorilla National Park					
	$\bar{X}$	*sd*	$\bar{X}$	*sd*	*t*	DF	*p*	Cohen's *d*
We buy food to eat we cannot produce regularly.	5.05	1.21	5.26	2.03	-1.64	569	<.001*	-0.13
We buy salt for cooking regularly.	6.82	.530	6.74	.618	1.62	569	<.014	N/A
Health Security (Overall)	4.39	1.25	3.59	1.29	7.49	569	.597	N/A
We have access to health care services.	4.09	1.78	3.28	1.54	5.77	569	<.003*	.48
We have health insurance.	6.31	1.23	2.09	1.70	33.76	569	<.001*	2.83
We have access to well-equipped health centers or hospitals.	5.24	1.49	3.53	1.65	12.91	569	.068	N/A
We buy prescribed medicine.	4.23	1.42	5.16	1.94	-6.53	569	<.001*	-0.54
We have access to clean water.	5.11	1.78	2.11	1.32	22.92	569	<.001*	1.92
Education Security (Overall)	4.89	1.32	3.74	1.33	10.27	569	.232	N/A
We have access to schools.	3.89	1.29	3.81	1.38	.758	569	.099	N/A
We can afford to pay fees for primary education.	6.04	1.32	3.62	1.65	19.27	569	<.001*	1.61
We can afford to pay fees for secondary. education	2.65	1.49	1.89	1.24	6.60	569	<.001*	.55
We can afford to pay fees for university education.	1.26	.73	1.25	.690	.131	569	<.003*	N/A
We can afford to buy scholastic materials.	4.24	1.37	3.97	1.74	2.03	569	<.001*	N/A
We can afford to buy students uniform.	5.02	1.60	4.60	1.77	2.95	569	.078	N/A
Economic Security (Overall)	3.74	1.23	3.29	1.17	4.43	569	.492	N/A
We own enough land for agriculture.	2.52	1.11	2.63	1.40	-1.00	569	<.001*	-0.08
We own enough livestock.	2.01	1.19	1.90	1.11	1.18	569	.268	N/A

continued…/

Table 4.3
Residents' perceptions of selected components of household livelihood securities by park

Household Livelihood Securities (Overall)[1] Household Livelihood Securities (Components)[2]	Volcanoes National Park		Mgahinga Gorilla National Park					
	$\bar{X}$	*sd*	$\bar{X}$	*sd*	*t*	DF	*p*	Cohen's *d*
We have access to loan and finance facilities.	3.28	1.63	2.57	1.47	5.58	569	<.002*	.46
We have financial savings.	3.25	1.66	2.46	1.32	6.27	569	<.001*	.52
We have finances to deal with hardships.	2.69	1.37	1.91	1.12	7.41	569	<.001*	.62
We can afford to buy clothing.	4.91	1.22	4.93	1.34	-.189	569	.515	N/A
We are satisfied with our current occupation/ employment.	4.11	1.31	3.26	1.39	7.47	569	.198	N/A

[1]Where, 1 = Not Satisfied, 7 = Completely Satisfied.
[2]Where, 1 = Strongly Disagree, 7 = Strongly Agree.
* p < .05

Comparisons of perceptions of CCE participants and non-participants regarding trends in quality of life and the four dimensions of household livelihood security

Changes in satisfaction with overall quality of life and the four dimensions of household livelihood security (food, health, education and economic) were compared between CCE participants and non-participants living next to each park, again using t-tests. As shown in Table 4.4, there were significant differences between participants and non-participants living adjacent to VNP regarding *overall quality of life* ($p < 0.01$), *food* security ($p < 0.003$), *health* security ($p < 0.006$) and *economic* security ($p < 0.033$). In each of the four constructs, participants of community conservation enterprises reported larger improvements in satisfaction than non-participants. Interestingly, no differences were found between the perceptions of participants and non-participants regarding satisfaction with *education* security ($p < 0.975$), even though this variable produced the

largest overall improvements (Δ = 2.31, 1.47 respectively). This could be attributed to the fact that education infrastructure is used equally all residents' regardless of their involvement in CCEs.

Surprisingly, no differences in the perceptions of Ugandan respondents were reported regarding any of the four securities, regardless of their involvement with CCEs; *food* security ($p < 0.353$), *health* security ($p < 0.216$), *education* security ($p < 0.902$) and *economic* security ($p < 0.477$) were not significantly different.

Table 4.4
Comparisons of perceptions of trends in household livelihood securities, by participants and non-participants

Volcanoes National Park					
Household Livelihoods Security	Participants (n=180)	Non-Participants (n=113)			
	Δ	Δ	*t*	*p*	Cohen's *d*
Overall Quality of Life	1.95	0.23	2.582	0.010*	0.35
Food Security	1.75	0.08	2.996	0.003*	0.35
Health Security	2.12	0.60	2.772	0.006*	0.32
Education Security	2.31	1.47	-0.031	0.975	N/A
Economic Security	1.70	0.16	2.151	0.033*	0.25
Mgahinga Gorilla National Park					
Household Livelihoods Security	Participants (n=167)	Non-Participants (n=111)			
	Δ	Δ	*t*	*p*	Cohen's *d*
Overall Quality of Life	1.94	0.87	1.658	0.098	N/A
Food Security	1.25	1.13	0.931	0.353	N/A
Health Security	1.12	1.13	1.240	0.216	N/A
Education Security	2.27	1.42	-0.123	0.902	N/A
Economic Security	1.08	0.98	0.712	0.477	N/A

Δ = differences between current and past means, where, 1 = Not satisfied, 7 = Completely satisfied.
* p < .05

Comparisons of perceptions of CCE participants and non-participants regarding trends in illegal behaviors across GVTL

Beyond the assessments of impacts of community conservation enterprises on residents' quality of life and household livelihood securities, the relationship between participation in CCEs and perceptions of trends in illegal behaviors was explored.[2] When comparisons were made between residents who participated in community conservation enterprises and those who did not, differences were reported regarding their perceptions of illegal behaviors. Perceptions of *past* behaviors were much higher than the perceptions of behaviors *currently.* As can be seen in Table 4.5, no differences can be reported on the measure of overall illegal behaviors ($p = .227$). However, significant differences were reported in all six behavioral categories with *participants* reporting greater improvements in behaviors than *non-participants.* Residents who participated in community conservation enterprises reported significantly larger improvements in the prevalence of all six illegal behaviors than those respondents who did not participate in CCEs. Trends in water collection and bamboo cutting exhibited the largest size effects (Cohen's d = 2.10 and 2.04, respectively).

[2] For a more in-depth understanding of this aspect of the overall study, readers are directed to Chapters 2 and 3.

Table 4.5
Residents' perceptions of trends in illegal activities by participant/non-participant group

Illegal Activities	Participants					Non-Participants								
	Current Perceptions		Past Perceptions			Current Perceptions		Past Perceptions						
	$\bar{X}$	SD	$\bar{X}$	SD	Δ	$\bar{X}$	SD	$\bar{X}$	SD	Δ	*t*	DF	*p*	Cohen's *d*
Overall	2.02	.98	5.85	1.28	3.83	1.68	.84	5.49	1.44	3.81	0.75	569	.227	N/A
Poaching	2.11	1.07	5.69	1.47	3.58	1.72	.88	5.19	1.65	3.47	3.02	569	0.001*	.25
Water Collection	1.90	.88	5.46	1.40	3.56	1.79	1.40	4.62	1.86	2.83	25.08	569	0.001*	2.10
Wood Cutting	1.52	.71	4.89	1.64	3.37	1.67	.67	4.69	1.66	3.02	6.23	569	0.001*	.52
Setting fires in forest	1.35	.56	4.56	1.57	3.21	1.16	.40	3.91	1.59	2.75	9.22	569	0.001*	.77
Bamboo Cutting	2.30	1.28	5.93	1.37	3.63	1.92	1.40	4.82	2.11	2.9	24.33	569	0.001*	2.04
Medicinal Herbs	1.48	.75	4.31	1.71	2.83	1.37	.62	3.52	1.91	2.15	10.09	569	0.001*	.84

Δ = differences between current and past means, where, 1 = Not satisfied, 7 = Completely satisfied.
* p < .05

Conclusions and Discussion

The purpose of this paper was to investigate the impact of community conservation enterprises on the household livelihood security of resident communities adjacent to GVTL. In particular, it sought to: 1) determine the perceptions of GVTL residents regarding trends in satisfaction with overall quality of life and household livelihood securities, 2) examine specific components of (contributors to) each dimension of household livelihood security, and, 3) examine the differences, if any, between CCE participants and non-participants, regarding their perceptions of household livelihood security and the prevalence of illegal behaviors. Each question was set against the backdrop and context of two contiguous, but very different national parks.

Overall, residents of both countries indicated they were moderately satisfied with their present quality of life. However, those who participated in community conservation enterprises, regardless of country of residence, showed the largest improvements in quality of life, reporting almost a 2-point gain on the 7-point satisfaction scale over the past several years. By assessing the findings regarding their satisfaction with the four dimensions of livelihood security, by each park, a more in-depth understanding of the lives of these residents is gained.

While residents of communities adjacent to Mgahinga Gorilla National Park in Uganda reported improvements in their quality of life and the four dimensions of livelihood security, no significant differences were found between participants and non-participants regarding quality of life or household livelihood securities. This suggests that the limited size and scope of CCEs in Uganda has done little to improve the lives of these

residents. Therefore, with the constraint of fewer tourism opportunities in Uganda due to the limited number of gorilla families open to visitation (i.e., only one), this renders meaningful comparisons between Rwanda and Uganda moot.

In stark contrast, in the villages surrounding Volcanoes National Park in Rwanda, the overall quality of life and all four dimensions of household livelihood security improved over the past several years, albeit in some cases, only slightly. And, given that the tourism industry in Rwanda was more developed with larger numbers of visitors, the trajectory of improvement was much greater for residents who participated in community conservation enterprises, than those who did not. Participants reported significantly larger improvements in their quality of life and with their food, health, and economic security. In addition, even though no significant differences could be reported regarding education security, it is important to note that education security was relatively high among non-participants, narrowing the gap in improvements reported by participants.

Therefore, this suggests that CCEs have made a difference in the lives of VNP residents by contributing to improvements to livelihoods and improvements in their overall quality of life. But, it is important to understand that the contributions of CCES to each of the four HLS dimensions accrues differently to individuals and their communities. The data clearly suggest that food and economic security are more indicative of individual benefits, where benefits related to health and education securities are often accrued by the entire community, regardless of participation in community conservation enterprises. For example, revenue-sharing from gorilla- based tourism has

been used to build schools, health clinics and public latrines, benefitting the entire community.

Next, delving deeper into the analyses of components of, or contributors to each of the four dimensions of HLS, some interesting patterns emerged that have direct implications to policy and management of the GVTL. It is apparent that food security is still a significant problem among residents living adjacent to both parks. Residents are not eating preferred food, nor are they eating three meals a day. Most troubling is the fact that these residents do not eat meat on a regular basis, instead relying on fruits and vegetables for their primary diet. Further, respondents readily agreed they cooked and heated their homes with wood. Concerns among residents also were found regarding not having enough agricultural land and livestock. As a result, it should not be a surprise to find higher rates of poaching for bushmeat and cutting wood in the parks. Addressing these issues would go a long way in reducing food insecurity and poaching.

Relatedly, another prominent finding was the lack of access to clean water reported in Uganda. This appears to be isolated primarily to that country. But, having to haul water long distances on a continual basis has been reported as a major drain on human capital and a major reason that children do not attend school, particularly girls. This problem is directly related to residents' low level of educational security and compounds the challenges associated with health security across residents of the GVTL. Government support of free primary education was evident in the responses of Rwandans. Finally, residents living on an annual income of fewer than $500 USD, have little in terms of savings, difficulty in accessing loan and finance facilities and, as a result,

little economic resilience during times of financial stress. This makes the income received through community conservation enterprises all the more important.

Finally, to complete the circle of questions regarding the relationship between CCEs and reducing illegal behaviors in the parks, our analyses suggest that significant improvements were made in each of the six different categories of illegal behaviors. Again, to provide perspective, respondents reported many illegal behaviors had been reduced over time, by over three points on the 7-pt scale. Further, significant differences were found between CCE participants and non-participants in all six categories. But, interestingly, in all six categories, participants reported a higher prevalence of illegal behaviors than non-participants. Therefore, given the limitation of this instrument to measure actual reductions in illegal behaviors, it should be seen as a positive that participants are, at least more aware of the problems.

In summary, this paper calls for park management and community development organizations to pay attention to these HLS dimensions in order to influence conservation and community development outcomes. Particularly, this calls for more investment in food and economic dimensions of HLS which benefits participants of CCEs directly and helps them to address household challenges. Across both parks, there is need for projects to provide more livestock (chickens or goats) that could address the community challenge of not eating meat. Lack of meat contributes to poaching and should be considered a high priority. Equally, conservation and community development organizations should focus more on providing clean water, a critical challenge that is facing communities living adjacent to MGNP. If these household livelihood security challenges are not addressed, communities will continue to put pressure on park for resources to address their household livelihood challenges.

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CHAPTER FIVE

CONCLUSION AND SYNTHESIS

This dissertation was intended to address the lack of empirical studies that assess the impacts of community conservation enterprises on community livelihoods and reducing illegal behaviors in protected areas across GVTL. Notably, this study went beyond investigating residents' perceptions of illegal activities in protected areas, to analyze and compare data on the known number of illegal activities in GVTL parks over a 9-year period (2007-2015). Therefore, the overarching research focus that guided this dissertation was to investigate the efficacy of community conservation enterprises as a tool for improving the livelihoods of people living in communities across GVTL, while reducing illegal activities in the parks that threaten wildlife and their habitats. To achieve this overarching objective, three specific research questions were addressed. The first research question was to investigate the perceptions of illegal conservation behaviors among indigenous populations of the GVTL and what drives those behaviors. The second research question was to compare the perceptual data collected from residents, with the actual number of illegal incidents collected through the GVTL's Ranger-based Monitoring program (RbM). The third research question was to investigate the impacts of community conservation enterprises (CCE's) on the quality of life and household livelihood security among the resident communities adjacent to GVTL parks. The broader achievement of this dissertation is that it provides new and needed empirical data from which to view illegal activities and the different dimensions of household livelihood security.

While some illegal behaviors were found to decrease over the years, such as forest fires and medicinal herbs collection, the majority of other illegal behaviors were found to increase. Poaching in particular was found to be a continuing problem in both parks. However, residents' perceptions of illegal behaviors indicated that they decreased. Our examination of the drivers of illegal behaviors indicate that these illegal activities are a response to existing household subsistence needs. For example, residents indicated that the major reasons for poaching were to get bushmeat to eat or sell. Additionally, cutting bamboo illegally was mainly for purposes of house construction, fencing, and making baskets for sale. Water collection activities were primarily driven by the fact that water in the park is available throughout the year, where it is intermittent in other sources outside the park.

Therefore, park and protected area managers must continue to monitor illegal activities as well as continue to assess the progress of household livelihood securities of resident communities. Law enforcement alone will provide only a partial solution, resulting in impoverished residents continuing to risk prosecution in order to survive. Some alleviation may be accomplished through initiatives to increase livestock production, grow bamboo and wood outside the park, and find year-round sources of clean drinking water. Unless these basic needs for protein, water and shelter are met, illegal activities are likely to continue. Therefore, to successfully mitigate illegal behaviors, park managers must concern themselves with the welfare of residents surrounding their park and involve community residents as stakeholders in park management decision-making.

With regards to the quality of life and household livelihood security, residents of both countries indicated that they were moderately satisfied with their quality of life. While residents of communities adjacent to Mgahinga Gorilla National Park in Uganda reported improvements in their quality of life and the four dimensions of livelihood security, there were no differences found between CCE participants and non-participants regarding quality of life or household livelihood securities. This indicates that CCEs have not made a significant difference on the residents' quality of life and HLS around MGNP. With the constraint of fewer tourism opportunities in Uganda due to the limited number of gorilla families open to visitation (i.e., only one), there is a need to explore other avenues that can improve the household livelihood securities of residents living adjacent to MGNP. We recommend that the focus should be put into agribusiness projects that could have a broader market within the community and beyond while at the same time solving the challenge of food and economic insecurity.

In contrast, the overall quality of life and all four dimensions of household livelihood security improved over the past several years across VNP among the CCE participants. This suggests that CCEs have made a difference in the lives of VNP residents by contributing to livelihoods improvement and improvement in their overall quality of life. Given the fact that tourism industry in Rwanda is more developed with more numbers of gorilla families open to visitation (i.e. 10 groups) and larger numbers of visitors, the trajectory of improvement is much greater for residents who participated in CCEs, than those who did not.

Despite this, food security is still a problem. Residents are not eating preferred food, nor are they eating three meals a day. Most troubling is the fact that these residents do not eat meat on a regular basis, instead they rely on fruits and vegetables for their primary diet.

Further, residents are more concerned with challenges of lack of access to clean water, using more wood for cooking, and not having enough agricultural land and livestock. With these household-based challenges, it is not surprising to find higher rates of illegal activities and in particular poaching for bushmeat and cutting wood in the parks. Therefore, to integrate conservation and community development, there is a critical need to address food and economic security challenges. Investing in projects such as livestock (chickens or goats) could address the community challenge of not eating meat and which contributes to poaching should be considered a high priority. Addressing these challenges would go a long way in reducing food insecurity and poaching in the park.

Finally, this study calls for park management and community development organizations to pay attention to these HLS dimensions in order to influence conservation and community development outcomes. In particular, this study calls for more investment in food and economic dimensions of HLS which benefits households directly and helps them address household challenges. Projects such as livestock (chickens or goats) that could address the community challenge of not eating meat and which could contribute to poaching reduction should be considered a high priority. Equally, conservation and community development organizations should focus more on providing clean water, a

critical challenge that is facing communities living adjacent to MGNP. If these household livelihood security challenges are not addressed, communities will continue to put pressure on park for resources to address their household livelihood challenges.

Limitations

The first limitation of this dissertation is that the divergence of resident' perceptions from "current professional thinking" regarding the perceived severity of illegal behaviors in GVTL. This could be attributed to several factors, which are methodological, psychological, sociological, and economic in nature. From a methodological standpoint, the instrument and question wording may not have performed well in this culture, particularly when asking about very sensitive topics like illegal behaviors. While we attempted to assuage fears of respondents by asking about why "members of their communities" engaged in illegal behaviors (rather than ask about their personal activities), there is undoubtedly some level of social desirability bias in in that respondents may not want to admit to performing illegal acts.

Secondly, residents may fear prosecution by law enforcement officers and have a general distrust of government. Over the years, governments in the region have been corrupt, unstable and prone to administering severe punishment when citizens do not comply with governmental edicts. In some cases, as parks were established, indigenous peoples have been physically removed from land within park boundaries and forced to relocate. Therefore, residents may be psychologically disposed to avoid reporting illegal activities.

Furthermore, illegal activities are often committed individually and in isolation of other community members, residents might be looking at the severity of illegal activities based on their personal behavior and lack of exact knowledge of crime and other illegal behaviors happening in the park. In most communities, illegal activities are not common knowledge, but rather the work of a small group of individuals whose activities are mostly shielded from the public eye.

Finally, some of the non-participants in CCEs could have indirectly benefited from the communal CCEs projects like schools, water facilities, and health centers because they live in the same geographical area. As a result, some of the differences between CCEs participants and non-participants found in food and economic security may not be as pronounced when asking about health and education security.

Therefore, future research should revise the instruments and question wording to take into consideration, community fears of law enforcement distrust, test illegal activity participation and knowledge, widen the scope of CCEs beneficiaries to include in revenue sharing and other community conservation projects across GVTL.

APPENDICES

APPENDIX A

THE RESEARCH PERMITS

RDB | RWANDA DEVELOPMENT BOARD

RESEARCH CONTRACT

This agreement is made between the Rwanda Development Board (RDB) Tourism & Conserv
(hereinafter referred to as "the authority") on one part and

SABUHORO Edwin (hereinafter referred to as "the researcher")

WHEREAS the researcher is the desirous of carrying out the research in the authority's protected area called **Volcanoes National Park**

And WHEREAS the authority has agreed to the said research to be carried out in the said protected areas, under the terms and conditions herein stipulated,

IT IS NOW AGREED AS FOLLOWS:

1. The authority has authorized and allowed the researcher to carry out the research described herein below, in **Volcanoes National Park**
2. The research shall be restricted to (project title) Community Conservation Enterprises as a tool for sustainable community livelihoods and conservation of mountain gorillas across the Greater Virunga Trans-boundary Landscape
3. The said research shall be commenced one days after execution of this agreement and shall have a duration of **1 months** after which the said research shall cease to be carried out,
4. The researcher or the group of researchers as Foreign Citizen will pay the research application project fee of **50$** non refundable paid once as consideration for the permission to carry out the research above described.
5. The researcher as a Foreign students will pay the research application project fee of **30$** non refundable paid once as consideration for the permission to carry out the research above described.
6. Each of the researchers as Foreign Citizen shall pay **120 $** monthly research fee non refundable
7. Each of the researchers as Foreign Student shall pay **50 $** monthly research fee non refundable
8. The researcher or the group of researchers as Rwandan Citizen shall pay **5000 Rwf** monthly research fee non refundable and **5000 Rwf** of application paid once.
9. Each of the researchers as Rwandan Students who is doing undergraduate courses shall pay **5000 Rwf** of application.
10. Before commencement of any field work, the researcher shall pay a report/security deposit of 300$ refundable within 15 days following the submission of his/her final report.

11. The researcher shall produce a progress report in on the activities covered under the research to the authority and shall at the completion of the research submit a final report on the research which shall include analyzed data, findings and recommendations.

12. The researcher shall where necessary make an application for permission to collect, take and/or use any specimens for the carrying out of the said research. Such application shall be made to the Executive Director of the Authority and shall indicate the exact need for the specimens and the number and the number and categories of specimens required.

13. The researcher shall not hunt , collect take, kill or injure any wild plant or animal or any part or derivative thereof and shall not collect , take or use any specimen without prior written approval of the Executive Director of the Authority such approval shall bear a stamp of the authority.

14. The authority shall at all times have absolute discretion in deciding on whether or not to grant permission to collect, take or use any specimen and on whether or not to grant permission to hunt, collect, take, kill, or injure any wild plant or animal.

15. The authority shall have a right to stop the research from commencing or continuing with the research herein above described, for good cause

16. This agreement shall be governed by and be subject to the Rwanda Wildlife Statute and all subsidiary legislation made there under , and to all other laws of Rwanda.

IN WITNESS WHREOF, the duly authorized representatives of the parties hereto have set their hands hereunto on the day and year above mentioned.

For Rwanda Development Board
Tourism and Conservation

for

Amb. Yamina KARITANYI
Chief Tourism officer
Rwanda Development Board

Signature

Date 19/06/15

For the Researcher

Names : Edwin SABUHORO

signature

19/06/2015

Date

UGANDA WILDLIFE AUTHORITY

OFFICE OF THE EXECUTIVE DIRECTOR

PLOT 7 KIRA ROAD KAMWOKYA
P. O. Box 3530, Kampala, Uganda

Our Ref: **COD/96/02** Date: 17th June, 2015

Sabuhoro Edwin
Clemsom University
South Calorina
USA

RE: RESERCH APPLICATION APPROVAL

I am in receipt of your application letter dated 29th May 2015 requesting to carry out research in Mgahinga Gorilla National Park titled **"Community Conservation Enterprises as a tool for sustainable Community livelihoods and conservation of Mountain Gorillas across the GVL."**

I am glad to inform you that your research application has been approved and commences on 1st July 2015 to 1st July 2016. You will be expected to submit a progress report by 30th September 2016 and the final report by 30th December 2016 to Uganda Wildlife Authority. In case you are unable to work within these dates, notify UWA in Writing. However, note that any researcher failuring to submit the reports in appropriate time will not be allowed to come back to wildlife protected areas to do further research.

You will be required to pay an application fee of US$ 50, a monthly research fee of US$ 100 and a refundable report deposit fee of US$300 to Uganda Wildlife Authority in accordance with UWA Monitoring and Research Policy and revised tariffs. You are also required to by law to seek clearance from the Uganda National Council for Science and Technology(UNCST). By copy of this letter, UNCST is fully informed that research has been approved by UWA.

Please report to the Conservation Area Manger and Warden Monitoring and Research of Bwindi Mghinga Conservation Area on arrival in the park for registration, payment and further guidance.

Conserving for Generations

Yours Sincerely,

EXECUTIVE DIRECTOR
UWA UGANDA WILDLIFE AUTHORITY

Raymond Engena
AG. EXECUTIVE DIRECTOR

c.c: Consevation Area Manager , BMCA
c.c: Warden Monitoring and Research, BMCA
c.c: Executive Secretary, UNSCT

Uganda Tel: +256-41-4355000, +256-31-2355000 Fax: +256-41-4346291, E-Mail: info@ugandawildlife.org, Website: www.ugandawildlife.org

APPENDIX B

GREATER VIRUNGA TRANSBOUNDARY LANDSCAPE SUPPORT FOR THE DISSERTATION RESEARCH

GVTC
GREATER VIRUNGA
TRANSBOUNDARY COLLABORATION
ICCN UWA RDB
Intergovernmental Organization
Organisation Intergouvernementale
Three countries, One landscape
Trois pays, Un paysage
RDC-Rwanda-Uganda

Office Address
(ADRA-Rwanda) offices on No
11641 Nyarutarama Road
PO Box 6626, Kigali, Rwanda
Office phone: +250 252 580 429
Email: info@greatervirunga.org
Website: www.greatervirunga.org
Facebook: GreaterVirunga
Twitter: @GreaterVirunga

MANDATE
Improved conservation of species, habitats, and ecological services contributing to increased socio-economic benefits, through effective transboundary collaboration.

Kigali, le 24 Novembre 2014
N° Ref. 191/GVTC/SE/2014

To whom it may concern

Reference: Letter of support for Mr. Edwin Sabuhoro's Research Project

We would like to express our strong support for Mr. Edwin Sabuhoro's research project, "*The Effectiveness of Community Conservation Enterprises as a Tool for Sustainable Community Livelihoods and Conservation of Mountain Gorillas across the Virunga Trans-boundary Landscape*" This proposal builds well in our current work and we would be delighted to facilitate it in any possible way.

The project is timely and important for the Greater Virunga Trans-boundary Landscape and will help us to address challenges we face in integrated development and conservation. During implementation, GVTC will work closely and commit to facilitate the research results dissemination to both park managements and community conservation stakeholders.

We believe this research project is important, feasible, and consistent with our conservation and human development goals around the GVTL. We remain confident that this research will inform policy makers, managers and particularly park managers and community development partners on areas that can make a better return on our community livelihood and conservation investments.

Yours Sincerely,

GREATER VIRUNGA TRANSBOUNDARY GVTC P.O.Box 6626 Kigali EXECUTIVE SECRETARIAT

Dr MUAMBA TSHIBASU Georges

Executive Secretary

APPENDIX C

SURVEY QUESTIONNAIRE A-Part 1: HLS

HOUSEHOLDS PARTICIPATING IN COMMUNITY CONSERVATION

ENTERPRISES

Number…….
Respondent household location: District……..……Sector/Parish…..…….……..
……Village……..

SURVEY QUESTIONNAIRE A-Part 1

HOUSEHOLDS BENEFITING FROM COMMUNITY CONSERVATION ENTERPRISES

LIVELIHOOD SECURITIES

Thank you very much for agreeing to participate in this important survey exploring the effectiveness of community conservation enterprises in reducing illegal activities and improving the livelihoods of people living in communities across Greater Virunga Transboundary Landscape. Today we will be interviewing you to gain your thoughts and opinions about how community conservation enterprises have benefited your household. The survey should take 25-30 minutes to be completed. Your participation is voluntary and you may stop at any time. The answers you provide will be kept strictly confidential.

PART 1

A. DEMOGRAPHICS

1. How old are you?……..……
2. Marital status (*circle where appropriate*) □ Single □ Married □ Divorced
3. What is your gender? (*circle where appropriate*) □ Male □ Female
4. What is your education level? (*circle where appropriate*) □ No education □ Primary □ Secondary □ Vocational □ Undergraduate
5. What is your occupation (*circle where appropriate*) □ Farmer □ Business □ Teacher □ Handicraft □ Any other
6. How many adults are in your household?……
7. What is their age?……
8. How many children are in your household?……
9. What is their age……..

B: HOUSEHOLD COMPOSITION, INCOME AND ASSETS

7. How much income does your household make annually? (Francs or Ugsh)……..…
8. What is the source of this income?…….
9. Do you own land? □ Yes □ No. If yes, how much land do you own?……
10. Do you own livestock? □ Yes □ No. If yes, what type and how many?

Cows:	Goats:	Sheep:	Pigs:	Chicken:	Others:

11. What type of shelter does your household have?

Roof construction □ Tiled □ Corrugated □ Asbestos □ Grass thatched
□ Other

Wall construction □ Concrete □ Brick □ Mud □ Other

12. What type of transport do you own?

□ Bicycle □ Motorcycle □ Car □ Other

C. HOUSEHOLD FOOD PRODUCTION AND PRODUCTIVITY

13. What type of food does your household produce?
……
14. Is the food produced sufficient to meet the needs of your family?
……

D. HOUSEHOLD ACCESS TO EDUCATION

15. How many of your children are in school?……..……
16. How many are not in school?……..……..
17. If not, what is the reason for not being in school?
……
18. How far do your children have to walk to school?……..

E. HOUSEHOLD ACCESS TO HEALTH CARE

19. Do you have access to health care facilities? □ Yes □ No.
20. If no, why?……..
21. Does your household have medical insurance? □ Yes □ No.
22. If no, what is the reason for not having medical insurance?
……
23. How far do you have to walk to access health care?……..……

F. HOUSEHOLD ECONOMIC BENEFITS FROM COOPERATIVES

24. Which cooperative are you a member of?……..……

25. Which year did you join this cooperative?……

26. How much money do you receive from your cooperative monthly/annually?

……

……

27. Are there any other benefits that your household gets from being a member of this cooperative?

……

……

……

28. Have you ever received money from the community lodge?……

G. OVERALL QUALITY OF LIFE

29. How satisfied are you with the quality of life for your family today?

Not Satisfied ← → Completely Satisfied						
1	2	3	4	5	6	7

30. Thinking back to the year you joined the cooperative, how satisfied were you with your households quality of life?

Not Satisfied ← → Completely Satisfied						
1	2	3	4	5	6	7

PART 2: LIVELIHOOD SECURITIES

1. Food Security Indicators

Please indicate your level of agreement or disagreement with the following statements. **In my household….**	**Strongly Disagree** ⟷						**Strongly Agree**
We eat preferred food regularly.	1	2	3	4	5	6	7
We eat three meals a day regularly.	1	2	3	4	5	6	7
We eat meat regularly.	1	2	3	4	5	6	7
We eat fruits and vegetables regularly.	1	2	3	4	5	6	7
We use wood to cook food regularly.	1	2	3	4	5	6	7
We buy food to eat we cannot produce regularly.	1	2	3	4	5	6	7
We buy salt for cooking regularly.	1	2	3	4	5	6	7

Overall	**Not satisfied** ⟷						**Completely Satisfied**
How satisfied are you with your households food security today?	1	2	3	4	5	6	7
How satisfied were you with your households food security the year you joined the cooperative?	1	2	3	4	5	6	7

2. Health Security Indicators

Please indicate your level of agreement or disagreement with the following statements. **In my household…**	**Strongly Disagree** ⟷ **Strongly Agree**						
We have access to health care services.	1	2	3	4	5	6	7
We have health insurance.	1	2	3	4	5	6	7
We have access to well equipped health centers or hospitals.	1	2	3	4	5	6	7
We buy prescribed medicine.	1	2	3	4	5	6	7
We have access to clean water.	1	2	3	4	5	6	7

Overall	**Not satisfied** ⟷ **Completely Satisfied**						
How satisfied are you with your households health security today?	1	2	3	4	5	6	7
How satisfied were you with your households health security the year you joined the cooperative?	1	2	3	4	5	6	7

3. Education Security Indicators

Please indicate your level of agreement or disagreement with the following statements. **In my household…..**	**Strongly Disagree** ⟷ **Strongly Agree**						
We have access to schools.	1	2	3	4	5	6	7
We can afford to pay fees for primary education.	1	2	3	4	5	6	7
We can afford to pay fees for secondary education	1	2	3	4	5	6	7
We can afford to pay fees for university education.	1	2	3	4	5	6	7
We can afford to buy scholastic materials.	1	2	3	4	5	6	7
We can afford to buy students uniform.	1	2	3	4	5	6	7

Overall	**Not satisfied** ⟷ **Completely Satisfied**						
How satisfied are you with your households education security today?	1	2	3	4	5	6	7
How satisfied were you with your households education security the year you joined the cooperative?	1	2	3	4	5	6	7

4. Economic Security Indicators

Please indicate your level of agreement or disagreement with the following statements. **In my household….**	**Strongly Disagree** ⟷ **Strongly Agree**						
We own enough land for agriculture.	1	2	3	4	5	6	7
We own enough livestock.	1	2	3	4	5	6	7
We have access to loan and finance facilities.	1	2	3	4	5	6	7
We have financial savings.	1	2	3	4	5	6	7
We have finances to deal with hardships.	1	2	3	4	5	6	7
We can afford to buy clothing.							
We are satisfied with our current occupation/ employment.	1	2	3	4	5	6	7

Overall	**Not satisfied** ⟷ **Completely Satisfied**						
How satisfied are you with your households economic security today?	1	2	3	4	5	6	7
How satisfied were you with your households economic security the year you joined the cooperative?	1	2	3	4	5	6	7

THANK YOU VERY MUCH FOR YOUR PARTICIPATION.

APPENDIX D

SURVEY QUESTIONNAIRE A-Part 2: ILLEGAL ACTIVITIES

HOUSEHOLDS PARTICIPATING IN COMMUNITY CONSERVATION ENTERPRISES

Number.....

SURVEY QUESTIONNAIRE A-Part 2

HOUSEHOLDS BENEFITING FROM COMMUNITY CONSERVATION ENTERPRISES

ILLEGAL ACTIVITIES

In this section, we want to ask a few questions about why you think members of this community similar to yourself participate in illegal activities in the park. Please do not use names when you answer.

OVERALL ILLEGAL ACTIVITIES

1. What is your overall assessment of illegal activities in the park today?

Very Low ← → **Very High**						
1	2	3	4	5	6	7

2. What is your overall assessment of illegal activities in the park the year you joined the cooperative?

Very Low ← → **Very High**						
1	2	3	4	5	6	7

ILLEGAL ACTIVITIES

1. Poaching Indicators

Please rate the reasons members of your community similar to yourself participate in poaching in the park. **Members of my community similar to myself go to the park to poach….**	**Strongly Disagree** ⟷ **Strongly Agree**						
Because of social pressure.	1	2	3	4	5	6	7
To exercise their indigenous rights.	1	2	3	4	5	6	7
To get bushmeat to eat.	1	2	3	4	5	6	7
For bushmeat to sell.	1	2	3	4	5	6	7
To collect hides, skins and ornaments.	1	2	3	4	5	6	7
In retaliation for non-compensation for crop damage by wildlife.	1	2	3	4	5	6	7
Overall	**Very Low** ⟷ **Very High**						
What is your overall assessment of poaching activities in the park today?	1	2	3	4	5	6	7
What is your overall assessment of poaching activities in the park the year you joined the cooperative?	1	2	3	4	5	6	7

2. Water collection Indicators

Please rate the reasons members of your community similar to yourself participate in collecting water in the park. **Members of my community similar to myself go to the park to collect water….**	**Strongly Disagree** ⟷ **Strongly Agree**						
Because they lack water sources outside the park.	1	2	3	4	5	6	7
Because they lack clean drinking water outside the park.	1	2	3	4	5	6	7
Because water sources in the park are closer to their homes than other water sources.	1	2	3	4	5	6	7
Because water in our community is expensive.	1	2	3	4	5	6	7
Because water in the park is available throughout the year when water in other sources is intermittent.	1	2	3	4	5	6	7
Because of traditional and cultural rituals.	1	2	3	4	5	6	7
To sell.	1	2	3	4	5	6	7

Overall	**Very Low** ⟷ **Very High**						
What is your overall assessment of water collection in the park today?	1	2	3	4	5	6	7
What is your overall assessment of water collection in the park the year you joined the cooperative?	1	2	3	4	5	6	7

3. Wood Cutting Indicators

Please rate the reasons members of your community similar to yourself participate in wood cutting in the park. **Members of my community similar to myself go to the park to cut wood….**	**Strongly Disagree** ⟷ **Strongly Agree**						
To use in fencing their households.	1	2	3	4	5	6	7
To use in agricultural farming.	1	2	3	4	5	6	7
To make household items like mortars.	1	2	3	4	5	6	7
To use in building their houses.	1	2	3	4	5	6	7
To get timber for sale.	1	2	3	4	5	6	7
To get firewood for cooking and heating.	1	2	3	4	5	6	7
To get firewood for sale.	1	2	3	4	5	6	7

Overall	**Very Low** ⟷ **Very High**						
What is your overall assessment of wood cutting in the park today?	1	2	3	4	5	6	7
What is your overall assessment of wood cutting in the park the year you joined the cooperative?	1	2	3	4	5	6	7

4. Forest Fires Indicators

Please rate the reasons that lead members of your community like yourself to cause forest fires in the park. **Members of my community similar to myself set fire in the park while….**	**Strongly Disagree** ⟷ **Strongly Agree**						
Roasting bush meat.	1	2	3	4	5	6	7
Harvesting honey using fire.	1	2	3	4	5	6	7
Practicing cultural and ritual practices that involve fire.	1	2	3	4	5	6	7
Clearing bushes for hunting.	1	2	3	4	5	6	7
Burning bushes to attract animals for poaching.	1	2	3	4	5	6	7
In retaliation for lack of compensation from animal crop raiding.	1	2	3	4	5	6	7

Overall	**Very Low** ⟷ **Very High**						
What is your overall assessment of forest fires in the park today	1	2	3	4	5	6	7
What is your over all assessment of forest fires in the park the year you joined the cooperative?	1	2	3	4	5	6	7

5. Bamboo Cutting Indicators

Please rate the reasons members of your community similar to yourself participate in bamboo cutting in the park. **Members of my community similar to myself go to the park to cut bamboo….**	**Strongly Disagree** ⟷ **Strongly Agree**						
To use it in making baskets for home use.	1	2	3	4	5	6	7
To use it in making baskets for sale.	1	2	3	4	5	6	7
To use in house construction.	1	2	3	4	5	6	7
To use it in agricultural farming.	1	2	3	4	5	6	7
To feed their livestock.	1	2	3	4	5	6	7
To use it in making chairs, tables and beds.	1	2	3	4	5	6	7
To use it in fencing their homes.	1	2	3	4	5	6	7

Overall	**Very Low** ⟷ **Very High**						
What is your overall assessment of bamboo cutting in the park today?	1	2	3	4	5	6	7
What is your overall assessment of bamboo cutting in the year you joined the cooperative?	1	2	3	4	5	6	7

6. Medicinal Herbs

Please rate the reasons members of your community similar to yourself illegally collect medicinal herbs in the park. **Members of my community similar to myself go to the park to harvest medical herbs….**	**Strongly Disagree** ⟷ **Strongly Agree**						
To get medicine for their household.	1	2	3	4	5	6	7
To get medicine for their livestock.	1	2	3	4	5	6	7
For cultural and traditional cleansing.	1	2	3	4	5	6	7
To get seedlings to plant outside the park.	1	2	3	4	5	6	7
To get food dietary supplement.	1	2	3	4	5	6	7
To get medicinal herbs for sale.	1	2	3	4	5	6	7

Overall.	**Very Low** ⟷ **Very High**						
What is your over all assessment of medicinal herbs collection in the park today?	1	2	3	4	5	6	7
What is your over all assessment of medicinal herbs collection the year you joined the cooperative?	1	2	3	4	5	6	7

THANK YOU VERY MUCH FOR YOUR PARTICIPATION.

APPENDIX E

SURVEY QUESTIONNAIRE B-Part 1: HLS

HOUSEHOLDS NOT PARTICIPATING IN COMMUNITY CONSERVATION

ENTERPRISES

Number…….
Respondent household location: District……..……Sector/Parish…..……..……..
……Village……..

CLEMSON
PARKS, RECREATION AND TOURISM MANAGEMENT

SURVEY QUESTIONNAIRE B-Part 1

HOUSEHOLDS NOT BENEFITING FROM COMMUNITY CONSERVATION ENTERPRISES

LIVELIHOOD SECURITIES

Thank you very much for agreeing to participate in this important survey exploring the effectiveness of community conservation enterprises in reducing illegal activities and improving the livelihoods of people living in communities across Greater Virunga Transboundary Landscape. Today we will be interviewing you to gain your thoughts and opinions about your household securities. The survey should take 25-30 minutes to be completed. Your participation is voluntary and you may stop at any time. The answers you provide will be kept strictly confidential.

PART 1

A. DEMOGRAPHICS

1. How old are you?……..……
2. Marital status (*circle where appropriate*) □ Single □ Married □ Divorced
3. What is your gender? (*circle where appropriate*) □ Male □ Female
4. What is your education level? (*circle where appropriate*) □ No education □ Primary □ Secondary □ Vocational □ Undergraduate
5. What is your occupation (*circle where appropriate*) □ Farmer □ Business □ Teacher □ Handicraft □ Any other
6. How many adults are in your household?……
7. What is their age?……
8. How many children are in your household?……
9. What is their age……..

B. HOUSEHOLD COMPOSITION, INCOME AND ASSETS

7. How much income does your household make annually? (Francs or Ugsh)……..…
8. What is the source of this income?…….
9. Do you own land? □ Yes □ No. If yes, how much land do you own?……
10. Do you own livestock? □ Yes □ No. If yes, what type and how many?

Cows:	Goats:	Sheep:	Pigs:	Chicken:	Others:

11. What type of shelter does your household have?

Roof construction □ Tiled □ Corrugated □ Asbestos □ Grass thatched
□ Other

Wall construction □ Concrete □ Brick □ Mud □ Other

12. What type of transport do you own?

□ Bicycle □ Motorcycle □ Car □ Other

C. HOUSEHOLD FOOD PRODUCTION AND PRODUCTIVITY

13. What type of food does your household produce?
……
14. Is the food produced sufficient to meet the needs of your family?
……

E. HOUSEHOLD ACCESS TO EDUCATION

15. How many of your children are in school?……..……
16. How many are not in school?……..……..……..
17. If not, what is the reason for not being in school?
……
18. How far do your children have to walk to school?……..

E. HOUSEHOLD ACCESS TO HEALTH CARE

19. Do you have access to health care facilities? □ Yes □ No.
20. If no, why?……..
21. Does your household have medical insurance? □ Yes □ No.
22. If no, what is the reason for not having medical insurance?
……
23. How far do you have to walk to access health care?……..……

F. OVERALL QUALITY OF LIFE

24. How satisfied are you with the quality of life for your family today?

Not Satisfied ⟷ **Completely Satisfied**						
1	2	3	4	5	6	7

25. How satisfied were you with your households quality of life 5 years ago?

Not Satisfied ⟷ **Completely Satisfied**						
1	2	3	4	5	6	7

PART 2: LIVELIHOOD SECURITIES

1. Food Security Indicators

Please indicate your level of agreement or disagreement with the following statements. **In my household….**	**Strongly Disagree** ⟷ **Strongly Agree**						
We eat preferred food regularly.	1	2	3	4	5	6	7
We eat three meals a day regularly.	1	2	3	4	5	6	7
We eat meat regularly.	1	2	3	4	5	6	7
We eat fruits and vegetables regularly.	1	2	3	4	5	6	7
We use wood to cook food regularly.	1	2	3	4	5	6	7
We buy food to eat we cannot produce regularly.	1	2	3	4	5	6	7
We buy salt for cooking regularly.	1	2	3	4	5	6	7

Overall	**Not satisfied** ⟷ **Completely Satisfied**						
How satisfied are you with your households food security today?	1	2	3	4	5	6	7
How satisfied were you with your households food security 5 years ago?	1	2	3	4	5	6	7

2. Health Security Indicators

Please indicate your level of agreement or disagreement with the following statements. **In my household…**	**Strongly Disagree** ⟷					**Strongly Agree**
We have access to health care services.	1	2	3	4	5	6	7
We have health insurance.	1	2	3	4	5	6	7
We have access to well equipped health centers or hospitals.	1	2	3	4	5	6	7
We buy prescribed medicine.	1	2	3	4	5	6	7
We have access to clean water.	1	2	3	4	5	6	7

Overall	**Not satisfied** ⟷					**Completely Satisfied**
How satisfied are you with your households health security today?	1	2	3	4	5	6	7
How satisfied were you with your households health security 5 years ago?	1	2	3	4	5	6	7

3. Education Security Indicators

Please indicate your level of agreement or disagreement with the following statements. **In my household…..**	**Strongly Disagree** ⟷					**Strongly Agree**
We have access to schools.	1	2	3	4	5	6	7
We can afford to pay fees for primary education.	1	2	3	4	5	6	7
We can afford to pay fees for secondary education	1	2	3	4	5	6	7
We can afford to pay fees for university education.	1	2	3	4	5	6	7
We can afford to buy scholastic materials.	1	2	3	4	5	6	7
We can afford to buy students uniform.	1	2	3	4	5	6	7

Overall	**Not satisfied** ⟷					**Completely Satisfied**
How satisfied are you with your households education security today?	1	2	3	4	5	6	7
How satisfied were you with your households education security 5 years ago?	1	2	3	4	5	6	7

4. Economic Security Indicators

Please indicate your level of agreement or disagreement with the following statements. **In my household….**	**Strongly Disagree** ← → **Strongly Agree**						
We own enough land for agriculture.	1	2	3	4	5	6	7
We own enough livestock.	1	2	3	4	5	6	7
We have access to loan and finance facilities.	1	2	3	4	5	6	7
We have financial savings.	1	2	3	4	5	6	7
We have finances to deal with hardships.	1	2	3	4	5	6	7
We can afford to buy clothing.							
We are satisfied with our current occupation/ employment.	1	2	3	4	5	6	7

Overall	**Not satisfied** ← → **Completely Satisfied**						
How satisfied are you with your households economic security today?	1	2	3	4	5	6	7
How satisfied were you with your households economic security 5 years ago?	1	2	3	4	5	6	7

THANK YOU VERY MUCH FOR YOUR PARTICIPATION.

APPENDIX F

SURVEY QUESTIONNAIRE B-Part 2: ILLEGAL ACTIVITIES

HOUSEHOLDS NOT PARTICIPATING IN COMMUNITY CONSERVATION ENTERPRISES

Number.....

CLEMSON
PARKS, RECREATION AND TOURISM MANAGEMENT

SURVEY QUESTIONNAIRE B-Part 2

HOUSEHOLDS NOT BENEFITING FROM COMMUNITY CONSERVATION ENTERPRISES

ILLEGAL ACTIVITIES

In this section, we want to ask a few questions about why you think members of this community similar to yourself participate in illegal activities in the park. Please do not use names when you answer.

OVERALL ILLEGAL ACTIVITIES

1. What is your overall assessment of illegal activities in the park today?

Very Low ← → **Very High**						
1	2	3	4	5	6	7

2. What is your overall assessment of illegal activities in the park 5 years ago?

Very Low ← → **Very High**						
1	2	3	4	5	6	7

ILLEGAL ACTIVITIES

1. Poaching Indicators

Please rate the reasons members of your community similar to yourself participate in poaching in the park. **Members of my community similar to myself go to the park to poach….**	**Strongly Disagree** ⟷ **Strongly Agree**						
Because of social pressure.	1	2	3	4	5	6	7
To exercise their indigenous rights.	1	2	3	4	5	6	7
To get bushmeat to eat.	1	2	3	4	5	6	7
For bushmeat to sell.	1	2	3	4	5	6	7
To collect hides, skins and ornaments.	1	2	3	4	5	6	7
In retaliation for non-compensation for crop damage by wildlife.	1	2	3	4	5	6	7
Overall	**Very Low** ⟷ **Very High**						
What is your overall assessment of poaching activities in the park today?	1	2	3	4	5	6	7
What is your overall assessment of poaching activities in the park 5 years ago?	1	2	3	4	5	6	7

2. Water collection Indicators

Please rate the reasons members of your community similar to yourself participate in collecting water in the park. **Members of my community similar to myself go to the park to collect water….**	**Strongly Disagree ⟷ Strongly Agree**						
Because they lack water sources outside the park.	1	2	3	4	5	6	7
Because they lack clean drinking water outside the park.	1	2	3	4	5	6	7
Because water sources in the park are closer to their homes than other water sources.	1	2	3	4	5	6	7
Because water in our community is expensive.	1	2	3	4	5	6	7
Because water in the park is available throughout the year when water in other sources is intermittent.	1	2	3	4	5	6	7
Because of traditional and cultural rituals.	1	2	3	4	5	6	7
To sell.	1	2	3	4	5	6	7

Overall	**Very Low ⟷ Very High**						
What is your overall assessment of water collection in the park today?	1	2	3	4	5	6	7
What is your overall assessment of water collection in the park 5 years ago?	1	2	3	4	5	6	7

3. Wood Cutting Indicators

Please rate the reasons members of your community similar to yourself participate in wood cutting in the park. **Members of my community similar to myself go to the park to cut wood….**	**Strongly Disagree ⟷ Strongly Agree**						
To use in fencing their households.	1	2	3	4	5	6	7
To use in agricultural farming.	1	2	3	4	5	6	7
To make household items like mortars.	1	2	3	4	5	6	7
To use in building their houses.	1	2	3	4	5	6	7
To get timber for sale.	1	2	3	4	5	6	7
To get firewood for cooking and heating.	1	2	3	4	5	6	7
To get firewood for sale.	1	2	3	4	5	6	7

Overall	**Very Low ⟷ Very High**						
What is your overall assessment of wood cutting in the park today?	1	2	3	4	5	6	7
What is your overall assessment of wood cutting in the park 5 years ago?	1	2	3	4	5	6	7

4. Forest Fires Indicators

Please rate the reasons that lead members of your community like yourself to cause forest fires in the park. **Members of my community similar to myself set fire in the park while….**	**Strongly Disagree** ⟷ **Strongly Agree**						
Roasting bush meat.	1	2	3	4	5	6	7
Harvesting honey using fire.	1	2	3	4	5	6	7
Practicing cultural and ritual practices that involve fire.	1	2	3	4	5	6	7
Clearing bushes for hunting.	1	2	3	4	5	6	7
Burning bushes to attract animals for poaching.	1	2	3	4	5	6	7
In retaliation for lack of compensation from animal crop raiding.	1	2	3	4	5	6	7

Overall	**Very Low** ⟷ **Very High**						
What is your overall assessment of forest fires in the park today	1	2	3	4	5	6	7
What is your over all assessment of forest fires in the park 5 years ago?	1	2	3	4	5	6	7

5. Bamboo Cutting Indicators

Please rate the reasons members of your community similar to yourself participate in bamboo cutting in the park. **Members of my community similar to myself go to the park to cut bamboo….**	**Strongly Disagree** ⟷ **Strongly Agree**						
To use it in making baskets for home use.	1	2	3	4	5	6	7
To use it in making baskets for sale.	1	2	3	4	5	6	7
To use in house construction.	1	2	3	4	5	6	7
To use it in agricultural farming.	1	2	3	4	5	6	7
To feed their livestock.	1	2	3	4	5	6	7
To use it in making chairs, tables and beds.	1	2	3	4	5	6	7
To use it in fencing their homes.	1	2	3	4	5	6	7

Overall	**Very Low** ⟷ **Very High**						
What is your overall assessment of bamboo cutting in the park today?	1	2	3	4	5	6	7
What is your overall assessment of bamboo cutting in the park 5 years ago?	1	2	3	4	5	6	7

6. Medicinal Herbs

Please rate the reasons members of your community similar to yourself illegally collect medicinal herbs in the park. **Members of my community similar to myself go to the park to harvest medical herbs….**	**Strongly Disagree** ⟷ **Strongly Agree**						
To get medicine for their household.	1	2	3	4	5	6	7
To get medicine for their livestock.	1	2	3	4	5	6	7
For cultural and traditional cleansing.	1	2	3	4	5	6	7
To get seedlings to plant outside the park.	1	2	3	4	5	6	7
To get food dietary supplement.	1	2	3	4	5	6	7
To get medicinal herbs for sale.	1	2	3	4	5	6	7

Overall.	**Very Low** ⟷ **Very High**						
What is your over all assessment of medicinal herbs collection in the park today?	1	2	3	4	5	6	7
What is your over all assessment of medicinal herbs collection in the park 5 years ago?	1	2	3	4	5	6	7

THANK YOU VERY MUCH FOR YOUR PARTICIPATION.

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