

AN EVALUATION OF COLLABORATIVE RESOURCE MANAGEMENT AND THE
MEASUREMENT OF ILLEGAL RESOURCE USE IN A UGANDAN NATIONAL PARK

By

JENNIFER N. SOLOMON

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Abstract of Dissertation Presented to the Graduate School
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Jennifer N. Solomon

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Protected area management in developing countries faces the challenges of building support for conservation among neighboring residents and monitoring the social and ecological impacts of conservation programming. This study examines a collaborative resource management (CRM) program at Kibale National Park, Uganda that allows residents to fish inside the park. Like other integrated conservation and development programs, the goals are to help alleviate poverty and build support for conservation and conservation-related behaviors. I empirically analyze the program's impact using an 81 item personal survey, with 94 CRM fishers and 91 respondents in a control group and additional data from a focus group, semi-structured interviews, and document review. Results show fishers earned significantly more income (median=U.S. \$376.02) than the control group (median= U.S. \$196.19, $U=2953.50$, $p<0.001$), and tribal affiliation influenced earnings. Fishers reported significantly more positive attitudes toward park staff than the control group (all p -values <0.05) and indicated more support for conservation ($U=2906.5$, $p<0.01$). Although CRM fishers deterred illegal activity, some may also extract resources illegally. Management recommendations include increased monitoring of fishers and their harvest levels, ecological studies of the fishery, and a seasonal moratorium.

Results of the CRM fishing survey indicated few respondents divulged illegal behavior when directly questioned; yet illegal resource use is a major threat to conservation worldwide. To manage effectively, the number of people engaging in illegal activities needs to be estimated. However, people violating the law seldom identify themselves for fear of retribution. A second survey was conducted with 251 residents to test the use of the randomized response technique (RRT) to better measure illegal activities. The RRT allows respondents to disclose sensitive information because the interviewer cannot ascertain an individual's true response to the incriminating question. Estimates of six types of illegal resource use, such as removing plants and snaring wildlife, were compared using surveys with the RRT versus direct questioning. The RRT survey method yielded an estimate of significantly more illegal activity than direct questioning for each type of illegal resource use (all p -values <0.001). This suggests the RRT is a potentially powerful tool for understanding conservation threats in the developing world.

CHAPTER 1 INTRODUCTION

When a Westerner mentions “Africa” the image that most often comes to mind is one of wild animals on endless grassy plains. Rarely, if ever, do Westerners envision the people that share the land with the wildlife (Adams & McShane 1992). It is these people that have the most impact on the survival of the wildlife. And in general, these people are poor. Africa harbors some of the poorest countries on earth.

Conservation would not be necessary if it were not for humans’ impact on the environment. Human activities have been destructive, but they also have the potential to be productive. We, as a society, are now in a race to conserve what is left of some of the most spectacular natural areas, as well as species, on this planet. The ways in which our natural resources are managed will inevitably influence the future of what we choose to conserve.

Today’s conservation management options are diverse, ranging from fortress conservation, also known as the “fences and fines” approach which is usually driven by governments, to internally-motivated conservation projects which are often initiated and managed by community members (Gavin et al. 2007). In between on the management continuum is collaborative resource management (CRM). The term, CRM, can be used to describe different types of conservation programs, but in general it means that management of a resource is shared by at least 2 different stakeholders and resources are managed for a specific benefit, thereby implying some level of development for the user. The underlying assumption is that the benefit is one of a *quid pro quo* nature, allowing local people to benefit or be compensated in lieu of something foregone, often lost access to resources (Alpert 1996; Scott 1998). Many CRM programs fall under integrated conservation and development projects (ICDPs), since CRM programs hope to achieve conservation of a resource or habitat in addition to livelihood improvement. The CRM

program examined in this dissertation is an ICDP which was established in Kibale National Park (KNP), Uganda in 2000.

Within the past 20 years, ICDPs have become very popular with conservation and donor communities. Unfortunately, positive outcomes that meet the dual objectives of conservation and development have been elusive. Although donors are hard-pressed to find concrete data indicating that ICDPs are a fruitful strategy, the lack of alternatives and the intuitive appeal of ICDPs have ensured that they will remain a tool for conservation. Advocates of ICDPs (e.g., Wilshusen et al. 2002) defend conservation and development programming, pointing out that the failures have been due to process and not necessarily fundamental conceptual flaws. Validating the ICDP process, however, has been hampered by a lack of proper assessments. My dissertation contributes to knowledge on the efficacy of ICDPs in achieving their dual goals of conservation and development.

This dissertation is two-part; using a survey, focus group, semi-structured interviews and document review, the first part analyzes the impact of Uganda Wildlife Authority's CRM fishing program in KNP on poverty, support for conservation, and conservation-related behaviors. Collaborative resource management in KNP permits select residents to use certain park resources; in the case of this study the resource is fish. The need to understand the impact of illegal resource use associated with CRM led to exploration of a new method to investigate this phenomenon. The second part of the dissertation includes the results of a methodological experiment aimed at providing data about illegal resource use.

Uganda is an ideal place to carry out these studies. Uganda holds an impressive array of biodiversity that is threatened by high population pressure bordering national parks of global significance (Figure 1-1). Its governmental wildlife management authority has been exploring

innovations in conservation management, especially strategies to reduce conflict between people that reside near or in protected areas and park authorities (Scott 1998). Collaborative resource management has been one such strategy. Uganda Wildlife Authority's CRM program aims to reduce poverty, improve relations with park staff and community members as well as encourage pro-environmental behavior in the park. The CRM program in KNP is in its infancy; the fishing program began in 2000. My study examines early results, following the first three years of the CRM fishing program, and answers the following questions: "Is the CRM program alleviating poverty?" and "Does the CRM program influence support for conservation and conservation-related behaviors?"

One of the results of the CRM fishing survey research was that local people residing around KNP divulged few illegal behaviors to Ugandan survey assistants. The second part of this dissertation, a direct result of this finding, examines the effectiveness of the randomized response technique (RRT) in estimating illegal resource use in a Ugandan community. Illegal resource use is considered a major threat to conservation in protected areas throughout the world, yet accurately estimating the number of people illegally using resources has been difficult. Randomized response technique is unique in allowing respondents to disclose sensitive information because the interviewer can not ascertain an individual's true response to the incriminating question. A common technique used in asking sensitive questions in the health sciences, RRT has never been used in a developing country on topics of natural resource use with populations that are semi-literate. This study takes the first step toward developing and testing a potentially powerful tool for understanding conservation threats in the developing world.

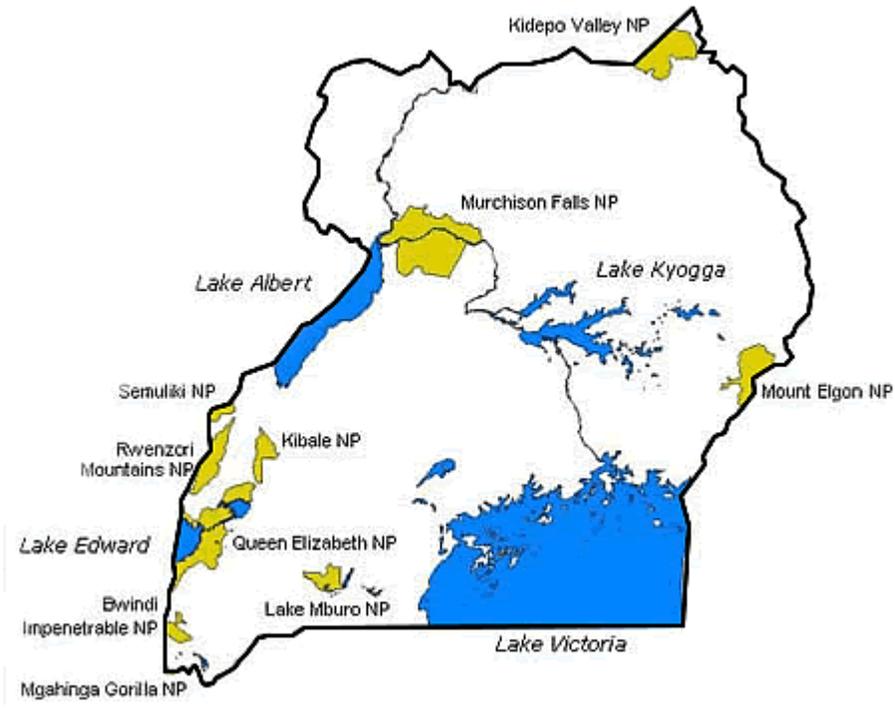


Figure 1-1. Map of Uganda with protected areas noted (Uganda Wildlife Authority 2006).

CHAPTER 2 BACKGROUND AND LITERATURE REVIEW

Background

Uganda's colonial history has shaped its current conservation policies and practices. State initiatives to conserve Uganda's diverse but dwindling habitats and species have been guided by a framework devised early in the 20th century (Hulme 1998). A prime component of this colonial legacy has been a protectionist orientation which frames Ugandan natural resource users as the conservation 'problem' and aims to achieve conservation objectives by not permitting resource users to access areas of conservation value. Wild animals are further protected by a ban on hunting of most wild species. Unfortunately, this protectionist stance has not effectively halted exploitation (Hulme 1998).

Forbidding people who live near parks to utilize resources has created strong negative emotions towards the protected areas and the government among people living near national parks (Mugisha & Jacobson 2004; Naughton-Treves 1996; Nepal & Weber 1995). Exacerbating these emotions are the incidences of crop-raiding by animals such as elephants, baboons, and chimpanzees (Naughton-Treves 1996). As one farmer explained, "These animals leave us poor and hungry... Why should we starve so that baboons may eat?" (Naughton-Treves 1997 p.35). This negative attitude towards the park and the wildlife within it has been the source for various interventions to provide benefits to protected area neighbors and reduce illegal, uncontrolled use of park resources. One such intervention is collaborative resource management (CRM). Collaborative resource management seeks to improve conservation outcomes by addressing poverty. The program allows people residing near select protected areas in Uganda to utilize park resources. By doing so, CRM aims to alleviate poverty, increase support for conservation, and encourage pro-environmental behaviors.

Collaborative resource management is a broad term, often couched under “community-based conservation”, used to describe partnerships between different stakeholders concerning management of land and/or natural resources. There are a vast array of terms that can include CRM projects, one of the more common being integrated conservation and development (ICDPs) (Adams & Hulme 2001; Timmer & Juma 2005). The name CRM itself implies that management of the resource is, in effect, joint and resources are managed for a specific benefit, thereby implying some level of development for the user. The underlying assumption is that the benefit is one of a *quid pro quo* nature, allowing local people to benefit or be compensated in lieu of something foregone, often lost access to resources (Alpert 1996; Scott 1998).

History of CRM – from Paternalism to Participation

Collaborative resource management is the direct result of what some experts believe to be the failed conservation regime of fortress conservation, also known as the ‘fences and fines’ approach (Inamdar et al. 1999; Songorwa 1999; Wilshusen et al. 2002). Fortress conservation, originally the dominant paradigm in the field, advocates a strict protectionist approach towards the conservation of natural resources. In the past 20 years though, a new “narrative” has arisen, namely community-based conservation (Adams & Hulme 2001; Western 2001). Community-based conservation advocates argue that conservation must be integrated with the interests and wishes of local people (Adams & Hulme 2001). The arguments for espousing this approach are based on both ethical (the rights and well-being of local people) and practical (the need for local support given limited conservation funds) concerns (Adams & Hulme 2001; Brechin et al. 2002; Wilshusen et al. 2002).

For several decades now the term “local participation” has been used widely in community-based conservation. More recently though there has been a distinction made between “beneficiary participation” and “participatory participation” (Scott 1998). Beneficiary

participation, a common concept in ICDPs, implies that certain stakeholders, usually local people, receive benefits as compensation for something foregone. In these programs, decision-making power rests with an external stakeholder, usually a governmental body or non-governmental organization, but not with the local people. Participatory participation intends that all stakeholders have decision-making authority and substantial input into project management (Scott 1998). In essence, CRM is about participation and partnerships. It advocates that local people, who are often affected by conservation initiatives, should have a prominent voice in conservation-related decisions if they so wish. Moreover, they should be able to shape and steer the direction of the conservation project.

The following section of this chapter highlights the literature that relates to the primary objectives of CRM: poverty alleviation and natural resource conservation, support for conservation, and pro-environmental behaviors. Literature pertaining to the randomized response technique is covered in Chapter 4.

Literature Review

Poverty and Conservation of Natural Resources

The United Nations (2003) estimates that worldwide 900 million people live in rural areas in absolute poverty (defined as deprivation of a human's basic needs) depending largely on natural resources for their livelihoods. Those who are currently chronically poor¹ will be the same people who will be in severe poverty by 2015; and the chronic poor tend to live in rural locales, closest to areas of conservation concern (Hulme & Shepherd 2003). Therefore it is not surprising that poverty and natural resource conservation, especially in developing countries, are perceived to be intimately connected.

¹ Chronic poverty involves “significant capability deprivations for a period of five years or more” (Hulme & Shepherd 2003 p 404-405).

The connection between poverty alleviation and the environment revolves around the sustainable use of resources. Poverty does not encourage people to act with long-term sustainability in mind (Liebersohn et al. 2003). The United States Agency for International Development (USAID), a major donor to developing nations worldwide, believes that countries such as Uganda need to sustainably use resources to pull themselves out of poverty and therefore they fund conservation programs that encourage donor recipients to raise their incomes (Liebersohn et al. 2003). USAID programming of this type is grounded in the idea that income generation will promote conservation when linked to conservation techniques and hence the people, the country and the environment will benefit (Liebersohn et al. 2003). This is a common belief among other multilateral donors (e.g., World Bank, International Monetary Fund), and serves as the primary assumption for ICDPs, which aim to achieve “site-based conservation with social or economic development goals or components” (Wells et al. 2004 p. 399).

Should conservation and development be programmatically linked?

Despite the links made by the ICDP literature and major donor agencies such as USAID, it is hotly debated whether conservation and poverty alleviation programs should attempt to achieve both goals simultaneously (Adams et al. 2004; Newmark & Hough 2000; Wilkie et al. 2006). Instituted in 2000, the United Nation’s Millennium Development Goals (MDGs) include both environmental sustainability and development objectives, but they are distinctly separate. Some experts believe that conservation efforts are being superseded by poverty alleviation objectives (Adams et al. 2004). From a pragmatic stance, both conservation and development projects, as well as developing country governments, often have limited finances available. Spreading thin resources even thinner may result in even fewer success stories (Alexander 2000; Wells et al. 2004). Additionally, some wonder if the goals of conservation and development are even compatible, as conservation of natural resources may negatively impact development, and

development may impair or restrict conservation efforts (Barrett & Arcese 1995; Hughes & Flintan 2001; Kellert et al. 2000; Rao & McGowan 2002; Sunderlin et al. 2005).

In general, few win-win cases can be found in the ICDP literature (Barrett & Arcese 1995; Brandon & Wells 1992; Hughes & Flintan 2001; Kellert et al. 2000; Marcus 2006; Newmark & Hough 2000; Sunderlin 2006; Wainwright & Wehrmeyer 1998). The effect of long-lasting positive benefits is elusive (Adams et al. 2004). Overall it appears that such projects produce modest cash or income benefits and may not affect a great portion of the communities. Experience has demonstrated that ICDPs promise more than they achieve (Timmer & Juma 2005; Wells et al. 2004).

Advocates of ICDPs (Wilshusen et al. 2002) defend conservation and development programming, pointing out that the failures have been due to process and not necessarily fundamental conceptual flaws. Validating the ICDP process, however, has been hampered by a lack of proper evaluation. The lack of monitoring and evaluation tools in ICDPs has led to difficulty in establishing a causal link between conservation programs and poverty alleviation (Hughes & Flintan 2001, Timmer & Juma 2005). Timmer and Juma (2005 p. 34) note, “without hard data and information, it is difficult to establish whether community-based conservation projects are having the desired impact on either livelihoods or biodiversity.” Therefore the analysis of the effectiveness of such projects is minimal. Timmer and Juma (2005) explain that the lack of data may be due, in part, to a fear of decreased funding of projects if they were not to demonstrate the anticipated results (Timmer & Juma 2005; Wells et al. 2004). No comprehensive review of ICDPs in terms of evaluating their effectiveness at alleviating poverty has been carried out (Robinson & Redford 2004). Robinson and Redford (2004) note only two ICDPs have demonstrated positive monetary returns for participants: CAMPFIRE (Communal

Areas Management Programme for Indigenous Resources) and a program carried out in the Mamiraua Sustainable Development Reserve in the Amazon region of Brazil. CAMPFIRE, a program that allows for controlled international sport-hunting of wildlife, reports large returns (\$4.9 million between 1989 and 1996) for its participants (Getz et al. 1999). Robinson and Redford (2004) note that average income of fishermen in Mamiraua increased from R\$320 to R\$845 over a 2 year period due to an increase in fish production from managed lakes in the reserve².

In order to decrease poverty, one needs to understand the causes of poverty. One of the reasons ICDPs may not decrease poverty may be the myriad causes of poverty. There is no “one-stop-shop” solution to tackling poverty. Also whereas most ICDPs work on the micro-level, poverty may be caused or exacerbated by exogenous influences (Bonger 2000; Rao & McGowan 2002; Sunderlin et al. 2005). In addition, even if poverty alleviation is achieved it does not mean that conservation gains will be made (Robinson & Redford 2004).

As Belsky (2003) writes, “But no effort can survive, let alone succeed, if the majority of local residents continue to bear the large proportion of the costs of environmental conservation while marginally sharing in its benefits” (p. 100). The intuitive appeal of this comment, as well as the lack of promising alternatives, is most likely why donors continue to fund such projects despite the lack of success stories (Wells et al. 2004).

² Those figures include all income though, not just financial gains from fishing, but the authors of the study believe that because no other large sources of revenue were introduced in the period that the majority of the increase is due to fishing revenues (Viana et al. 2004).

Measuring poverty

Many different definitions of poverty abound (Buchanan 2006) and measurement of poverty can be complex (Adams et al. 2004). Poverty is a multi-dimensional, dynamic process (Rao & McGowan 2002) and occurs in developed and developing countries.

In the past, the term poverty alleviation suggested simply raising incomes, but today the term also has broader implications. Traditional, income-based measures of poverty are used by the MDG's, as well as the World Bank, which defines extreme poverty as living on less than U.S.\$1 per day (measured in 1985 purchasing power parity dollars) (Buchanan 2006; Thomas 2000). The World Bank also defines those living in poverty as earning less than U.S.\$2 per day (Thomas 2000). Both of these definitions involve measurements using poverty lines. Absolute poverty measures poverty by estimating the cost of a basket of basic necessities. Households earning less than the cost of the necessities are deemed poor. By taking a percentage of the median (or mean) income of a country, relative poverty is defined (Thomas 2000). Households earning less than this figure are considered to be living in poverty. All of these types of definitions involve income poverty.

The United Nations calls for a broader definition of poverty encompassing a variety of different variables, creating a multi-dimensional definition of poverty (Thomas 2000). The United Nations Development Program (UNDP) realizes that lack of income may not include all of those that live in poverty. UNDP states that poverty “is the denial of choices and opportunities for living a life one has reason to value” (UNDP 2006). To account for this broader definition of poverty the UNDP uses both the Human Development Index (HDI) and Human Poverty Index (HPI) which combine a series of different variables (e.g., health, education, longevity, social exclusion) (Thomas 2000).

Poverty in Uganda

Although Uganda has experienced impressive economic growth in the past decade, it remains one of the world's poorest nations, ranking 144th out of 177 countries on UNDP's 2003 Human Development Index (UNDP 2003). Even though economic growth in Uganda has been good, poverty is increasing, especially among the poorest members of society. Most benefits from economic growth go to the wealthiest 20% of the populace (UNDP 2003). Thirty-four percent of the population lived in poverty in 2000, and according to the 2002/3 Ugandan National Household Survey this figure increased to 38% (UNDP 2003). This equates to approximately 9 million Ugandans living on less than U.S.\$1 a day (United States Agency for International Development 2005). The largest group of the impoverished are farmers, who primarily live in rural areas, where 96% of Ugandans reside (Liebersson et al. 2003; UNDP 2003). Per capita income in 2002 was U.S. \$330 (UNDP 2003).

Support for Conservation and Pro-Environmental Behavior

Local peoples' support for and participation in conservation programs are necessary components for their sustainability (Alexander 2000; Jacobson et al. 2006). Therefore, their perceptions about programs and the protected area, as well as their behavior, are critical components in the protection of resources (Alexander 2000). Researching attitudes, which refers to an individual's evaluation of a person, concept, entity, or action (Pierce et al. 2001), may illuminate support for environmental policies and possibly behavior (Gelcich et al. 2005; Kollmuss & Agyeman 2002; Rauwald & Moore 2002) and may be correlated with the success of a protected area (Struhsaker et al. 2005). Today, attitudinal and behavioral surveys are commonly used to gauge the effect of conservation and development programs on community members, as well as provide guidance for such programs (Fiallo & Jacobson 1995; Gillingham & Lee 1999; Infield & Namara 2001; Parry & Campbell 1992).

Support for conservation

Support for conservation may be influenced by many factors. In the community-based conservation literature education, wealth, age, residence time, economic activity, gender, ethnicity, resource use, awareness of environmental issues, participation in conservation activities, costs of living near a PA, benefits received from conservation and knowledge have all been measured and relationships with support for conservation identified (Spiteri & Nepal 2006 and references therein). Some studies have found certain predictors of variables to be positive correlates while others have found no relationship. For example, while wealth has been found to be positively correlated with support for conservation in some studies (Infield 1988, Mordi 1991, Newmark et al. 1993), other studies have found no relationship (Marcus 2006, Sah & Heinen 2001). Similarly, educational level has been found to be positively correlated with support for conservation by Infield (1988) in his work in Uganda, and Marcus (2006) in Madagascar, while other researchers report no relationship in other parts of Africa (Boer & Baquete 1998; Parry & Campbell 1992). These types of findings may be due to myriad variables that influence those sites, as well as methodology. Additionally, perhaps in some cases such variables are not causal variables. The importance of social context in influencing support for conservation cannot be underestimated (Gelcich et al. 2005). For example, De Boer and Baquete (1998) found that local people at four different sites surrounding one reserve in Mozambique had differing levels of support of conservation and resource use patterns; due to this, they recommended site-specific resource management plans to ensure success.

Attitudes of local residents towards a protected area and support for its conservation have been shown to be influenced by the benefits perceived by residents, the costs/damaging consequences of the conservation area, and socio-demographic variables, as well as the relationship with protected area staff. While research suggests that providing benefits to local

people results in support for conservation (Abbot et al. 2001; Arjunan et al. 2006; Bauer 2003; Boer & Baquete 1998; Hamilton et al. 2000; Lewis et al. 1990; Mehta & Heinen 2001; Newmark et al. 1993), the extent and nature of the benefits matter. If benefits are small in relation to the costs of living near a protected area or distribution of such benefits is inequitable, perceived benefits have been found to have little influence on attitudes (Gillingham & Lee 1999). Parry and Campbell (1992) found that despite substantial benefits received in a community-based project, negative conservation attitudes existed. They attributed this to the local peoples' lack of resource management decision-making power. Thus, benefits, costs, equitable distribution and decision-making power are all correlates of pro-conservation attitudes in community-based conservation. Notable costs include: resource use restrictions, damage to crops by wildlife, loss of livestock, and human injuries/fatalities from wildlife (Boer & Baquete 1998; Fiallo & Jacobson 1995; Newmark et al. 1993; Parry & Campbell 1992). Additionally, socio-demographic factors play a role in a person's support of conservation (Boer & Baquete 1998; Infield 1988; Spiteri & Nepal 2006).

In general, studies have found "high levels of public support for conservation in principle, but a pronounced lack of support for the external institutions responsible for the implementation of conservation strategies" (Gillingham & Lee 1999 p. 218). Local people often hold negative attitudes of protected area staff sometimes due to costs such as evictions from the PA and resource use constraints (Newmark et al. 1993). Poor relations with park staff can contribute to negative attitudes toward a protected area (Fiallo & Jacobson 1995).

The limited empirical research that has been conducted on support for conservation associated with conservation programs near protected areas in Uganda is similar to the patterns found in the broader literature. For example, in their review of a seven-year-old community

conservation program around Lake Mbuoro National Park (LMNP), Uganda, Infield and Namara (2001) note that the project, which generated mostly community-level benefits such as infrastructure improvement, did not improve attitudes about the protected areas on a community-level. However when they examined areas where the program focused with those where it did not, they found a difference in attitudes, with areas that received the program expressing more positive attitudes. The authors also write that damage from crop-raiding wildlife influenced perceptions of the park, a commonly noted trend in the literature. The type of benefits received also impacted attitudes towards LMNP. Infield and Namara (2001) found that the conservation programs in LMNP effectively built the perception that the park provides benefits to a portion of the population, but at the same time half of the study population still recognized no benefits from the park. The data prompted the authors to surmise that the costs of living near the park for at least one-half of the population may be too great compared with the benefits received from the program.

Mugisha's (2002) comparison of attitudes between people that live near parks that have community-based conservation (CBC) programs and people living near parks that have no CBC programs found few differences between the two groups. People living near CBC parks did not perceive personal benefits as strongly as those people surveyed at non-CBC parks. One of the reasons cited for this was the denial of access to resources found within the park. Such denial may be associated with harassment from park guards, resulting in a negative relationship with park staff (Mugisha 2002).

Behavior

“Behavior” refers to a particular action (Monroe 2003), such as the setting of wire snares, or the chopping of wood for use as fuel. In Uganda, as in many tropical locations, areas of high conservation significance are under considerable stress, surrounded by human populations whose

densities are high and mounting. Changing the behavior of people that live on the edge of these conservation islands is at the core of conservation and development programs which hope to reduce pressure from humans on natural resources by providing livelihood alternatives for program participants.

Some environmental organizations continue to use a model, from the 1970's, which states that environmental knowledge will influence environmental attitudes resulting in pro-environmental behavior (Kollmuss & Agyeman 2002). However, researchers have recognized that the attitude behavior correspondence model may be too simplistic as a multitude of variables impact behavior, and attitudes may not necessarily correlate with behavior (Kollmuss & Agyeman 2002; McKenzie-Mohr 2000; Olli et al. 2001).

Understanding human behavior is a critical component in creating successful conservation programs. In developing countries, around protected areas, many behaviors of interest are non-sanctioned activities that few local people wish to disclose to program designers who may be viewed as outsiders in externally-driven programs. In part, social marketing sheds some light on such a conundrum, and for this reason it is highlighted here. It calls for comprehension of barriers to behaviors, encouraging an understanding of those who carry out an activity and those that do not (Jacobson et al. 2006, McKenzie-Mohr 2000). Although this understanding usually revolves around the behavior that is to be encouraged (e.g., composting, use of fuel-efficient stoves), it can likewise be for the behavior that is to be discouraged (e.g., hunting).

Applying techniques developed in the field of marketing to social problems, social marketing has been widely used in developing nations in the field of health sciences to change behavior related to infectious diseases such as HIV (Andreasen 1995). Recently it has been used to address environmental behavior (Jacobson et al. 2006).

In developing nations, the barriers to changing a behavior can be formidable. For example, hunting activity may be driven by: culture, the need for a basic necessity (food/protein), the ease of obtaining meat, and/or the lack of financial resources necessary to acquire it in a market. Costs to hunting might be the time needed to participate in the hunt or the chance of being apprehended by park authorities. Convincing people that hunting should not occur requires an understanding of why people hunt and the costs and benefits involved in hunting. The first step in social marketing is to identify the barriers to a behavior, and that requires understanding the “customer” by listening to him/her (Andreasen 1995).

Few studies have been able to link perceived benefit of a protected area’s conservation program in a developing nation with a change in behavior (Moorman 2006). This may be due to the fact that the behavioral changes that are the focus of such studies are often illegal, and therefore gathering information from people about such activity is challenging due to a respondents’ reluctance to disclose such sensitive information (Solomon et al. 2007). Social marketing has a history of addressing sensitive information through its success in dealing with subjects such as sexually transmitted diseases, abortion issues, and drug use. Social marketing research shows that perceived costs and benefits are linked to behavior (Jacobson et al. 2006). Providing incentives (e.g., access to resources inside a protected area) or disincentives (e.g., loss of participating in a CRM program) in order to encourage a particular behavior may be particularly useful in situations where reasons for an individual to change his/her behavior are negligible (Jacobson et al. 2006).

In the case of ICDPs, behavior may be best understood theoretically in the context of the reasonable person model. The reasonable person model addresses the complex nature of behavioral predictors by recognizing that an individual’s circumstances play a fundamental role

in his/her behavior (Kaplan 2000). It posits that by recognizing human proclivities as well as circumstances that serve as the foundations for motivations, it may be viable for individuals to act with the environment in mind. Being sensitive to the needs of people, recognizing their inclinations, and ensuring they do not feel helpless are important components in creating a platform for pro-environmental behavior (Kaplan 2000).

Correlates of environmental behavior are not as well-studied as those of conservation attitudes (Olli et al. 2001). In general, studies have shown that benefits generated from ICDP projects do not generate sufficient incentives to dissuade participants from changing their environmental behaviors in favor of the protected area (Gartlan 2004; Emerton 2001, Lewis & Phiri 1998; Wells et al. 2004). However, Lewis et al. (1990) did find that providing monetary benefits from safari concessions in Zambia changed locals' behavior, resulting in a reduction in poaching. An ecotourism project in Honduras generated significant community benefits and resulted in less hunting and agricultural clearing (McShane and Newby 2004). Also, costs associated with carrying out a behavior directly impact behavior (Marcus 2006; Milner-Gulland & Leader-Williams 1992). For example, Milner-Gulland and Leader-Williams (1992) found that the chance of being captured by law enforcement authorities, as well as the type of penalty incurred, influenced decisions of whether or not local people poached elephants and rhinoceros.

The reasonable person model posits that helplessness is to be avoided at all costs and participatory problem-solving is to be encouraged. Feeling helpless dissuades people from engaging in behavioral change. For example, if people can't solve their own problems they will feel helpless to enact behavioral change. An example from Uganda may revolve around crop-raiding, which is hypothesized to affect local people's behavior (Infield & Namara 2001; Naughton-Treves 1996). Even if a wild animal inflicts damage on crops, local people are not

permitted to kill it (except if it is classified by Uganda Wildlife Authority as a pest such as baboons). Collaborative resource management may reduce feelings of helplessness, as it encourages people to become involved in conservation and management of the park.

The type of benefit received is believed to influence pro-environmental behavior. It is thought that benefits that accrue directly to the individual are more likely to impact environmentally-related behavior to favor conservation than those that generate community-level benefits (Kiss 2004). For example, conservation contracts which reward individual signees with direct payments (i.e., performance payments) for a pre-determined conservation outcome can result in behavioral changes (Ferraro 2001). However not all projects which boost incomes promote conservation. Some studies have found that increasing living standards encourages resource use (McShane & Newby 2004 and references therein, Trujillo 1998). A seven-year-old community conservation program around Lake Mburo National Park, Uganda, generated community-level benefits such as infrastructure improvement, as well as individual benefits; however it did not change behavior such as illegal hunting (Infield & Namara 2001).

Participation, a core building block in community-based conservation, is another key ingredient in the reasonable person model. The reasonable person model contends that providing people a meaningful way to participate in problem-solving can encourage pro-environmental behavior. Participatory participation has been a challenge for conservation, with a large amount of variation in the level of local participation within ICDPs (Wells et al. 2004). Theoretically, ICDPs may empower people with information and encourage them to participate in problem-solving, but most projects are externally-driven, and the framework for local participation may not exist, creating significant challenges in ICDPs (Wells et al. 2004).

Conclusion

Integrated conservation and development projects involve combining conservation objectives with development needs. Due to the lack of monitoring and evaluation tools in ICDPs it is difficult to determine whether they are having their desired impacts on livelihoods or conservation. My thesis helps to fill this gap for collaborative resource management by empirically analyzing if Kibale National Park's CRM fishing program is meeting select objectives which are common to conservation and development programs. In this study I answer two questions: Is the CRM program alleviating income poverty? And if so, does the CRM program influence support for conservation and encourage pro-conservation behaviors?

CHAPTER 3
AN ANALYSIS OF A COLLABORATIVE RESOURCE MANAGEMENT FISHING
PROGRAM'S IMPACT ON POVERTY, SUPPORT FOR CONSERVATION, AND PRO-
ENVIRONMENTAL BEHAVIOR AT KIBALE NATIONAL PARK, UGANDA

Collaborative Resource Management in Uganda

Collaborative resource management (CRM) is one of a variety of approaches used by the Community Conservation department of the Uganda Wildlife Authority (the governmental body charged with management of Uganda's protected areas). The Community Conservation department works with people living around protected areas using tools such as education and awareness programming, conflict resolution, revenue-sharing and collaborative resource management (Uganda Wildlife Authority 2000). In essence CRM in Uganda is a "rights for responsibilities" strategy that grants people certain rights to use natural resources, participate in policy development and management and take up some responsibilities to monitor and regulate harvests as well as other tasks (Chhetri et al. 2003).

CRM Conceptual Framework and Objectives in Uganda

The Uganda Wildlife Authority (UWA) lists objectives of CRM projects, such as: garnering cooperation for conservation of the protected area; overcoming conflict with communities neighboring the protected area; providing local people opportunities to protect the park, thereby reducing management costs; supporting local livelihoods; contributing to poverty alleviation; and maintaining traditional knowledge (UWA 2000).

In Uganda, there are two different CRM approaches being used by UWA; the Specific Issue Approach and the Integrated Collaborative Management Approach (UWA 2000). The Specific Issue Approach concerns a particular problem or issue of interest to community members and to protected area managers, while the Integrated Collaborative Management Approach covers a broad array of issues. With the latter approach trade-offs may exist between

communities and UWA. For example, the community may be asked to cease use of certain resources in exchange for assistance with crop-raiding animals (UWA 2000). This study examines a program that uses the Specific Issue Approach.

The Specific Issue Approach involves discussion with a community to reach a written agreement regarding a problem or issue of interest to both the community and the protected area managers. For example, the issue might be access to grazing lands inside the protected area or use of trees that grow along the park's boundary. Discussion with both parties may involve negotiation regarding the terms of the agreement. The written agreement details the shared responsibilities and benefits, monitoring and control mechanisms, as well as conditions for revocation or renewal of the agreement (UWA 2000).

Coordination and Capacity-building

Coordination of CRM programs with protected area staff is essential to the success of CRM. In its CRM literature, UWA notes that a consistent message as well as application of protected area policy, legislation and by-laws is necessary for neighboring communities (UWA 2000). Law enforcement rangers have to be knowledgeable regarding the CRM agreements in each community so that enforcement is uniform. Community conservation rangers also must be aware of patrol activities and law enforcement issues so they do not provide erroneous information to community members. Therefore, development of a CRM agreement must involve all protected area staff (community conservation, law enforcement, tourism, research and monitoring staff). If necessary, UWA notes that district extension staff may be involved in CRM agreements if alternative resources outside of the protected area are necessary. Mutual trust is a necessary component of CRM agreements. All parties need to be trained so that they can confidently contribute to CRM processes.

Location of CRM programs

Uganda Wildlife Authority believes that CRM will be most successful in areas where resource use has been ongoing for long periods. Ideally, such use should be important to the livelihoods of the community members. Furthermore, the use of resources would not be easily deterred by law enforcement approaches. CRM may also be successful in communities where there is ongoing conflict between the community and protected area staff as a result of staff restricting use of resources. UWA notes that CRM is not appropriate in cases where severe conflicts exist (e.g., agricultural encroachment into the park, boundary disputes), existing law enforcement approaches are successful, and where there are species that require a high level of protection and therefore may be negatively impacted by CRM projects.

Collaborative Resource Management in Kibale National Park

Information regarding CRM was provided to communities in sensitization programs by UWA in 1997. In 1999 UWA implemented CRM as a management strategy at Kibale National Park (KNP). By 2003 KNP had established several Specific Issue agreements covering the following resources/issues: rattan cane, fishes, beekeeping, and coffee, water for cattle, firewood, and eradication of exotic species. At the time of this study, at least three other protected areas in the country were also using specific issue collaborative resource agreements. This study examines the impacts of the fishing Specific Issue agreement at Lake Kabaleka.

Research Hypotheses

Two groups of individuals were surveyed: fishers and a group of people that served as a comparison group, hereafter called the control group. The general objectives of CRM outlined in the conceptual framework for this study were derived from UWA documents (Ogwal 2003, UWA 2000) (Figure 3-1). Based on these objectives, the following hypotheses were tested:

1. CRM fishers exhibit less signs of poverty than the control group.

2. CRM fishers express more support for conservation than the control group.
3. CRM fishers express evidence of more pro-environmental behaviors than the control group.
4. CRM fishers report fewer illicit behaviors than the control group.

The first hypothesis, regarding poverty, will be tested by comparing self-reported incomes, and wealth indicators of fishers and the control group. The second hypothesis is tested comparing the results of Likert items examining support for the park, park staff and consumption of park resources for the two groups. The third and fourth hypotheses will test for differences in behaviors by comparing the results of questions asking about pro-environmental acts (e.g., removal of wire snares from the park) and illegal activities (e.g., hunting) respectively.

Methods

Site Profile –Lake Kabaleka, Kibale National Park

Kibale National Park (KNP), a 795km² forest remnant in western Uganda has been listed as one of the highest conservation priority sites on the African continent, surrounded by some of the densest human population in all of Africa (Cordeiro et al. 2007, Naughton-Treves et al. 2007). Kibale harbors an exceptional diversity of non-human primates (Struhsaker 1981). People surrounding the park practice subsistence agriculture and use forest products to augment their livelihoods (Chege et al. 2002). In the 1970s and 80s, when the protected area was a forest reserve and game corridor, approximately 13,000 people lived within its boundaries. In 1992 these people were evicted from the area and the national park was gazetted in 1993 (Chege et al. 2002). Illegal resource use is a major threat to the biodiversity in the park (Mugisha 2002, Mugisha and Jacobson 2004). Crop-raiding as well as resource use restrictions have resulted in local residents' negative attitudes about the park (Mugisha 2002; Naughton-Treves 1996).

Fishing Specific Issue Agreement

The fishing Specific Issue agreement is for the Kayanja landing site located on Lake Kabaleka in the south-western portion of the park (Figure 3-2). Instituted in 2000, the agreement covers fishermen, boat owners and fish mongers, collectively called fishers. Prior to this agreement, all fishing was considered illegal inside the protected area. This Specific Area Agreement was instigated by UWA to curb illegal fishing, which was rampant on Lake Kabaleka (O. Biira, personal communication). At the time of the study the local chairman of the Kayanja landing site region served as the liaison between UWA and the fishers. Data collection sheets were provided to the group by UWA, and the local chairman and another fisher were involved in collecting data on fish harvested and gear utilized and reporting them to UWA. UWA supplied suggestions for net sizes to fishers, but there were no catch restrictions. Although there was still no formal, written contract at the time of the study, fishermen were issued identification cards by UWA following the program's inception indicating their involvement in CRM.

Located within the southern boundary of Kibale National Park, Lake Kabaleka is a shallow water lake (usually not greater than 2-3 m deep) measuring approximately 100 ha (Melnychuk & Chapman 2002). Home to various indigenous and introduced tilapiine cichlids, it is located within the Lake George swamp system and is of high conservation value, as Lake George is a wetland designated as a Ramsar site of international importance (Ramsar Convention Secretariat 2006).

The fishery is primarily composed of four species; mudfish (*Clarias gariepinus*), lungfish (*Protopterus aethiopicus*) and tilapia (*Oreochromis niloticus* and *O. leucostictus*). Fishing is carried out by using nets or hooks. Fishermen noted that while the lungfish and mudfish are primarily caught with hooks, tilapia is usually caught with nets. Although two different landing sites exist on the lake, Kayanja Landing site is the only one where legal fishing takes place under

the CRM program. Unless a person is fishing under the CRM agreement all other fishing within the park is illegal.

Data Collection and Sources

The survey research was conducted during June 2003-January 2004, during which the CRM fishing program was 3.5-4 years old. Three primary data collection methods were employed: standardized surveys, open-ended interviews, and a focus group. A review of program-related documents also was undertaken to provide a comprehensive understanding of the CRM fishing program.

A structured survey which included a combination of open and fixed response questions was conducted with a census of 94 fishermen, fish mongers and boat owners. A stratified random sample of 101 individuals who reside in the communities where the fishermen's primary residences are located served as the control group. I acquired a list of 95 fishers involved in CRM from a local council leader for the area who was responsible for filling out resource data sheets for Uganda Wildlife Authority. Of the 95 fishers, some fish, some own a canoe and fish, and others fish and buy and sell fish (fish mongers). Fishers use nets or hooks or a combination of the two methods to catch fish. The fishers surveyed resided in 27 different communities and represented 17 different ethnic groups.

Due to the fact that no baseline data were available, a control group was selected for comparative purposes. In selecting the control group, I attempted to match for sex, geographical location, age and wealth ranking in selecting the stratified random sample which made up the control group. Due to the considerable distance between communities, the study area was divided into seven regions. To create the control group, seven communities were selected, one in each region, where the majority of the fishermen resided. The local chairman of each selected community provided a list of all household heads in the community and their ages. Following

the wealth ranking exercise described below, I randomly selected the equivalent number of males (all fishers were male) that fell into the same age class and wealth ranking group as there were fishers that resided in the region. Ideally I would have compared fishers to other fishers not involved in CRM but this was not possible as there were no other fishers in these communities.

During the initial phases of the research I was unsure of the number of fishers in the CRM program. I originally thought there might be less than 30 fishers. I was concerned that the sample size was going to be small. Due to this I utilized a wealth ranking exercise to ensure that I would not be comparing fishers who may be of one wealth class to a control group that, if randomly selected, may not have enough respondents of a similar wealth class to statistically compare the two groups. I used a wealth ranking exercise (Adams et al. 1997; Slocum et al. 1995) in which several local community leaders in each village were surveyed. Community leaders assisted in modifying four wealth categories that had been previously used in development research in Uganda. These categories, in order from the poorest category to the wealthiest are: cannot manage, earns slowly, have something, and can manage (International Institute for Sustainable Development 2003) (see Table 3-1 for description of categories). Leaders were asked to sort local residents into the four categories according to the leaders' perceptions of how they ranked in terms of their wealth (Bernard 2002).

The survey was designed and pilot-tested in two communities surrounding Kibale National Park (KNP). As the study detailed here is part of a larger study on CRM around KNP, and there existed limited numbers of CRM programs around KNP, two communities that were not part of any collaborative management program were used in the pilot study. The survey was divided into six sections: 13 items covered support of conservation, three items related to benefits received from park, 21 questions covered the respondents' household profile which included

socio-demographic variables to be used as poverty indicators, nine items related to behaviors, eight items tested knowledge of environmentally-related laws; and 5 items covered involvement in the collaborative resource management program (Appendix A). As this study is part of a larger study on KNP's CRM programs, survey questions asked were general to CRM and not specific to the CRM fishing program.

Prior to conducting interviews, local council leaders were consulted to obtain permission to conduct the survey and discuss the intentions of the research. The survey was conducted in one of three languages; English, the national language of Uganda, Rutoro, or Rukiga. Two men and one woman fluent in the vernacular languages of the area were trained to administer the survey. Respondents were asked what language they preferred and the survey was delivered in that language. Responses to the survey were written in English, but all interviews, except one, were conducted in one of the local languages. The average time for the fishers to complete the survey was 64 min (range: 40-101 min), the same as the control group (range: 33-160 min). Ten respondents in the control group did not know of Kibale National Park, while all fishers knew of the park's existence. Respondents that did not know of the existence of the park were dropped from the analysis. One person in each of the control and fisher groups refused to participate in the survey. To verify that surveys were completed by respondents, I randomly selected 5% of fishers and the control group and went to their homes to ask them if they did indeed complete the survey.

The wording of some questions related to support for conservation was reversed during the design phase of the survey to prevent response bias. All negatively worded items were reverse scored resulting in a 5-point Likert scale with anchor points of 1 = strongly disagree and 5 =

strongly agree. The lower end of the scale indicates weak support of conservation and higher figures indicate a pro-conservation response.

All knowledge of local environmental laws items were answered with yes, no or don't know. All negatively worded items were reverse scored. An eight point knowledge scale was created with correct answers receiving a "1" and all others a "0".

Illegal resource collection is very difficult to measure accurately (Infield & Namara 2001; Moorman 2006; Solomon et al. 2007) (see following chapter for a comprehensive review of the topic). When piloting for the survey portion of the study began I found that most people did not disclose illegal behavior, even when they were repeatedly promised that their responses would be kept confidential. The wording of the behavior questions went through several iterations during the pilot phase of the survey. I used a balanced question concerning the placement of snares inside the park. A balanced question is designed to encourage respondents to provide their true response by theoretically reducing the effects of social desirability, usually by preempting the question with a statement saying that some people do the sensitive behavior of interest, others do not (Weisberg et al. 1996).

A focus group (Bernard 2002) consisting of 8 fishers was conducted in Hima, the closest large town to Lake Kabaleka, for a duration of approximately 75 minutes. One male, unknown to the group, and fluent in the local languages, translated and helped to coordinate the focus group. I had two main objectives for the focus group: gather economic data and discuss the benefits and weaknesses of the CRM program. Additionally, a seasonal activities calendar (Slocum et al. 1995) was produced by participants to examine seasonal variance of fishing activities. I asked the local council leader to invite several fishermen, canoe owners and fish mongers as I wanted to obtain financial data for their occupations. One fisherman, two fish

mongers, two canoe owners, two fishers/canoe owners, and one fish monger/canoe owner attended the focus group. I asked each fisher to record via secret ballot their fishing activity (fish mongering, fisherman, boat owner), how much they earned on a good day, how much they earned on a bad day and how many days on average they worked. Participants free listed (Bernard 2002) all items associated with fishing, fish mongering, and canoe owning, the current cost of each item, and how long each item lasts. Participants then worked in groups of two, listing the benefits and weaknesses of the CRM program, which were then reported to the group as a whole for discussion.

Analysis

Survey data were entered into an SPSS 10.0 for statistical analysis. Most responses are not normally distributed, including the Likert and dichotomous response items. P values of ≤ 0.05 were considered statistically significant. Socio-demographic characteristics of the fishers and the control were described and compared using Pearson's chi-square. I compared income data, support for conservation, and behavior items between fishers who were identified as part of the CRM program (treatment group) and residents who were not part of the program (control group). In selecting the control group, I attempted to match for sex, age, geographical location, and wealth through a wealth ranking process. To help control for potential confounding, all socio-demographic variables that differed significantly between the fishers and control group were analyzed for associations. Point-biserial correlation (r_{pb}) acquired using a Pearson's product moment correlation coefficient (Pearson's r) was used for associations between dichotomous variables and Likert response items. Spearman's correlation coefficient (r_s) was used for continuous variables and Likert response items. Dichotomous response variables and dichotomous response items were analyzed using the Phi coefficient. In the case of tribes, where multiple responses were provided, Pearson's chi-square and Phi was used to determine specific

categories for analysis with each of the response items. All socio-demographic variables that differed significantly between the two groups and were found to have statistically significant associations with the response variables were then included in models when examining if differences existed between the fishers and control.

Continuous response variables were analyzed using a general linear model. The general linear model is thought to be robust against assumptions of normality (Field 2005). In one case, the model resulted in a violation of one of the major assumptions of analysis of covariance: homogeneity of regression slopes. These data were subsequently analyzed with the Johnson-Neyman technique using SAS software.

Five-point Likert response items were analyzed for differences between fishers and the control using a proportional odds model. In cases where the assumption of parallel lines was not met (p -values <0.05), multinomial logistic regression was used. Dichotomous response variables that had covariates were analyzed for differences between fishers and the control using binary logistic regression. In cases where the confounding variables were not well suited to the model, as indicated by the Hosmer-Lemeshow statistic, all potential confounding variables were added to the model and were removed manually, one by one. Socio-demographic variables were removed if the Wald statistic's p -value was larger than 0.1 and the Hosmer-Lemeshow statistic's p -value remained above 0.05 following the removal of the variable (I. Liu, personal communication). Differences between nominal data were analyzed using Pearson's chi-square tests. Chi-square results that had expected frequencies of <5 were analyzed using the Fisher's exact test.

Economic data gathered from the focus group with fishers were entered into Microsoft Excel for computations. During the focus group I collected data on the types of fishing-related

assets, quantity owned and used, and the length of time on average that an item would last. I chose not to use straight line depreciation (i.e., liquidation value) because it does not “capture the productive value of these items to their owners” (Wallace 2004, p.57). Instead, I accounted for the replacement value of the items by calculating a yearly cost for each item.

Results

Socio-demographic Variables

Seven of the 21 socio-demographic variables differed between fishers and the control group (Table 3-2). All respondents were male, with the average age of fishers being 31 years (SD=12.5) and the control group being 34 (SD=11.2). Significantly fewer fishers reported being married than the control group ($\chi^2(1)=5.18, p<0.05$). Fishers also had significantly lower education levels than the control group ($\chi^2(2)=12.18, p<0.01$), were more likely to have been evicted from the park ($\chi^2(1)=14.36, p<0.01$), and reportedly experienced significantly less crop raiding by wildlife ($\chi^2=9.92, p<0.01$). The number of respondents surveyed within each region (noted in Table 3.2 as straight-line distance from park border) differed significantly between the two groups ($\chi^2=14.71, p<0.05$). Tribal composition differed significantly among the two groups, as did their main income sources; 87% percent of fishers listed fishing as their main source of income, while 58% of the control group listed farming.

Covariates

Of the seven socio-demographic variables that differed significantly between fishers and the control group only one, tribe, consisted of multiple categories. Nineteen different tribal affiliations were recognized during the survey. Because some tribes had few respondents, making it difficult for statistical analysis, I chose to run analyses with the tribal groups that had at least 5 respondents. Phi was used to determine specific categories for analysis with each of the response items. Only one of the categories, namely the Bakonjo tribe, was significant ($\chi^2(1)=$

9.78, $\Phi=0.230$, $p<0.01$), and therefore was determined to be a possible covariate. Tables 3-3 – 3-7 list all individual items and significant covariates, which when appropriate, were controlled for in the following analyses.

Livelihood-related Data

The median annual self-reported gross income for fishers was U.S. \$376.02¹, (SD=403.48) while the control group's median was U.S. \$196.19 (SD=538.21). Fishers (m place=10608) earned significantly more than the control group (m place=78.32; $U=2953.50$, $p<0.001$). The only covariate for income was the Bakonjo tribe. Using a general linear model when income is stratified for Bakonjo, fishers that are Bakonjo ($n=12$) earn on average U.S. \$399.38 more than Bakonjo people in the control group ($n=29$) (Wald=6.52 (1), $p<0.05$). A significant negative association exists between Bakonjo and income ($r_{pb} = -0.204$, $p<0.01$, $n=184$). Therefore people who are Bakonjo are likely to have a lower income than people who are not Bakonjo.

Fishers earned 70% (U.S. \$261.58, SD=291.20) of their annual median income from fishing activities alone. Fishers in the focus group reported that on a bad day of fishing they earned on average U.S. \$0.91, while on a good day U.S. \$3.13. Fisher families also consume fish, and this benefit is not accounted for in this analysis.

The majority of fishers (83%) reported that they are financially better off compared to before they started their fishing activities. On average fishers had been collecting the resource for 7.3 years. Of the 94 fishers in the study, approximately half of them (43) engaged in fishing activities prior to the year 2000 when the CRM fishing program was instituted. Of those 49 fishers who started collecting when the CRM program started, 84% reported being financially better off than before they started fishing activities, and 81% of those who were engaged in

¹ UgSh1,835=U.S.\$1, June 2, 2003 exchange rate (Bank of Uganda)

fishing activities prior to the implementation of the CRM program² reported being financially better off compared to before they started fishing in KNP.

On average, fishers completing the survey reported carrying out fishing activities on a monthly basis for 4.7 days per week, with an average of three weeks worked per month. Time spent on a collecting trip (which includes travel time to and from the site collection area) averaged approximately 6.7 hours. On average, fishers reported collecting 9 fish per day (min 2, max 35).

Costs of Fishing-related Assets

Forty-five percent of fishers use a combination of hooks and nets, while 52% use solely hooks and 3% solely nets. I calculated the costs of net assets assuming that fishers work 5 days per week for 36 weeks per year (Table 3-3). According to these data, annual median net incomes of fishers from fishing activity alone may range from U.S. \$213.26 (for a fish monger) to U.S. \$248.32 (for a fishermen exclusively using hooks and not paying a canoe owner for use of a boat).

Other Indicators of Wealth

Local community leaders placed eight (9%) fishers in the lowest wealth category, “cannot manage” during the wealth ranking exercise. Forty-nine (58%) fishers were categorized as “earns slowly”. Twenty-five (29%) fishers were placed in the “have something” category and 3 (4%) were in the highest wealth category, “can manage”.

Land holdings ranged from 0 acres (n=2) to 21 acres for the fishers; while the control group ranged from 0.3 to 20 acres. Although no difference was found between the two groups in

² Fishers were not asked if their fishing activities prior to implementation of CRM were carried out at Lake Kabaleka, therefore it is not prudent to conclude that they were illegally fishing in Lake Kabaleka.

terms of acreage holdings, 20% of the fishers did not know the amount of acreage they held. The fishers did not differ from the control group in other wealth-related assets such as wall materials, roof materials, painted houses, personal transportation, and eligible children attending school, number of wives, or number of goats (Table 3-2).

Support for Resource Conservation

There were no significant differences between the fishers and the control group on five items that asked about consumption of natural resources inside the park (Table 3-4). In general, both groups tended to support resource conservation. The distribution of scores for the statement, “Poor people need the wildlife in the park for meat” was bimodal. Approximately half of the respondents agreed with this statement, while half disagreed with it (Table 3-4).

Relationship with Park Staff

Three items evaluated respondents’ relations with park staff. The three items showed significant differences between the fishers and the control group (Table 3-4); fishers responded more positively towards park staff than the control group (Table 3-4).

Support for Kibale National Park

Five items measured support for Kibale National Park (Table 3-4). For these items no differences between the two groups were found. Only one question resulted in the majority of people indicating weak support for conservation – respondents believe that their villages do not benefit from tourists that come to visit the park.

Perceived benefits: After controlling for education, income and crop-raiding experience, significantly more fishers than control group respondents agreed with the statement, “The park provides benefits to you.” (Wald = 34.18 (1), $p < 0.001$). Both fishers and the control group listed resource-related benefits from the park as the most valuable benefit. The majority of fishers (93%, $n=82$) that agreed or strongly agreed that benefits existed listed resources

(primarily fish) from the park as the most valuable benefit while only 42% (n=22) of the control did the same. Two fishers listed rainfall as the most valuable benefit, while 29% (n=15) of the control group listed rainfall as the most valuable benefit. During the focus group fishers listed five other benefits of participating in the CRM program: fish as a source of food for home consumption, sustenance for families, job opportunities, local development, and socialization with other fishers.

Support for Conservation Scale

The thirteen items noted above were designed to measure support for conservation. Five of the scaled items were removed from the final conservation-related measure due to poor inter-item reliability. The scale to measure support for conservation was constructed from 8 items (Table 3-4). Overall mean support for conservation on a scale of 1 to 5 was 3.16 (SD=0.6322). Fishers' scores (m place=97.91) were significantly higher than the control group (m place=770.02; $U=2906.5$, $p<0.01$). Fishers' unadjusted mean support was 3.28 (SD=0.6101) and the control group was 3.02 (SD=0.6317). Reliability analysis of the eight items revealed a Cronbach's alpha of .74 with an inter-item mean of .26. Analysis of covariance (ANCOVA) with the covariates income ($r_s=0.153$, $p<0.05$, $n=173$) and distance of region from park border ($r_s=0.167$, $p<0.05$, $n=168$) revealed a violation of the assumption of homogeneity of regression slopes, in particular a significant interaction with income. Because of such a violation, it is reasonable to conclude that there is a significant difference between the two groups (Engqvist 2005). Using the Johnson-Neyman technique to analyze the regression slopes results in a significant difference between the two groups when income is less than U.S. \$602.16, while there is no significant difference between the two groups when income is greater than U.S. \$602.16. The majority of respondents (66 % of fishers and 75% of the control) reported incomes of less than U.S. \$602.16.

Pro-environmental Behaviors

Three items measured behaviors related to deterring illegal activity in the park (Table 3-5). Preventing illegal activity, in particular extinguishing bush fires and removing wire snares that are used for hunting, was noted by UWA as of importance in evaluating the success of the CRM program. After controlling for eviction from the park as well as being of the Bakonjo tribe, a statistically significant difference existed between fishers and the control group for the item regarding extinguishing bush fires (Wald=10.79 (1), $p<0.01$). After controlling for eviction from the park and income, a statistically significant difference also existed between fishers and the control group for the item concerning removal of wire snares (Wald=3.810 (1), $p=0.05$). In these two cases, fishers reported more pro-environmental actions than the control group (Table 3-5). No difference between the two groups was found when respondents were asked about the number of times they reported illegal acts in KNP in the past year (Wald=0.967 (1), $p=0.325$).

Illicit Behaviors

No statistically significant difference was found between the fishers and the control group when respondents were asked the following “balanced” question, “Some people place snares in Kibale National Park, other people do not. Have you or people from your household placed snares/traps inside of Kibale National Park in the past year?” Only one respondent, a fisher, answered in the affirmative in response to the question. Five other statements referred to the following activities: hunting in crop fields outside of the park, collection of firewood, collection of water and hunting within the park. There were no statistically significant differences between fishers and the control group for any of the hunting related questions and very few respondents responded in the affirmative to these items (Table 3-6). Significantly more fishers responded “yes” to the statement, “Firewood is scarce and the park has a lot of wood therefore there is no problem if you go and take some firewood from inside of the park” ($\chi^2(1)=11.082$, $p<0.01$), with

approximately 23% of fishers replying yes in comparison to 6% of the control group (Table 3-6). Similarly, after controlling for marriage, the responses of fishers were significantly different from the control group in response to the statement, “Water is plentiful in the park therefore you sometimes go to the park to collect it.” (Wald=5.253 (1), $p<0.05$).

Knowledge of Local Environmental Laws

Eight items measured knowledge of local environmental laws (Table 3-7). The mean knowledge score for fishers was 7.5 (SD=0.7) and for the control group, 7.6 (SD=0.73). Fishers did not differ in their knowledge of local environmental laws (m place= 89.68) from the control group (m place=96.43; $U=3964.50$, $p>0.05$), even after controlling for the covariates education ($r_s=0.199$, $p<0.01$, $n=185$), distance $r_s=0.242$, $p<0.01$, $n=178$) and crop-raiding ($r_{pb}=0.-0.157$, $p<0.05$, $n=184$) using a general linear model (SE=0.113, $t=0.280$, $p=0.780$). None of the individual items differed significantly between the fishers and the control group. Sixty-one percent of the fishers and 69% of the control group answered all eight questions correctly.

Discussion

To a great extent, Uganda Wildlife Authority’s CRM program at Lake Kabaleka in Kibale National Park is meeting its objectives. Fishers perceive benefits from the park more than the control group. Fishers participating in the CRM program at KNP were found to have higher incomes and more positive relationships with KNP staff than the control group. Fishers also support conservation in general more than the control group.

The CRM fishing program also had negative impacts. Although some fishers are actively protecting the park from illegal activities, some may also extract resources without permission, such as firewood and water. The implementation of CRM contributed to pressure on the fish stock. The CRM program encouraged fishing, with approximately 50% of fishers starting fishing activities at Lake Kabaleka shortly after the commencement of the CRM program.

Impact of CRM on Poverty

Fishers had almost double the gross income as the control group, and 83% reported being better off compared to before they started the fishing CRM program. The results indicate that significant benefits are limited to people in the Bakonjo tribe. This does not necessarily mean that Bakonjo is the limiting factor as being Bakonjo could be associated with other variables that were not measured, for example, fishing skills or marginalization. Data indicate that being a member of the Bakonjo tribe is associated with low income levels. Therefore the results show that the poorest of the poor are significantly improving their income as a result of the fishing CRM program.

Specific indicators of wealth (e.g., painted houses, goat ownership, metal roofing etc.) did not differ between the two groups. This may be because the wealth ranking exercise which resulted in crude measurements of wealth and was used to select the control group did an adequate job in ascertaining wealth.

The CRM program focuses on increasing *income* however it does not truly address poverty alleviation, as defined by the United Nations Development Program (United Nations Development Program 2003). For example, it does not directly increase access to health care or educational opportunities. In this sense, a CRM program alone will probably not meet the broad objective of poverty alleviation. This fishing CRM program increases income for a select group but does not dictate how fishers spend their earnings. This is a choice of the participants themselves. However, a measure of poverty championed by Sen (1999) is “choice.” Increased income does allow fishers more options than the control group respondents who have less gross income. For example, with more income fishers may be able to pay transportation costs to better health care centers outside of their immediate, rural community. Transportation costs are high in the region and may hinder access to regional health centers that may offer different

treatment options. Additionally, increased income may provide children access to secondary education centers that are outside their villages of primary residences.

Impact of CRM on Support for Conservation

Many more fishers than control group respondents agree that the park provides benefits to them. Fishers reported better relationships with park staff than the control group, yet, in general, no difference was noted among the two groups for the individual items concerning support for conservation of the park. This result is similar to what has been found in some other community conservation projects where relationships with park staff improve but a change in attitude regarding conservation of the protected area in general is negligible (Arjunan et al. 2006; Hulme & Murphree 2001).

It is not surprising that fishers reported better relationships with park staff considering that fishers are permitted to be inside the park and have frequent interaction with park staff at the landing site from which they fish. Control group respondents, who have little reason to be inside of the park legally, are more likely questioned if found inside the park by park staff and possibly sanctioned. Park staff is often called on in times of trouble, for example, when crop-raiding by wild animals occurs. At such times, residents may transfer their anger on to park staff, resulting in a poor relationship. Mugisha (2002) found that residents living near parks with community-based conservation (CBC) programs, including KNP, reported more cordial relations with park staff compared to people neighboring parks with no program CBC programs.

Support for Conservation Scale

Based on the support for conservation scale, the majority of fishers are more supportive of conservation than the majority of the control group. Fishers earning above U.S. \$602 did not differ from the control group, although these people are the minority of those surveyed. These

results indicate that there may be some threshold effect and earning relatively larger incomes does not ensure increased support for conservation.

Impact of CRM on Pro-Environmental Behaviors

One of UWA's objectives with the CRM program is to have fishers engage in pro-environmental behavior. Fishers benefit from the fish resource inside the park and therefore should have more of a vested interest in protecting the park. It appears that some fishers are actively protecting the park, by preventing at least one bushfire and/or removing snares in the year prior to the survey. Although a statistically significant difference exists between fishers and the control when it comes to extinguishing bushfires or removing snares inside the park, this may be a result of the fact that many respondents in the control group are not as likely to visit the park on a regular basis, as they have little legal reason to be there. However, although fishers may be engaging in pro-environmental behaviors, after controlling for covariates the data indicated that they are not reporting illegal behavior more than the control group. This is disconcerting as KNP has limited staff to effectively manage illegal acts and UWA documents indicate one of CRM objectives is to reduce management costs by encouraging CRM participants to protect the park. Reporting illegal acts may be more time consuming compared to preventing bushfires or removing snares as fishers would have to locate park staff to report illegal activities. Although park staff is located at various outposts around the park, the distances between villages and outposts are often quite considerable for people to travel on foot or by bike.

Impact of CRM on Illicit Behaviors

With the increasing sensitivity of the topic, fewer respondents provided affirmative responses to the illicit behavior items. Using balanced questioning, only one person admitted to placing snares inside the park. One percent of all respondents admitted to hunting inside of the park. Six percent of all respondents admitted to placing snares/traps in their crop fields. More

respondents admitted to collecting firewood (14%) and water (11%) from the park. Although the sensitivity of the questions most likely affected the number of respondents that admitted to an act, it is also likely that fewer people hunt than collect resources that are needed on a daily basis such as firewood and water.

The number of responses for less sensitive questions regarding collection of firewood and water were significantly different between the fishers and control group, with more fishers replying “yes” to those items. Fishers are more likely to be inside of the park than the control group members because they are permitted to be there and therefore the temptation to opportunistically extract resources illegally may be larger in comparison to the control group. Some fishers may not believe such activities to be illegal, possibly because they have not been sanctioned for them or because of bribery involving UWA guards (Struhsaker et al. 2005, see Infield & Namara 2001 for discussion of bribery and abusive behavior by park guards). Although this study demonstrates that local people are very familiar with the select local environmental laws covered in the survey, results of two items suggest fewer fishers may understand regulations regarding illegal placement of snares and grazing of domestic animals inside the park than the control group members. This trend and the disclosure of illicit activity are troublesome, as they imply that resources such as firewood are being extracted from the park illegally while fishers are inside of the park. In times of livelihood-related stress, fishers may extract more resources found within the park (Twyman 2000).

This study shows that CRM was positively associated with some behaviors to help protect park resources. Its affect on curbing illegal exploitation was difficult to assess – the long-term effects of the program on exploitative behaviors will need to be monitored considering the complex nature of the predictors of pro-environmental behavior (Kollmuss & Agyeman 2002).

Other Considerations for CRM Management: Accuracy of UWA records

UWA records on CRM participation need to be updated. A report issued in 2003 noted that 30 fishermen were provided with resource identification cards and 15 boats were registered with the Fisheries Department (Ogwal 2003). When I undertook this study in 2003, 95 individuals were identified as CRM fishers by the community leader in charge of filling out resource data sheets. All fishers interviewed were fishing from the KNP Kayanja landing site and believed they were part of the CRM program.

Limitations of Study

Support for conservation, behaviors, and benefits from CRM programs are not static. This study is a current snapshot of the fishing CRM program in its early stages, but in reality it is a moving target. Recent events in communities involving the protected area and/or protected area staff will undoubtedly influence support for conservation (Hill 1998; Infield & Namara 2001). For example, changes in crop raiding by wildlife may result in negative attitudes, or the construction of a health clinic using tourism revenue from the protected area may increase the number of people with positive attitudes about the protected area.

The absence of baseline data is a limitation of this study. This prevented analysis of specific changes or improvements in support for conservation, behaviors or poverty levels of CRM participants. Ideally respondents would have been randomly assigned to both a treatment and control group. Participants in the CRM program may already differ markedly from their peers in variables other than those noted, as they chose to participate in the program. For example, I was unable to control for factors such as societal and personal influences. The control group used was the best available comparative group for the fishers. If the CRM fishing program did not exist fishers would more than likely be similar to the control group, as no legal fishing exists in the park and not one of the 101 people surveyed for the control group fished.

This study only included men and therefore we can say little of conservation attitudes and behaviors of women. We can not assume homogeneity within a village, as gender as well as life circumstances play a role in support for conservation and resource-related behavior (Coomes 2004, Hill 1998).

Recommendations

At the time of this study the fishing CRM program in Kibale National Park was in its infancy. Monitoring of a program in its early stages will lessen the risk of failure in meeting its stated objectives because important programmatic changes are more likely to be made (Lewis & Phiri 1998). Recommendations to improve the CRM program follow.

Encourage Ecological Studies of the Resource

The CRM program encouraged fishing, with approximately 50% of fishers starting fishing activities at Lake Kabaleka shortly after the commencement of the CRM program. This increase in pressure on the resource base requires careful management so as to not reduce stock size over time. Although Uganda Wildlife Authority supplies net size recommendations to CRM fishers, such size requirements may not be adequate because the species fished as well as the ecology of Lake Kabaleka are not sufficiently studied to determine sustainable harvesting rates. No quotas are in place to prevent over-fishing as sustainable harvest rates have not been established. This is a common problem with many ICDP projects, with some project managers choosing not to greatly restrict harvest because of fear of losing community support (Newmark & Hough 2000).

Ecological studies of the fishery should be carried out to scientifically inform management decisions. There is a move to manage fisheries on an ecosystem-wide basis rather than fish stock alone (Jorgenson & Muller 2000). Lake Kabaleka would be a good place to practice such a strategy, as it is located within a protected area. Makerere University, Uganda's most prominent educational institution, has a biological field station in Kibale National Park. Through KNP's

institutional ties with the university, applied research on the fishery and the area surrounding it should be encouraged.

Diversify Fishers' Income Base by Instituting a Seasonal Moratorium on Fishing

Because fishers earn such a large proportion of their income from only fishing activities, there is a need for them to diversify their income base (Koziell and McNeill 2002). Fluctuations in the quantity and sizes of fish are bound to change, especially if monitoring and management are not inherent in the CRM process. Additionally, if monitoring does become more stringent, it may result in a call for a reduction in total allowable catch thereby requiring livelihood alternatives for fishers. If a stochastic or exogenous event such as disease were to limit the fish supply then these fishers would lose their livelihood base. In this sense, fishing activities are risky. Moreover, studies report that when financial and/or natural resources are not available, people tend to use forest/protected area resources as safety nets or insurance to ensure their needs are met (Bush et al. 2006; Coomes 2004). This could put the protected area's resources at risk if such "hungry gaps" induced by exogenous events do occur (Bush et al. 2006). To ensure diversification and limit reliance of individuals on the fishery, it may be helpful for UWA to implement a seasonal moratorium on fishing. This approach would require policing of fishers, which is warranted, as it appears that fishers may be using certain park resources without permission (e.g., firewood, water).

Increase Monitoring and Evaluation

Three particular results of this study point to the need for increased monitoring and evaluation by UWA: compared to figures in UWA documents, there are many more fishers who believe they are part of the CRM fishing program, approximately one-half of CRM fishers started fishing at the inception or following the institution of the CRM program, and some fishers are extracting other controlled resources found within the park. The first two findings indicate

greater pressure on the fishery than originally intended by UWA. The third finding noted above is not surprising, as it is known that even when resource extraction is regulated, it is likely that individuals will modify their behavior to make such regulation less effective than originally intended (Hilborn et al. 1995).

Although greater oversight of the CRM program may be required, it is understandably difficult as the number of rangers available for such a task is limited. At the time of the research, KNP had a total of 29 rangers (of which 3 were drivers) covering the entire 795 km² park (M. Okirina, personal communication). Financial and logistical constraints also contribute to monitoring problems (Chhetri et al. 2003).

In light of the limited capacity to monitor the fishery, I recommend that UWA expand its current system of monitoring to a participatory adaptive management system (Gavin et al. 2007). At the time of the study two fishers collected data on fish harvested and gear utilized. These data are only collected if at least one of the two fishers is present at the site. Data are not reliable, as fishers may undervalue their catches (Ogwal 2003). A monitoring system should be instituted that includes all fishers. The results of the fishers' record keeping should be returned to them by KNP's Research Warden in a culturally appropriate format (e.g., a meeting and/or poster that could be placed at the landing site) on a regular basis.

In addition to participatory monitoring and evaluation, educational seminars should be provided to fishers so that they can understand the dynamics of the fishery and the need for biological information. UWA should tap into the expertise of both national and foreign researchers who study in and around KNP for such public education endeavors. Participatory monitoring and educational seminars could lead to participatory problem-solving in the future. According to the reasonable person model (Kaplan 2000), participatory problem-solving is a key

component in eliciting behavioral change. Working with experts is important to participatory problem-solving (Kaplan 2000). Interaction with researchers may aid fishers in exploring problems with the CRM fishery and potential solutions. Transparent monitoring and evaluation activities, in addition to education, may create a vested interest in creation of a sustainable fishery and lessen the risk of its collapse.

Measure Program Outputs

Defining success in terms of conservation and development is a very necessary part of programs and one that can not be overlooked. Including measurable outputs and monitoring them over time is essential for defining a successful program (Margoluis and Salafsky 1998). Program documents for the CRM program do not indicate measures of success, but rather general objectives.

Future Research: Broaden the Definition of Poverty

In recent years, researchers have started to measure poverty alleviation not by income alone but rather by outcomes, examining what a person is capable of doing with his/her resources (Sen 1999; Shepherd 2004). In terms of addressing poverty alleviation I recommend a follow-up survey to examine the long-term effects of the CRM fishing program, particularly how the increased income provided by the program has been used by resource users. Did the children of fishers attend school for more years than the control? Did fishers and family members have better access to health care? By examining capabilities and not simply assets or income, the outcomes of the CRM program can be more comprehensively evaluated.

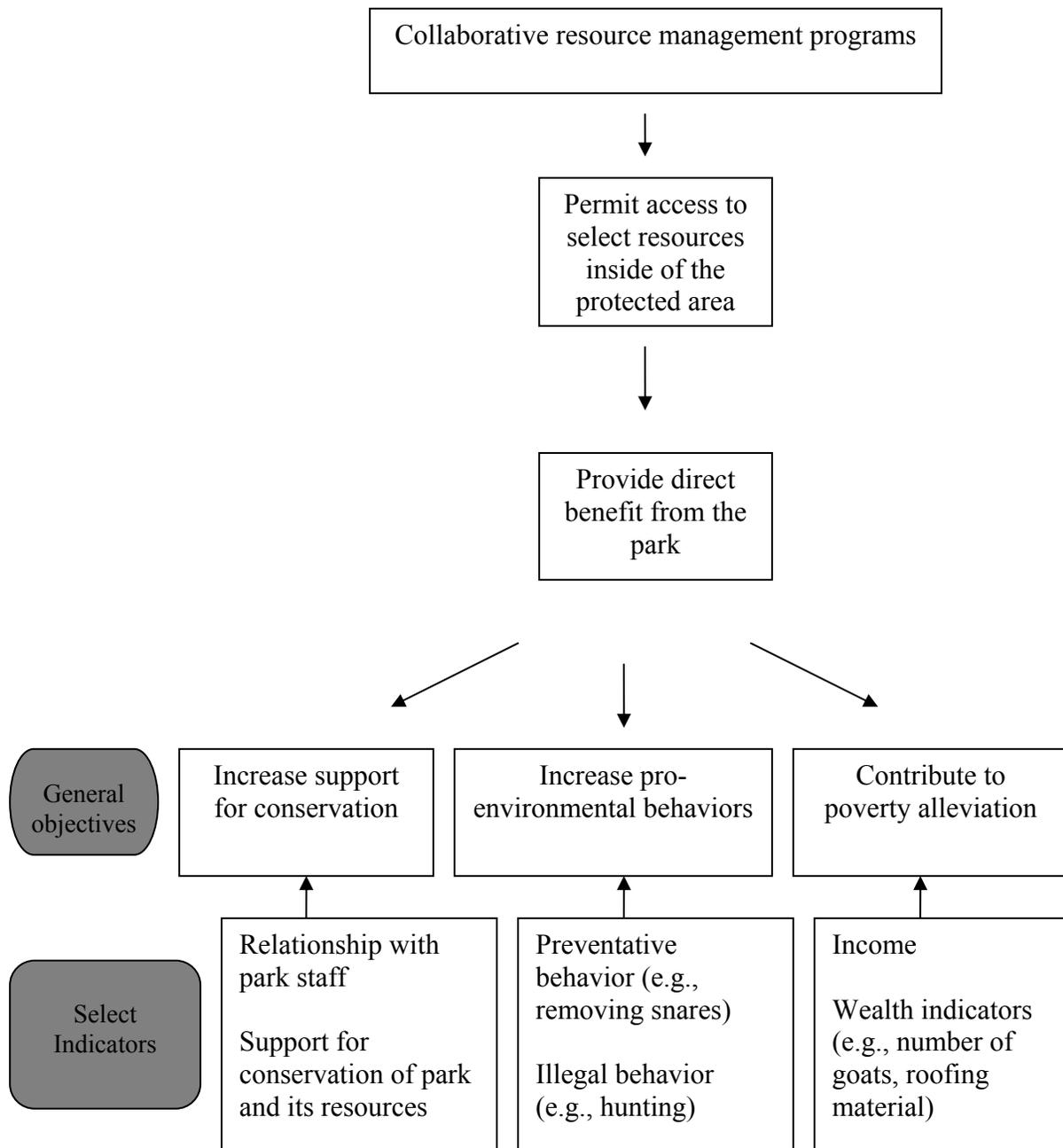


Figure 3-1. Conceptual framework for this assessment of Uganda Wildlife Authority’s collaborative resource management program

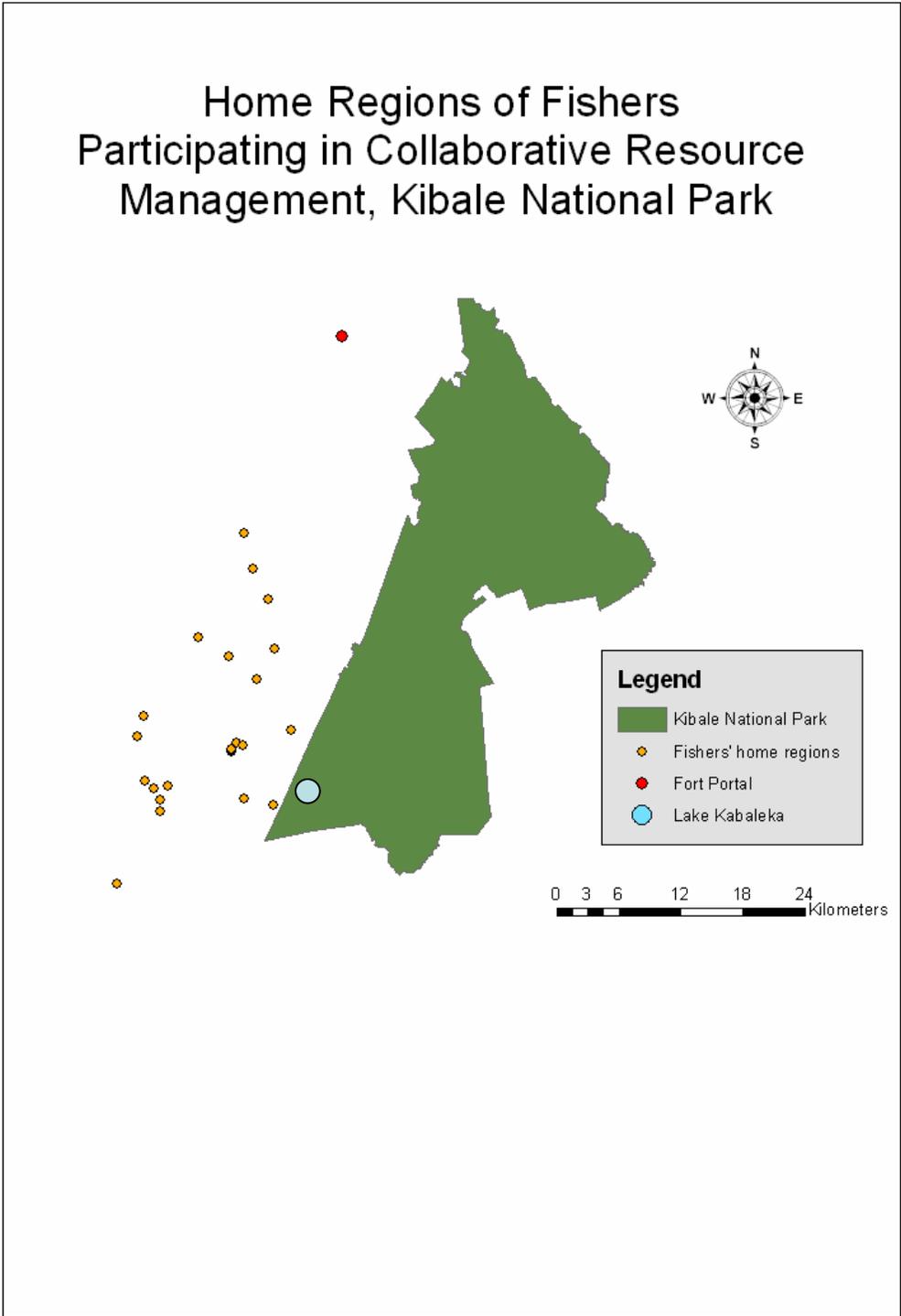


Figure 3-2. Home regions of fishers participating in collaborative resource management

Table 3-1. Categorizations of wealth used to rank the wealth of survey respondents by local community leaders (Modified from the International Institute of Sustainable Development 2003)

Category	Description of Individuals in Category
Cannot Manage	<p data-bbox="699 411 967 443"><i>Dependent on others</i></p> <ul data-bbox="748 453 1341 636" style="list-style-type: none"> <li data-bbox="748 453 1166 485">• Cannot manage on their own <li data-bbox="748 491 1341 522">• Struggle to find food and manage finances <li data-bbox="748 529 1341 594">• Rely on assistance from other community members <li data-bbox="748 600 1084 636">• May be older or sickly
Earns Slowly	<p data-bbox="699 678 1089 709"><i>Unpredictable earnings/assets</i></p> <ul data-bbox="748 720 1365 898" style="list-style-type: none"> <li data-bbox="748 720 1365 821">• May earn on a seasonal basis or might have short-term contractual work at unpredictable intervals <li data-bbox="748 827 1365 898">• May work for others and receive small sums of money
Have Something	<p data-bbox="699 940 976 972"><i>Some earnings/assets</i></p> <ul data-bbox="748 982 1341 1087" style="list-style-type: none"> <li data-bbox="748 982 1243 1014">• May earn money on a regular basis <li data-bbox="748 1020 1341 1087">• May have animals/crops that provide them with food on a daily basis
Can Manage	<p data-bbox="699 1129 1008 1161"><i>Regular earnings/assets</i></p> <ul data-bbox="748 1171 1365 1312" style="list-style-type: none"> <li data-bbox="748 1171 1365 1272">• Earn regularly and have assets such as a permanent house and/or their own motorized transportation (a moped or car) <li data-bbox="748 1278 1308 1312">• May employ others to do labor for them

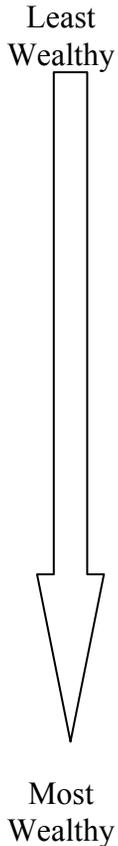


Table 3-2. Socio-demographic variables of interest

Variable	Fishers % (n)	Control group % (n)	Pearson's Chi- square	<i>p</i>
Respondent's age (in years)			4.121	0.13
18-30	62 (58)	47 (43)		
31-50	32 (30)	42 (38)		
≥51	6 (6)	11 (10)		
Marital Status			5.179	<0.05
Married	76 (67)	89 (81)		
Single	24 (21)	11 (10)		
Number of people residing in respondent's residence			1.716	0.63
0-2	23 (22)	17 (15)		
3-6	52 (49)	56 (51)		
7-10	20 (19)	21 (19)		
≥11	4 (4)	7 (6)		
Have children	78 (73)	86 (78)	2.00	0.16
Number of children			4.395	0.22
0	22 (21)	13 (12)		
1-4	48 (45)	52 (47)		
5-8	26 (24)	25 (23)		
9 or more	4 (4)	10 (9)		
Residence time			4.907	0.3
≤5 years	22 (20)	14 (13)		
5-9 years	21 (19)	20 (18)		
10-14 years	11 (10)	18 (16)		
15-20 years	21 (19)	14 (13)		
≥21 years	26 (24)	34 (31)		
Education level			12.184	<0.01
No formal education	22 (21)	12 (11)		
Primary (1-7 years)	68 (64)	59 (54)		
Secondary or more(≥ 8 years)	10 (9)	29 (26)		
Evicted from park			14.363	<0.001
Yes	43 (40)	17 (15)		
No	57 (54)	83 (74)		
Land tenure			8.258	0.083
Leasehold	10 (9)	2 (2)		
Customary	19 (17)	23 (21)		
Rented	35 (31)	26 (24)		
Public land	13 (11)	14 (13)		
Bought land	23 (20)	34 (31)		

Table 3-2. Continued

Variable	Fishers % (n)	Control group % (n)	Pearson's Chi-square	<i>p</i>
Payment or no payment for land			0.607	0.44
Pays or paid for land (lease, rented or bought)	68 (60)	63 (57)		
No payment for land (public or customary)	32 (28)	37 (34)		
Acreage			4.902	0.3
≤1 acre	38 (26)	48 (43)		
1.1-2	24 (18)	24 (22)		
2.1-3	19 (14)	9 (8)		
3.1-4	7 (5)	6 (5)		
4.1 or more	16 (12)	13 (12)		
Tribal groups (with ≥5 respondents)			11.033	<0.05
Batoro	37 (35)	26 (24)		
Bakiga	20 (19)	13 (12)		
Bakonjo	13 (12)	32 (29)		
Banyankole	9 (8)	7 (6)		
Bafumbira	5 (5)	7 (6)		
Respondent's first ranked occupation			143.093	<0.001
Farmer	10 (9)	58 (53)		
Fisher	87 (82)	0 (0)		
Other	3 (3.2)	42 (38)		
Problem with crop raiding			9.923	<0.01
Yes	16 (15)	36 (33)		
No	84 (79)	64 (58)		
Painted house			1.626	0.20
Painted	22 (19)	14 (13)		
Not painted	78 (69)	86 (78)		
Roof Material			2.456	0.12
Iron	68 (63)	78 (71)		
Grass-thatched	32 (30)	22 (20)		
Walls of house			1.973	0.16
Mud	90 (75)	83 (68)		
Plaster	10 (8)	17 (14)		
Has own transportation (includes bicycles, mopeds, cars etc.)			2.814	0.09
Yes	64 (60)	52 (47)		
No	36 (34)	48 (44)		

Table 3-2. Continued

Variable	Fishers % (n)	Control group % (n)	Chi- square	<i>p</i>
All eligible children attend school			2.385	0.12
Yes	93 (52)	98.5 (64)		
No	7 (4)	1.5 (1)		
More than one wife			0.597	0.44
Yes	14 (13)	10 (9)		
No/Not applicable	86 (81)	90 (80)		
Number of goats			1.047	0.59
1-2 goats	49 (20)	44 (20)		
3-4 goats	32 (13)	27 (12)		
5 or more goats	19.5 (8)	29 (13)		
Straight-line distance (in meters) region is from KNP border			14.71	<0.05
696	5.8 (5)	8.8 (8)		
2102	2.3 (2)	9.9 (9)		
3461	12.8 (11)	7.7 (7)		
6426	61.6 (53)	41.8 (38)		
6654	4.7 (4)	13.2 (12)		
14056	3.5 (3)	8.8 (8)		
15369	9.3 (8)	9.9 (9)		

Table 3-3. Costs to fishers per activity

Activity	Major expenditures	Cost (in U.S.\$) per year based on 5-day work week over 36 weeks/yr.
Net fishing	Nets, tarps, matches, soap for cleaning nets, payment to canoe owner	26.14 ^a
Hook fishing	Hooks, thread, tarps, matches, payment to canoe owner	13.26 ^a
Fish mongers	Bicycle, bicycle repairs, basket, medical certificate, license, stall/space for selling, table, knife, panga, bucket, plastic bags	48.32 ^b
Canoe owners	Timber to construct canoe, nails, carpenter, repair work, payment to Uganda Wildlife Authority, payment to Fishery Department	45.12 ^{b,c}

^a These figures do not account for the amount paid by fishers to canoe owners, which is variable. Fishermen will share the use of canoes among themselves. Fishers reported that some fishermen pay canoe owners up to U.S. \$5.45 per month for use of the canoe. ^b The estimated costs for both the fish mongers and canoe owners may be over-estimates, as I assumed that both groups were following federal regulations for their activities. For example, fish mongers are required to have a medical certificate, as well as a license to sell their fish. ^c This figure is based on a canoe life of 3.5 years. Over half of this figure consists of U.S. \$2.72 monthly payments to Uganda Wildlife Authority for access to the lake. Canoe owners pass this fee on to fishers that use their boats.

Table 3-4. Comparison of individual support for conservation items for fishers and control group

Item	Item responses	Fishers % (n)	Control group % (n)	Significant covariates Correlation coefficient ^b <i>p</i> n	df	Chi-square (Likelihood ratio ^c or Wald ^d)	<i>p</i>
Consumption of Natural Resources							
*People should be allowed to collect any resource from the park.	Strongly disagree	1.1 (1)	6.6 (6)	Distance to park	1	0.116 (Wald)	0.734
	Disagree	64.9 (61)	60.4 (55)	0.167			
	Neutral	3.2 (3)	3.3 (3)	<0.05			
	Agree	24.5 (23)	26.4 (24)	168			
	Strongly agree	6.4 (6)	3.3 (3)	Education			
				0.164			
				<0.05			
				185			
				Evicted from			
				park			
				-0.209			
				<0.01			
				182			
If there were no laws regulating access to resources, all the wildlife in the park would not be killed. ^a	Strongly disagree	54.3 (51)	52.7 (48)	-	1	0.04 (Wald)	0.84
	Disagree	43.6 (41)	45.1 (41)				
	Neutral	0 (0)	0 (0)				
	Agree	1.1 (1)	2.2 (2)				
	Strongly agree	1.1 (1)	0 (0)				
*What people need from the forest, grasslands, lakes and wild animals is more important than protecting the forest, grasslands, lakes and wild animals.	Strongly disagree	2.1 (2)	2.2 (2)	-	1	0.565 (Wald)	0.452
	Disagree	68.1 (64)	73.6 (67)				
	Neutral	5.3 (5)	3.3 (3)				
	Agree	21.3 (20)	17.6 (16)				
	Strongly agree	3.2 (3)	3.3 (3)				

Table 3-4. Continued

Item	Item responses	Fishers % (n)	Control group % (n)	Significant covariates Correlation coefficient ^b <i>p</i> n	df	Chi-square (Likelihood ratio ^c or Wald ^d)	<i>p</i>
Poor people need the wildlife in the park for meat.	Strongly disagree	1.1 (1)	2.2 (2)	-	1	0.652 (Wald)	0.42
	Disagree	51.1 (47)	43.3 (39)				
	Neutral	3.3 (3)	4.4 (4)				
	Agree	38 (35)	41.1 (37)				
	Strongly agree	6.5 (6)	8.9 (8)				
Wild animals are not very valuable because they do not bring money to Uganda. ^a	Strongly disagree	23.4 (22)	21.3 (19)	Bakonjo	1	0.005 (Wald)	0.942
	Disagree	68.1 (64)	71.9 (64)	-0.148			
	Neutral	1.1 (2)	0 (0)	0.046			
	Agree	5.3 (5)	6.7 (6)	183			
	Strongly agree	1.1 (1)	0 (0)	Marriage 0.167 <0.05 183			
Relationship with Park Staff Your relationship with staff from Kibale National Park has not been good. ^a	Strongly disagree	9.6 (9)	9.8 (8)	Distance to	1	6.422 (Wald)	<0.05
	Disagree	87.2 (82)	63.4 (52)	park			
	Neutral	1.1 (1)	14.6 (12)	0.190			
	Agree	1.1 (1)	11 (9)	<0.05			
	Strongly agree	1.1 (1)	1.2 (1)	168 Crop-raid -0.186 <0.05 175			

Table 3-4. Continued

Item	Item responses	Fishers % (n)	Control group % (n)	Significant covariates Correlation coefficient ^b <i>p</i> <i>n</i>	df	Chi-square (Likelihood ratio ^c or Wald ^d)	<i>p</i>
*Park staff do not take time to listen to the troubles of people who live in this village.	Strongly disagree	1.1 (1)	0 (0)	Income 0.188 <0.05 181	1	25.776 (Wald)	<0.001
	Disagree	59.6 (56)	21.3 (19)				
	Neutral	5.3 (5)	5.6 (5)				
	Agree	26.6 (25)	57.3 (51)				
	Strongly agree	7.4 (7)	15.7 (14)				
*Park staff take local people to be wrongdoers.	Strongly disagree	4.3 (4)	0 (0)	-	1	9.487 (Wald)	<0.01
	Disagree	72.3 (68)	55.6 (50)				
	Neutral	1.1 (1)	4.4 (4)				
	Agree	16 (15)	30 (27)				
	Strongly agree	6.4 (6)	10 (9)				
Support for Kibale National Park							
*People are poor because they live near the park.	Strongly disagree	0 (0)	1.1 (1)	Education 0.156 <0.05 185 Evicted from park -0.175 0.018 182	4	1.369 (Likelihood ratio)	0.850
	Disagree	47.9 (45)	53.8 (49)				
	Neutral	4.3 (4)	2.2 (2)				
	Agree	37.2 (35)	34.1 (31)				
	Strongly agree	10.6 (10)	8.8 (8)				

Table 3-4. Continued

Item	Item responses	Fishers % (n)	Control group % (n)	Significant covariates Correlation coefficient ^b <i>p</i> <i>n</i>	df	Chi-square (Likelihood ratio ^c or Wald ^d)	<i>p</i>
Management of Kibale National Park is not your responsibility but that of the government of Uganda. ^a	Strongly disagree	19.1 (18)	22.2 (20)	Education	3	0.923 (Likelihood ratio)	0.820
	Disagree	68.1 (64)	68.9 (62)	0.205			
	Neutral	1.1 (1)	0 (0)	<0.01			
	Agree	11.7 (11)	8.9 (8)	184			
	Strongly agree	0 (0)	0 (0)				
*The park does not provide benefits to you. ^a	Strongly disagree	20.2 (19)	5.6 (5)	Education	1	34.182 (Wald)	<0.001
	Disagree	73.4 (69)	52.8 (47)	0.155			
	Neutral	0 (0)	0 (0)	<0.05			
	Agree	5.3 (5)	38.2 (34)	183			
	Strongly agree	1.1 (1)	3.4 (3)	Income 0.180 <0.05 181			
*Your village does not benefit from tourists that come to visit the park. ^a	Strongly disagree	1.1 (1)	0 (0)	Crop-raiding -0.153 <0.05 182	1	0.740 (Wald)	0.390
	Disagree	27.2 (25)	20.5 (18)	Income 0.269			
	Neutral	9.8 (9)	5.7 (5)	<0.001			
	Agree	58.7 (54)	71.6 (63)	178			
	Strongly agree	3.3 (3)	2.3 (2)	Distance to park 0.169 <0.05 173			

Table 3-4. Continued

Item	Item responses	Fishers % (n)	Control group % (n)	Significant covariates Correlation coefficient ^b <i>p</i> n	df	Chi-square (Likelihood ratio ^c or Wald ^d)	<i>p</i>
*Kibale National Park should be given to Ugandans living around the park for conversion to agriculture.	Strongly disagree	6.4 (6)	7.9 (7)	Education	1	0.098	0.754
	Disagree	52.1 (49)	53.9 (48)	0.302		(Wald)	
	Neutral	1.1 (1)	3.4 (3)	<0.001			
	Agree	33 (31)	28.1 (25)	183			
	Strongly agree	7.4 (7)	6.7 (6)				

* Item was used to construct eight item conservation scale. ^a Question has been reverse worded for analysis. ^b Dichotomous socio-demographic variables were analyzed using point-biserial correlation coefficient (r_{pb}) (Pearson's r); all other variables were analyzed using Spearman's rho. ^c Multinomial regression analysis was used. ^d A proportional odds model was used.

Table 3-5. Comparison of pro-environmental behaviors for fishers and control group

Item	Fishers % (n)	Control group % (n)	Significant covariates Correlation coefficient ^b <i>p</i> n	df	Wald ^c	<i>p</i>
How many times in the past year have you prevented bush fires in KNP? ^a			Evicted from park	1	10.79	<0.01
0	70.2 (66)	95.6 (87)	0.233			
1-2 times	12.8 (12)	2.2 (2)	<0.01			
≥3 times	17 (16)	2.2 (2)	182			
			Bakonjo			
			-0.186			
			<0.05			
			185			
How many times in the past year have you reported an illegal activity in KNP? ^a			Evicted from park	1	0.967	0.325
0	79.8 (75)	91.2 (83)	0.187			
1-2 times	13.8 (13)	3.3 (3)	<0.05			
≥3 times	6.4 (6)	5.5 (5)	182			
			Income			
			0.180			
			<0.05			
			184			

Table 3-5. Continued

Item	Fishers % (n)	Control group % (n)	Significant covariates Correlation coefficient ^b <i>p</i> n	df	Wald ^c	<i>p</i>
In the past year how many times have you removed wire snares from KNP? ^a			Evicted from park	1	3.810	0.05
0	88.3 (83)	98.9 (90)	0.198			
≥1 time(s)	11.7 (11)	1.1 (1)	<0.01			
			182			
			Income			
			0.165			
			<0.05			
			184			

^a Scale was collapsed to allow for statistical analysis. ^b Dichotomous socio-demographic variables were analyzed using point-biserial correlation coefficient (r_{pb}) (Pearson's r); all other variables were analyzed using Spearman's rho. ^c Wald score indicates a proportional odds model was used (for dependent variables with multiple categories) or logistic regression (for dependent variables with dichotomous response) was carried out in order to control for significant covariates.

Table 3-6. Comparison of illegal behaviors and opinions of behaviors for fishers and control group

Item	Fishers % (n)	Control group % (n)	Significant covariates Correlation coefficient ^a <i>p</i> n	df	Chi-square (Pearson's or Wald ^b)	<i>p</i>
Some people place snares in KNP, other people do not. Have you or people from your household placed snares/traps inside of KNP in the past year?			-			1.00 ^c
Yes	1.1 (1)	0 (0)				
No	98.9 (93)	100 (91)				
Sometimes you have to place snares/traps in your fields to prevent animals from raiding your crops?			-	1	0.134 (Pearson's)	0.714
Yes	5.3 (5)	6.6 (6)				
No	94.7 (89)	93.4 (85)				
Since animals from the park raid crops, it is your right to go to the park to hunt animals.			Marriage -0.147 <0.05 184	1	0.006 (Wald)	0.937
Yes	1.1 (1)	0				
No	98.9 (93)	100 (90)				
Firewood is scarce and the park has a lot of wood therefore there is no problem if you go and take some firewood from inside the park.			-	1	11.082 (Pearson's)	<0.01
Yes	22.8 (21)	5.6 (5)				
No	77.2 (71)	94.4 (85)				
Meat is scarce and sometimes you have to hunt inside of KNP to find it.			-			0.5 ^c
Yes	2.1 (2)	0				
No	97.9 (92)	100 (91)				

Table 3-6. Continued

Item	Fishers % (n)	Control group % (n)	Significant covariates Correlation coefficient ^a <i>p</i> n	df	Chi-square (Pearson's or Wald ^b)	<i>p</i>
Water is plentiful in the park therefore you sometimes go to the park to collect it.			Marriage	1	5.253 (Wald)	<0.05
Yes	17.4 (16)	4.4 (4)	<0.05			
No	82.6 (76)	95.6 (87)	183			

^aFor correlations between dichotomous variables tables Phi was used to test for strength of association. For continuous/interval socio-demographic variables Pearson's r was used for analysis. ^b Logistic regression was used to control for significant covariates. ^cA Fisher's exact test was used.

Table 3-7. Comparison for individual knowledge of local environmental laws

Knowledge statements	True or False	Fishers % correct (n)	Control group % correct (n)	Significant covariates Correlation coefficient ^a <i>p</i> <i>n</i>	df	Chi-square (Pearson's or Wald)	<i>p</i>
People are permitted to hunt all wild animals in the protected area.	False	100 (94)	100 (91)			N/A ^b	
Grazing of animals is not allowed inside the protected area.	True	86.2 (81)	94.5 (86)		1	3.658 (Pearson's)	0.06
Anybody is allowed to live inside of the protected area.	False	97.9 (92)	98.9 (90)				1.0 ^c
Placing snares inside the protected area is prohibited.	True	88.3 (83)	95.6 (87)		1	3.313 (Pearson's)	0.07
A person needs to get permission before he or she can collect resources inside the protected area.	True	94.7 (89)	86.8 (79)	Bakonjo -0.191 <0.01 185 Income 0.171 <0.05 184	1	0.63 (Wald)	0.427 ^d
Placing snares in your fields is permitted by park staff if an animal has been raiding your crops.	False	93.6 (88)	96.7 (88)				0.5 ^c
People are allowed to make charcoal inside Kibale National Park.	False	100 (94)	100 (91)			N/A ^b	

Table 3-7. Continued

Knowledge statements	True or False	Fishers % correct (n)	Control group % correct (n)	Significant covariates Correlation coefficient ^a <i>p</i> n	df	Chi-square (Pearson's or Wald)	<i>p</i>
Only foreigners are permitted to visit Kibale National Park. Ugandans are not.	False	88.3 (83)	83.5 (76)	Crop-Raiding -0.185 <0.05 183 Distance to park 0.195 <0.01 178	1	0.040 (Wald)	0.842 ^e

^a For correlations between dichotomous variables tables Phi was used to test for strength of association and Spearman's rho was used with continuous level socio-demographic variables. ^b N/A=Not applicable. No statistic is calculated because the item is a constant. ^c A Fisher's exact test was used. ^d Logistic regression was used to control for covariates. ^e Final logistic regression model included Bakonjo tribe variable as well as covariates noted.

CHAPTER 4 ESTIMATING ILLEGAL RESOURCE USE AT A UGANDAN PARK

Introduction

Illegal resource use threatens conservation in national parks in the developing world (Skonhofs & Solstad 1996; Albers & Grinspoon 1997; Bruner et al. 2001), yet determining the extent of illegal resource use is challenging (Leader-Williams et al. 1990). Natural scientists have used a variety of techniques to estimate illegal resource use including measurement of stocks over time (e.g., via aerial surveys, camera trapping, ground transects), counting the number of known-violators and calculating patrol effort, and signs of illegal activity (e.g., poachers, camps, fresh carcasses and direct and clandestine observation) (Leader-Williams et al. 1989; Lewynsky 1986; Smith et al. 1989; Smith & Smeltzer 1991). In fisheries, illegal catch has been estimated by observer programs, comparison of reported landings with market sales, and review of logbooks coupled with interviews (Pitcher et al. 2002). Social scientists have used different methods to estimate levels of illegal resource use, relying on economic modeling, ethnology, decision tree analyses, focus groups, market studies, and self-reporting (Damania et al. 2003). Resource managers may rely on key informants for information regarding illegal resource activity.

The effectiveness of these techniques for quantifying illegal resource use is limited by methodological constraints. Often the techniques do not account for the number of people violating the law and therefore have limited policy implications. There may be one person in particular, an outside group of individuals, or a vast majority of a community's population collecting resources illegally. Additionally, these techniques can be time-consuming and financially burdensome, especially in developing countries where resources are stretched thin over large geographical areas.

From a programmatic perspective it is essential to accurately quantify the number of people illegally using resources within a protected area. Today's resource managers have many different options (e.g., increased regulation, community-based programs, integrated conservation and development strategies) to address illegal resource use. By understanding who illegal resource users are (e.g., young males, low income earners) and how many of them exist (e.g., a small proportion of a community or a majority) resource managers can use such data to guide programmatic decisions, thereby increasing the likelihood that conservation goals will be achieved.

People violating the law often do not wish to identify themselves for fear of retribution. Asking a person directly if he or she has violated the law may not produce a true response. Surveys have been used to determine illegal resource use, but since this is a sensitive topic the results of direct questioning are suspect. Issues likely to be sensitive or embarrassing tend to be underreported in surveys (Locander et al. 1976; Fowler & Mangione 1990; Azfar & Murrell 2005).

Sensitive issues are "ones that seem threatening in some way to those being studied" (Renzetti & Lee 1993, p. 4). There is a cost (either real or perceived) associated to those participating in the study. This cost goes beyond time and possibly money. There are psychological costs, such as shame or embarrassment, and possible unwelcome consequences (Renzetti & Lee 1993). Mistrust and concealment on the part of the respondent may be the result of possible sanctions upon revelation of having committed a sensitive behavior. This can negatively impact data collection, decreasing the accuracy of information and producing questionable results.

An alternative method for studying sensitive behaviors is the randomized response technique (RRT) (Warner 1965). To date, no studies have used RRT to examine rates of illegal resource use in the developing world, where rural populations may be illiterate, biodiversity levels high, and staff and funds limited for conservation research and programming. The challenge is to develop a method that can be applied at little cost in communities of diverse ethnicities or illiterate populations. This paper presents the results of the first adaptation of RRT to meet this critical conservation challenge.

Randomized Response Technique

The randomized response technique increases the respondent's propensity to respond, as well as the inclination to respond more accurately than direct questioning (Umesh & Peterson 1991). Warner (1965) designed an initial RRT using two questions that were related (e.g., "I am a member of a secret society." and "I am not a member of a secret society.") to evaluate the proportion of people that engage in the sensitive behavior. The respondent rolls a die and depending on the outcome of the roll answers one of the questions. The respondent is instructed to answer the sensitive question if, for example, numbers 1 through 3 are the outcome of the die roll. Otherwise, the non-sensitive question is answered. The administrator of RRT does not know which question the respondent answers, as the administrator does not witness the die roll, but the proportion of answers to the sensitive question can be determined by the probability of getting the die numbers that correspond with the sensitive question. Therefore, there is no way of knowing the answer an individual provides, but the proportion of sensitive questions the entire sample answers can be estimated. In essence the technique is useful in developing aggregate estimates of illegal behavior.

Modifications of RRT have been used to research a variety of sensitive behaviors such as voting practices, abortions, tax evasion, and drug use (Wright 1980; Umesh & Peterson 1991;

Schill & Kline 1995; Houston & Tran 2001). Some studies have used RRT in relation to exploitation of natural resources (Chaloupka 1985; Schill & Kline 1995; Wright, 1980), yet none have been carried out in the developing world to examine illegal resource use in parks.

Applying RRT to illegal use of natural resources in developing countries is challenging. The RRT has been used in a number of health studies in developing countries with illiterate or semiliterate populations. A study in Turkey found education level to be the most significant correlate with successfully using the RRT method to estimate rates of induced abortions (Tezcan & Omran 1981). Only one-half of the illiterate women surveyed were able to successfully respond to the RRT method. Efforts to survey women regarding induced abortion using RRT with illiterate populations in Taiwan report similar findings (I-Cheng et al. 1972).

This study makes some unique adaptations to the RRT method to examine illegal resource use in a developing country for a population that is partially illiterate. I surveyed two communities around Kibale National Park in western Uganda. Kibale National Park has widespread problems with poaching of natural resources (Mugume 2000; Koojo 2001; Mugisha & Jacobson 2004; Chapman et al. 2005). Despite the evidence, in a separate study I* conducted in other communities around Kibale National Park when directly questioned only 2 of 452 respondents admitted to illegally placing snares to trap animals inside of the park during the past year.

I examine the effectiveness of using the RRT technique to assist park management in assessing the extent of illegal resource use at Kibale National Park. I test the hypothesis that if

* This chapter is reproduced from Solomon, J., S. K. Jacobson, K. Wald, and M. Gavin. 2007. Estimating Illegal Resource Use at a Ugandan Park with the Randomized Response Technique. *Human Dimensions of Wildlife*. 12(2):75-88. Only one change has been made for the purpose of this dissertation; the word “we” has been changed to “I”.

respondents find it undesirable to admit to illegal resource use, then estimates of illegal resource use when measured by RRT will be higher than when measured by direct questioning.

Methods

Study Site

Two communities on different sides of the park, Bitanga and Kiwamba¹ were selected with marked differences in their residence time and land tenure in order to understand results in response to possible community effects. Established in 1986, Bitanga lies on the southwestern border of the park. The approximately 170 households derive much of their income from agriculture. The park land running adjacent to the community is primarily composed of grasslands and young secondary forest. Many (75%) of the survey respondents in Bitanga have resided there for less than 10 years, and 97% reported living on public land. Over a 2.5-year period (January 2001-June 2003) Uganda Wildlife Authority cautioned, prosecuted or fined a total of 86 individuals for illegally collecting resources inside KNP; 27% resided in Bitanga.

Kiwamba, established in 1960, is composed of approximately 120 households and borders the park's eastern side. The park land adjacent to the community is comprised primarily of old growth forest. Seventy-three percent of Kiwamba's respondents indicated that they had lived in the community for over 21 years. The majority of Kiwamba's respondents had purchased the land they lived on (56%) or held customary tenure (37%), inheriting the land from family members. Only 2 % of park violators arrested or cautioned by the Uganda Wildlife Authority for illegal activities over the 2.5 year period noted above resided in this community.

¹ Names of communities have been changed because illicit behavior was disclosed and the majority of household heads in each community participated in the survey.

Data Collection

Prior to conducting household interviews, local council leaders granted permission to conduct the study. The survey was delivered in one of three local languages: Rutoro, Rukiga or Rukonjo, by three male assistants trained in the survey technique and fluent in these languages.

Based on a sketch of each community, each survey administrator went door to door, requesting to speak with the head of the household in their designated area. Survey administrators greeted the household head and then read an informed consent which explained that the survey was being undertaken by a student who was studying natural resource management. If the household head was not available, the administrator asked for an appropriate hour to return when the household head would be available. If nobody was home, the administrator would return at least three times to contact the household head.

The survey was administered to a total of 251 heads of households between April and May of 2004 in Bitanga and Kiwamba. The goal was to survey all household heads in both Bitanga ($N = 170$) and Kiwamba ($N = 120$). Eighty-nine percent ($n = 151$) of household heads in Bitanga completed the survey and 83% of Kiwamba's household heads were surveyed ($n = 100$). The cooperation rate was 100% for those contacted.

Responses to the survey were directly translated into English at the time of the interview by the survey administrator. The average time to complete the survey was 87 minutes. Survey administrators did not ask for names of people that they interacted with while administering surveys.

Survey Instrument

A method known as "translation/back-translation" was used to increase the reliability of the translated survey instrument (Behling & Law 2000). First, a bilingual individual translated the source language (English) survey into the target language. Second, the draft target language

survey was translated back into the source language by a second bilingual person who was unfamiliar with the wording of the original source language document. Then the back-translated document was compared with the original. Finally, if considerable differences existed between the two documents a draft with adjustments was made to eliminate the differences (Behling & Law 2000).

The face-to-face survey was composed of five sections: socio-demographic and economic data; attitudes toward park staff, the park and consumption of park resources; perceived benefits and costs associated with the park; and questions regarding local environmental law. In the section on resource collection which is discussed here, respondents were asked about illegal collection of the six most common illegally extracted natural resources from the park based on Uganda Wildlife Authority (UWA) records. Approximately half of the survey respondents randomly received the randomized response questions first, followed by direct questioning; while the other half received the direct question and then the randomized response question. I analyzed only the first set of questions that respondents answered to avoid response order bias.

I used the paired-alternative RRT format, also known as the ‘two unrelated questions’ technique (Fox & Tracy 1986). My RRT methodology evolved with pilot tests of several techniques such as using hand-drawn pictures of people engaging in illegal activities, to maximize the effectiveness of the method with illiterate respondents. Respondents indicated that photographs were easier to interpret than drawings, so models (volunteers from a local community) were photographed engaging in 6 illegal behaviors (collecting firewood, poles, and timber, grazing animals, making charcoal, hunting animals). I used black and white photos that showed little detail, but rather depicted the behavior at a glance. All photos were placed in the same size and color cardboard envelope and were replaced if they showed signs of wear.

I pilot tested several objects to use for the non-sensitive question. In this case, I needed to use something that could be easily recognized so that the respondent would know what it represented, but not overtly suggestive of other things. Photographs of playing cards had gambling implications for respondents and a photo of a Ugandan five-cent coin which has a picture of a fish suggested illegal fishing. I selected a U.S. penny because respondents did not find it suggestive of anything. The following is the RRT survey disclosure (see Table 4-1 for brief explanation of RRT steps) that was read to each respondent prior to their participation in the RRT portion of the survey:

“I have a few more questions for you.

First, I need you to flip this coin. Let me show you what you are going to do. You flip the coin like this. (Survey administrator flips coin.) And then look at what it lands on. There are two choices, it may land showing you a head, or it may land showing you a building. Don’t tell me what it lands on. You just need to remember what it lands on, but don’t tell me what it landed on. It is your secret.

Next, I am going to show you two pictures. One is of a coin with a head on it, similar to the one you may see on the coin. On another is a picture depicting an activity you may have done inside Kibale National Park without permission since the year 2000 began (collecting firewood, charcoal, grazing animals, hunting animals, collecting timber, poles). I am going to put both of these pictures in envelopes and place the envelopes in the bag. You will choose one of the envelopes. It is random. I don’t know which one you will choose.

Open up the envelope and look at the picture. Don’t tell me which one you are looking at. If you are looking at the head, tell me “yes” if you saw a head

when you flipped the coin. If you saw a building [back of coin], then tell me “no”. If you are looking at the picture, tell me yes, if you have ever gone to the park since 2000 to do the particular activity without permission² depicted in the picture. If you have not gone to the park to do it, tell me no. Please be honest with me, as I have no way of knowing which picture you are looking at.”

Following this description the survey administrator demonstrated a sample RRT question with the respondent. If there were any questions, the survey administrator would answer them. Prior to starting the RRT questions, the survey administrator gave the large, black plastic bag to the respondent. Each respondent was asked to make sure nothing was in the bag. Before placing the photos in the bag, the survey administrator would explain what each photo depicted (e.g., the photo of the snare depicted hunting in the park since the year 2000, the photo of the person with the bag of charcoal depicted making charcoal in the park since the year 2000). After respondents answered “yes” or “no” they were instructed to place the photo they chose back in the bag, shake it and return the bag to the survey administrator. This ensured that when the administrator went to replace a photo there would be no way of knowing what photo the respondent had chosen since both photos would be in the bag.

Direct questioning of respondents asked, “Since 2000 began have you done any of the following activities in the park without permission: collect firewood?; hunt animals?; make charcoal?; collect timber?; graze animals?; or collect poles?”

² The phrase “without permission” was included because in certain circumstances respondents may have received permission from local authorities to extract resources or they may have paid a bribe to local rangers to extract resources, possibly believing that this then made the extraction legally permissible. The purpose of the study is to examine the effectiveness of RRT in estimating illegal resource extraction and therefore it was our intent to clarify that we were not referring to cases where it was legal or respondents believed it legal to extract resources.

Data Analysis

I used the following formula (Fox & Tracy, 1986) to estimate the proportion of the surveyed population that performed the illegal collection of each resource:

$$X_x = ([\lambda - (1- p) \Pi_y] / p)$$

with a variance of

$$\text{Var}(X_x) = \lambda(1- \lambda)/np^2$$

Π_y = known proportion of the non-sensitive behavior

λ = observed proportion of “yes” responses

p = probability of answering the sensitive behavior question

n = sample size

The probability that a respondent answers “Yes” to the innocuous question (“Did you see a head when you flipped the coin?”) is 0.5, while the probability of picking the photo with a picture of the coin head is 0.5. Therefore, the probability of a respondent answering “Yes” in response to the innocuous question is $0.5 * 0.5 = 0.25$. The limit to the answer of Yes questions is therefore $0.25 * N$ where N is the number of respondents. The remainder of “Yes” answers are in response to the question regarding the illegal activity. Since the probability of a respondent answering the innocuous question is 0.5 assuming an equal chance of picking either photo from the bag, the number obtained is doubled to provide an estimate of the number of respondents who would answer “Yes” to the question regarding the illegal activity. A design tree illustrating the method is depicted in Figure 4-1.

Results

Approximately 29% of respondents had no formal education, while 59% had at least some primary education, 10% had some level of secondary education and 2% had some college/technical education. Females composed 12% of the respondent pool. The response rate

was 100%. One survey was omitted because the elderly respondent was unable to see the picture on the coin used in the RRT portion of the survey and therefore could not answer any of the RRT questions.

The combined results from the two communities revealed that estimates of illegal resource use when measured via RRT are significantly higher (binomial tests $p < 0.001$) than when measured by direct questioning for all resources (Table 4-2).

Separating the data between the two communities results in larger estimates of illegal resource use when measured using RRT than with direct questioning in all resource categories in both communities, except for illegal grazing by the community of Kiwamba (Table 4-3).

Discussion

The RRT was a viable method of estimating illegal resource use around Kibale National Park. This study demonstrates that RRT provides a much higher estimate for illegal activities (firewood collection, hunting, charcoal production, timber collection, grazing of animals, pole collection) than direct questioning in almost all cases, which supports other evidence of common illegal resource use.

In only one case concerning illegal grazing by Kiwambans did RRT result in a smaller estimate than direct questioning. Kiwamba residents tended to report more illegal behaviors during direct questioning than Bitanga residents. Over a two and half year period for which I have sanctioning data from Uganda Wildlife Authority, more people were arrested in Bitanga ($n = 23$) than in Kiwamba ($n = 2$). Kiwambans may not be so fearful of admitting to illegal behavior since so few are sanctioned for it. Because Kiwamba residents have more secure and longer land tenure, they may feel more comfortable in revealing their activities when directly questioned. Since most of Bitanga's residents at the time of the survey were in a tenuous position in terms of land tenure they may be less trusting of newcomers asking them about their illegal resource use,

possibly believing that they would be removed from the land. These differences underscore the need to examine results by community and not necessarily by combining community-level data. Communities surrounding parks are heterogeneous, and park policy needs to reflect the varying use patterns surrounding parks and to target subsets of users to create effective programs.

Application of RRT in the Developing World

Many potential applications of RRT exist for both researchers and conservation practitioners concerned with natural resource management, especially those in developing countries. By using visual cues, my RRT model eliminates the need to use words or numbers in a survey therefore it is especially valuable in the developing world, where populations living around protected areas often have low literacy rates and reside in rural areas with limited educational opportunities and high poverty levels.

Randomized response technique can estimate the number of people involved in illegal resource extraction and therefore can be used in concert with biological surveys (e.g., rapid assessment programs) to more fully understand the dynamics of resource use around protected areas (Parker & Carr 1992). In the developing world RRT could be incorporated into participatory rural appraisal programs to better comprehend the resource use of local communities (Chambers 1994). Randomized response technique could be used to both set conservation action priorities and evaluate the effectiveness of conservation programs. For example, RRT can be used as a means of improving threat reduction analysis (Salafsky & Margoulis 1999; Mugisha & Jacobson 2004) by allowing practitioners to quantify the level of threat posed by illegal activities, particularly if the method can be developed to quantify the amount of resources being used. Randomized response technique also could be more broadly applied to test the effectiveness of different conservation strategies, ranging from community-

based projects aimed at improving livelihoods to increased enforcement measures for deterring illegal resource extraction.

Other Potential Applications

The application of RRT is not limited to examining illegal resource extraction. Any behavior or attitude that may be undesirable to reveal is a prime candidate for RRT research. In the developing world, where some researchers work in cultures not similar to their own, getting people to reveal undesirable attitudes and behaviors can be a daunting task. Many examples exist where RRT would be an excellent tool for use in human dimensions survey research. Examples include: research regarding human-wildlife disease transmission which may inquire about people's hygienic habits in areas where human settlements abut protected areas (e.g., the outbreak and potential crossover of scabies from humans to endangered mountain gorilla populations); research by conservation agencies regarding their own policies or practices where it may not be culturally acceptable for a respondent to be critical; research regarding attitudes toward a government's policies where it may be perceived by respondents to be risky to provide disparaging answers.

Constraints to Using RRT

Comparisons of the randomized response method to direct questioning do not always find that RRT has increased the number of people disclosing a sensitive item (Buchanan & Tracy 1982; Umesh & Peterson 1991). Results of a meta-analysis of 32 comparative studies found that RRT yields more positive results as the sensitivity of the study topic increases (Lensvelt-Mulders et al. 2005).

When using direct questioning to investigate sensitive issues researchers' primary concern is a true response. When a researcher decides to use RRT to estimate sensitive issues, a host of potential constraints arise (Buchanan & Tracy 1982; Fox & Tracy 1986; Umesh & Peterson

1991; Berrens et al. 1997). Table 4-4 outlines the major concerns generated by RRT as well as ways my study minimized limitations, such as mechanical errors, respondent recall, and statistical noise.

The process of carrying out an RRT design can be confusing; hence mechanical error becomes a major concern. I addressed this limitation by thoroughly piloting and providing a simple explanation of the RRT process that was delivered to the respondent. Survey administrators also were well-trained in the process. Each administrator gave a RRT example to the respondent prior to delivering the actual RRT items in an effort to minimize mechanical errors as well as reduce the chance that the respondent feels a trick is inherent in the process. Additionally, I used a fairly easy RRT process. A RRT study carried out with women in Turkey found that the ease of using the device as well as understanding it was associated with education level. Illiterate women had the most difficulty using and understanding the randomizing device used in the study (Tezcan & Omran 1981). Adapting the device to suit educational levels of respondents is advisable and therefore I adapted the RRT process to be suitable for respondents that had little formal education.

Statistical noise is an inherent part of RRT, but it can be adjusted according to the priorities of the research (Fox & Tracy 1986). In essence a trade-off exists between allowing for the respondent to feel confident that their response is confidential and an acceptable variance. The probability of answering the sensitive question impacts the variance. A small p value (the probability of answering the sensitive question) affords the respondents greater protection since they have less chance of selecting the sensitive question. But a small p value also means that the sampling variance will increase. Therefore a balance needs to be attained when designing the research so that the probability of receiving the sensitive question is “comfortable” for the

respondent and the variance is not so great as to swamp any possible results. When dealing with extremely sensitive issues it might be preferable to choose a smaller p value as to increase cooperation (Fox & Tracy 1986). Populations that are not familiar with probability theory are especially at risk to fear trickery and therefore a randomizing device that permits the respondent to clearly comprehend the process is essential. For this reason I chose a p value of 0.50.

Randomized response technique items usually ask for the respondent to recall a certain event, therefore recall bias is another major concern for the design of an RRT item. Although such events, especially when they are illegal, may seem memory-worthy, research shows that certain events come to mind more easily than others. For example, a study in Taiwan found that women were able to recall more readily complicated abortions that might have resulted in hospitalization than abortions that were without complications (Barreto et al. 1992). In their extensive report on self-reporting crime, Junger-Tas and Marshall (1999, p. 51) note the use of “anchor points” to provide a reference point to a respondent. In this study, I used the year 2000 as an anchor point since the turn of the millennium was a noteworthy event in rural communities in Uganda, as it was for much of the world.

Future Considerations

This study demonstrates that RRT holds promise in providing more accurate estimates of illegal resource use by rural populations residing near protected areas. It also affirms the need for further application of innovative RRT methodology in the field of natural resource management, such as an adaptation in the future to estimate quantities of illegal resources extracted from protected areas. Resource managers in developing countries are often short on time and funding and therefore development of a simple and fast methodology using RRT can be a vital conservation tool.

Table 4-1. Brief explanation of steps carried out during randomized response technique questioning

Step	Actions
1	Respondent flips penny Notes side it lands on without disclosing it to interviewer
2	Interviewer places 2 photos into a bag; one photo depicts the illegal behavior, the other photo is a picture of the head side of the coin
3	Respondent randomly selects one photo from the bag
4	Respondent answers “yes” or “no” in response to the question depicted by the chosen photograph without disclosing which photograph was picked

Table 4-2. Comparison of two methods to quantify illegal resource use in Kibale National Park, Uganda

Resource	Estimated proportion from randomized response technique (RRT) ^a (n=132)	Variance of RRT estimate	Proportion from direct questioning ^b (n=119)	Statistical significance of difference between proportions
Charcoal	0.516	0.008	0.025	$p < 0.001$
Hunting	0.394	0.007	0.017	$p < 0.001$
Poles	0.622	0.007	0.403	$p < 0.001$
Timber	0.258	0.007	0.042	$p < 0.001$
Firewood	0.682	0.007	0.37	$p < 0.001$
Grazing	0.288	0.007	0.135	$p < 0.001$

^a Proportion x 100 = estimated % of surveyed population illegally extracting resource from protected area. ^b Proportion x 100 = % of surveyed population illegally extracting resource from protected area

Table 4-3. Effectiveness of two methods to quantify illegal resource use in two communities near Kibale National Park, Uganda

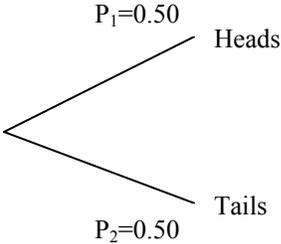
Resource	Bitanga				Kiwamba			
	Estimated proportion from randomized response technique (RRT) ^a (n=78)	Variance of RRT estimate	Proportion from direct questioning ^b (n=73)	Statistical significance of difference between proportions	Estimated proportion from randomized response technique ^a (n= 54)	Variance of RRT estimate	Proportion from direct questioning ^b (n=46)	Statistical significance of difference between proportions
Charcoal	0.576	0.013	0.027	<0.001	0.426	0.018	0.022	<0.001
Hunting	0.474	0.013	0	<0.001	0.278	0.018	0.043	<0.001
Poles	0.448	0.013	0.274	<0.01	0.870	0.016	0.609	<0.001
Timber	0.192	0.012	0.014	<0.001	0.352	0.018	0.087	<0.001
Firewood	0.526	0.013	0.219	<0.001	0.908	0.015	0.609	<0.001
Grazing	0.32	0.012	0.055	<0.001	0.24	0.017	0.261	N.S. ^c

^a Proportion x 100 =estimated % of surveyed population illegally extracting resource from protected area.. ^b Proportion x 100 = % of surveyed population illegally extracting resource from protected area. ^cN.S. Nonsignificant

Table 4-4. Major concerns when using randomized response technique and ways to minimize concerns in this study

Major Concerns	How I Minimized Concerns
Mechanical Error/Game-like (I-Cheng 1972)	<ul style="list-style-type: none"> -Simplified explanation of RRT process -Trained survey administrators thoroughly in the RRT process -Began RRT section with example, where respondent administered a RRT question to the survey administrator -Chose locally relevant and easily understandable RRT devices (coin, photos)
Belief of Trickery (I-Cheng 1972)	<ul style="list-style-type: none"> -Asked respondents in piloting phase if they suspected trickery and modified RRT process accordingly -Provided example of RRT with roles of survey administrator and respondent reversed -Used 50% probability for receiving sensitive question to increase respondent cooperation -Provided multiple verbal assurances of anonymity
Statistical Noise (Fox & Tracy 1986)	<ul style="list-style-type: none"> - Chose highest probability of selecting sensitive question possible to ensure less variance - Selected large sample size
Recall Bias (Junger-Tas & Marshall 1999)	<ul style="list-style-type: none"> - Used prominent locally-known historical event (the start of the new millennium) as anchor point to aid respondents in recalling time frame

Stage 1: Flip Coin



Stage 2: Sensitive Question

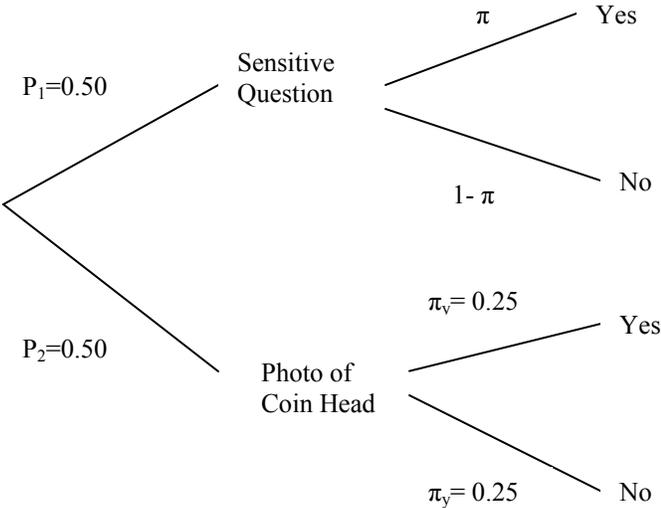


Figure 4-1. Decision tree (adapted from Chaloupka 1985)

CHAPTER 5 CONCLUSION

Conclusion for Collaborative Resource Management Study

This study reports results from the CRM fishing program at Lake Kabaleka in Kibale National Park (KNP), Uganda. Beginning in 2000, the collaborative resource management (CRM) program allowed individuals to legally fish at Kayanja landing site. Approximately 70% of fishers' income was derived from fishing activities alone. Fishers reported higher incomes than their control group, although when adjusting for confounding variables income was found to be significantly different between fishers and the control group for one tribal group. Fishers were also more supportive of conservation in general. Fishers reported a better relationship with park staff than the control group, although no difference was found between the two groups for individual items regarding support of the park and resource conservation. While some fishers are actively protecting the park by preventing bush fires, removing wire snares/traps, they also may be extracting resources illegally. CRM increased pressure on the fishery with approximately 50% of fishers only starting to fish in the lake after implementation of the CRM program.

Implications of Collaborative Resource Management Findings for Conservation

While CRM may be a viable tool to positively impact park relations, increase support for conservation and raise incomes, CRM can also increase pressure on protected resources. This result reinforces the need to examine unintended consequences of conservation-related programming both prior to implementation as well as throughout the project's lifespan. Viewing CRM programs as experiments in progress rather than established programs is a necessity and for this reason an adaptive management approach is critical.

Although previous studies have noted that ICDPs may encourage in-migration to the project location (McShane and Newby 2004), little research has focused on changing livelihood strategies or the impact those changes have on individuals, communities and resources. In this study, over 50% of fishers were new to fishing activities and fishing became their major source of income. The program did not supplement income, but rather completely redefined livelihoods. This impact of the program has inherent dangers, both for the people involved in the program, as well as the resource base. Exogenous and stochastic events can influence both the needs of people as well as resource availability. Income diversification should be ensured as an essential component of both conservation and development programming.

Recommendations to Uganda Wildlife Authority

Uganda Wildlife Authority's CRM program at Lake Kabaleka in Kibale National Park is meeting its objectives but some worrisome trends need to be addressed. With fishers heavily reliant on fishing activities for income, evidence of illegal resource extraction, and program induced shifts in livelihood strategies there is greater pressure on the resource than originally intended. To address these concerns, I recommend:

Ecological studies: At the time of the research UWA had not determined sustainable harvest rates for the fishery. Ecological studies of the fishery should be carried out to scientifically inform management decisions. Through KNP's institutional ties with Makerere University, applied research on the fishery and the area surrounding it, should be encouraged. Fishers' involvement in the research process could increase support for sustainable harvest estimates. Additionally, such institutional ties can be used to encourage a comprehensive study to understand resource extraction within the park. The reasonable person model (Kaplan 2000) underscores the need to understand peoples' life circumstances. Such data are needed to determine what resources are being used by whom and for what purposes.

Institute a seasonal moratorium: Fishers need to diversify their income base to provide a safety net for their livelihoods. To ensure diversification and limit reliance of individuals on the fishery, it may be helpful for UWA to institute a seasonal moratorium on fishing.

Increase monitoring and evaluation: Although greater oversight of the CRM program may be required, it is understandably difficult as the number of rangers available for such a task is limited. In light of the limited capacity to monitor the fishery, participatory adaptive management should be instituted. The results of the fishers' record keeping should be returned to them by the KNP Research Warden in a culturally appropriate format on a regular basis. Additionally, educational seminars should be provided to fishers so they can understand the dynamics of the fishery and the need for biological information. UWA should tap into the expertise of both national and foreign researchers who study in and around KNP for such educational endeavors. Transparent monitoring and evaluation activities, in addition to education, may create a vested interest in creation of a sustainable fishery and lessen the risk of its collapse.

Since Uganda Wildlife Authority is managing a conservation project that includes a development component, the program needs to ensure the ecological value of the area is not sacrificed for the socio-economic and attitudinal gains of the CRM fishing program. If UWA can ensure that ecological integrity is maintained through proper monitoring and evaluation, more CRM programs may be valuable in creating more positive relations between local residents, and more support for conservation.

Conclusion for Randomized Response Technique Study

During the course of the CRM study, very few survey respondents admitted to illegal resource use, despite the fact that it has been reported as one of the largest threats to KNP (Mugisha 2002). As a result of this difficulty, I evaluated the effectiveness of the randomized

response technique (RRT) in quantitatively estimating illegal resource use around KNP.

Estimates of six types of illegal resource use when measured by RRT were significantly higher than when measured by direct questioning.

Randomized Response Technique as a Methodological Tool in Conservation

Poaching is considered one of the greatest threats to protected areas in Africa (Kaltenborn et al. 2005). Changing peoples' behavior requires a comprehensive understanding of the people that are participating in such acts (Kaplan 2000). It is very challenging to persuade people to admit to illegal resource use. The RRT addresses this challenge by ensuring anonymity to respondents, encouraging them to provide truthful responses.

Many potential applications of RRT exist for both researchers and conservation practitioners concerned with natural resource management, especially those in developing countries. By using visual cues, the RRT model presented in this study eliminates the need to use words or numbers in a survey. Therefore it is especially valuable in the developing world, where populations living around protected areas often have low literacy rates and reside in rural areas with limited educational opportunities and high poverty levels. The RRT developed in this study is not limited to research regarding illegal resource extraction. Any behavior or attitude that may be socially undesirable is well-suited for this RRT method.

APPENDIX A
ENGLISH/RUKIGA LANGUAGE VERSION OF COLLABORATIVE RESOURCE
MANAGEMENT SURVEY

1. Interviewer's Code (Enamba yowakubuza)
2. Respondent ID number (Akamayiso ko'orabuzibwa)
3. Date (Ebiro byokwezi)
4. Start time (Eshaaha yokutandika):
5. Language Used(Orurimi wagamba):
6. Village Name (Eizina ryekyaro)
7. Distance to Park Boundary (Ni mairo zingahe okurugaha kuhika ahi park eratangirira) (km)
8. Parish Name (Eizina ryomuruka):
9. Registered resource user y/n
- 9A. Resource

Knowledge of Park-Related Laws and Programs

Please answer the following questions to the best of your knowledge. I just want to know what you think. Do not worry if you do not know an answer to a question. If you do not know, just tell me. (Ndakushaba kugarukamu ebibuzo ebi kubigarukamu okusigyikirira ha magezi gawe nkoku orabimanya. Ndenda kumanya kusha nkoku oratekateka. Otakafayo ku'orabe otaramanya ekyokugarukamu. Omukyinakubuza. Kandi ku orabe otaramanya ongambire.)

10. Is there a protected area owned by the government nearby? (hariho omwanya ogurinzirwe ogu govumenti erareberera aha mpaha?)
 - a. Yes (Yego)
 - b. No (Ingaha)
 - c. Don't know (Tinkamanya)

11A. If yes (Yego):		11B. If no or don't know (Ingaha ninga tinkamanya):	
What is the name of the protected area closest to your house? (eizina rya park eyeri haihi nenju yawe niriha?)	Name provided (Eizina eriyagamba):..... Don't know (Tinkamanya):_____	Do you know of Kibale National Park (nomanya park ya Kibale)?	Yes (Yego): _____ No (Ingaha): _____ Don't know (Tinkamanya): _____



Proceed to true/false questions



*If yes,
proceed to
true/false
questions*

*If no, proceed to
questions on separate
demographics sheet*

Please answer the following statements with yes, no or don't know. (Ndakushaba kungarukamu mubibuzo ebi nay ego namazima. Ingaha nebishuba nainga na tinkamanya, okusigyikyira nkoku orabe wahurira.)

12. People are permitted to hunt all wild animals in the protected area. (Abantu baraikyirizibwa kuhiga enyamaiswa ezo mu Park ya Kibale.)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

13. Grazing of animals is not allowed inside the protected area. (Kurisa amatungo tikuraikyirizibwa omunda ya park.)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

14. Anybody is allowed to live inside of the protected area. (Abantu baraikyirizibwa kutura mu park.)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

15. Placing snares inside the protected area is prohibited. (Okutega emitego omunda ya park barakuzibira.)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

16. A person needs to get permission before he or she can collect resources inside the protected area. (Omuntu aretagyisa kutunga orusa atakagire kugira ekyobutungyi ekyiyaiha mu park.)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

17. Placing snares in your fields is permitted by park staff if an animal has been raiding your crops. (Kutega emitego omuntabire yaawe kuraikirizibwa abakozi bapark kuba enyamishwa ija kwona ebyokurya byaawe.)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

18. People are allowed to make charcoal inside Kibale National Park. (Abantu baraikirizibwa kwosya amakara omunda ya Kibale National Park.)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

19. Only foreigners are permitted to visit Kibale National Park. Ugandans are not. (Abanyamahomga bonka nibo baraikirizibwa kubunga omunda ya Kibale National Park. Abanya Uganda tibakabikiriza.)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

20. Spearing of baboons that have raided crops is permitted with permission from park staff. (Kucumita enkobe ezirona ebyokurya barakwikiriza watunga orusa kuruga habakozi bomu park.)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

21. To whom does Kibale National Park belong? (Eirindiro rya Kibale mra nebererwa oho?)

Now I am going to read you some statements that people have made about the park and its lands. Please tell me whether you strongly agree, agree, are neutral, disagree or strongly disagree. Sometimes I will also ask you to tell me the reason why you answered the way you did. There are no right or wrong answers, I am only asking you for your opinion. If you do not understand a question, please ask me to repeat it. (Mbwenu naza kukushomera ebi abandi bantu baragamba ahari park na ni'taaka ryayo. Ndakushaba ongambire ku orabe ori, kuhamisiriza ngu nkwe kiri kandi ninkahe ahi araikyiriza kyonka ota kahamiza kyimwe, kandi ninkahe ahi arabanganisa, na ninkahe ahi oranga, na ninkahe ahi orangira kimwe. Kandi obundi bwire mbasa kukubuza nahabwenkyi orangerukamu nko ku wangerukamu. Tihariho answer/engarukamu, ahikyire rundi egwire. Oihireho ninkubuza habwokutekateka kwawe. Ku orabe otayetegyereza ekibuzo ndakushaba ongambire nkigarukemu.)

Park Staff

22. Your relationship with staff from Kibale National Park has been good. (Enkolengane yawe na abakozi ba Kibale park bubaire buri burungyi.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

22a. Why did you answer that way? (Habwenkyi orangerukamu engarukamu egyo?)

23. Park staff do not take time to listen to the troubles of people who live in this village. (Abakozi bo mu park tibakagyira obwire bwo kuhurikyiza ebizibu bya abantu abaratura omuri ekyi kyaro.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

24. Park staff take local people to be wrongdoers. (Abakozi ba park baratwaza abantu ba burijo nka enkozi zebibi.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

Support for Kibale National Park

25. People are poor because they live near the park. (Abantu baba abooro habwokutuura hamushikye gwa park?)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

26. Management of Kibale National Park is your responsibility as well as the government of Uganda. (Okureberera park ya Kibale nobujunanizibwa we hamwe na governmenti ya Uganda.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

27. The park provides benefits to you. (Park erakuretera amagoba.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

27a. If agree or strongly agree; in your opinion, what are those benefits?

Please rank those benefits you mentioned from best benefit to lesser benefits. (Which benefits you the most?)(Ku orabe ori kwikyiriza/ kwikyiraza orahamisiriza; ni birungyi kyi, kandi.)

(Obihe enamba oratandika nekyira kukyirayo oburungyi kuhika ahari ekyitaine ebirungi migasho mingyi.)

Benefit (Ebirungyi)

Rank (Omwanya Ogukiratwara)

28. Your village benefits from tourists that come to visit the park.

(Ekyaro kyawe kiriagira ebyomugasho ebikiratunga ababungi biija kubunga omu Kibale National Park.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

28a. Why did you answer that way? (Habwekyi oragarukamu ogu muringo?)

29. Kibale National Park should be given to Ugandans living around the park for conversion to agriculture. (Eirindiro rya Kibale bashemerire kurihereza abantu abanya Uganda abaritwire hamushikye bakarihindura eryo kuhingwamu.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

Support for Consumption of Resources in Kibale National Park

30. People should be allowed to collect any resource from the park. (Abantu bashemerire kwikyirizibwa kwiha kyoona ekyo butungyi kuruga mu park.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

30a. Why? (Habwekyi?)

31. If there were no laws regulating access to resources, all the wildlife in the park would be killed. (Kuba hatarabireho ebiragiro ebirazibira kwiha ebyobutungyi mu park. Ebikoko byona ebyo mwihamba byo yisirwe.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

32. These days, animals that live in the park are important sources of meat for people living around the park. (Biro ebi, enyamaiswa eziratura mu park nebyomugasho mu nyama. Habwa'abantu abatwira haihi na park.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

32a. (if agree) What types of animals from the park are important sources of meat? (Ku orabe waikiriza) (Ni nyamaiswa kyi kuruga omu park ezine emigasho mu nyama.)

33. What people need from the forest, grasslands and lakes is more important than protecting the forest, grasslands, lakes and wild animals. (Ebya, abantu ebibarenda kuruga mu mahamba, nomunyanja bine emigasho, kukyira kurinda enyanja, eihamba nenyamaiswa zaryo.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

34. Poor people need the wildlife in the park for meat. (Abantu abooro barenda enyamishwa ezo mu park kuziryamu enyama.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

34a. Why did you answer that way? (Habwekyi oragarukamu ogu muringo?)

35. Wild animals are very valuable because they bring money to Uganda. (Enyamishwa nezo muhendo/omugasho habwokuba zirareta esete mu Uganda.)

- a. Strongly agree (Kwikiriza nohamiza kimye)
- b. Agree (Kwikyiriza)
- c. Neutral (Kubanganisa)
- d. Disagree (Kwanga)
- e. Strongly disagree (Kwangyirakimwe)

35 a. Why did you answer that way? (Habwekyi oragarukamu ogu muringo?)

Perceived Benefits from the Park

36. If you could collect any resource from Kibale National Park that you wanted, what would you collect? Please rank order them. (Ku wakubeire oine akyobutungyi ekyoraiha mu park ya Kibale akyorenda, woyihireyo kyi. Ndakushaba ebihe enamba okubire.)

Products (Ekintu waihayo)	Rank(Enamba/omwanya ogukiratwara)
---------------------------	-----------------------------------

37. Lots of people use resources from Kibale National Park. Please list what products you actually get from Kibale National Park in both the wet and dry seasons for your:

(Abantu bingyi barakoresa ebyobutungyi kuruga omu Kibale National Park. Ndakushaba ongambire ebyobutungyi ebyoraiha mu park ya Kibale eby'o mubwire bwenjura na nomubwire bwomusana habwe:

Daily needs? (Byetagwa bya burijo?)

For sale? (Ebyo kuguza?)

Other needs (Ebyetagwa ebindi?)

Subsistence needs (daily needs) (Ebyetagwa bya burijo)

Type of products (Nikintukyi)

Use of products (Omugasho gwakyo)

Commercial needs (for sale) (Ebyokuguza) (ebyamaguzi)

Type of products (Nikintukyi)

Use of products (Omugasho gwakyo)

Other needs (Ebyetagwa ebindi)

Type of products (Nikintukyi)

Use of products (Omugasho gwakyo)

For each item collected:

38. Name of item

Do you collect the resource every month of the year or seasonally?

(Ebyomugasho ebyoihaga omu park, obihayoga buli mwezi ninga buli season?)

If collected monthly	If collected seasonally
<p>38a. If monthly, how many weeks per month do you collect the resource? (Kworabe obihayo buli mwezi orakolesa wiiki zingahe mu mwezi gumwe?)</p>	<p>38a. If seasonally, how many months of the year do you collect it? And 38 b. How many weeks per month do you collect it? (Kworabe obiihayo buli season,orakolesa wiiki zingahe mu mwezi gumwe?)</p>
<p>38b. How many trips do you make per week?(Omu wiiki emwemu orazayo emirundi ingahe?)</p>	<p>38c. How many trips do you make per week?(Omu wiiki emwemu orazayo emirundi ingahe?)</p>
<p>38c. For each of the items you collect from Kibale National Park, how many working hours do you spend on each collecting trip, including time traveling to and from the area to collect the resource? (Habwa buri kintu ekyoraiha mu park ya Kibale. Orakozesa eshaaha zingahe habwa buri murundi, otairemu obwire obwo kugyenda nokugaruka kuruga omu kicweke ahi waiha ekyobutungyi?)</p>	<p>38d. For each of the items you collect from Kibale National Park, how many working hours do you spend on each collecting trip, including time traveling to and from the area to collect the resource? (Habwa buri kintu ekyoraiha mu park ya Kibale. Orakozesa eshaaha zingahe habwa buri murundi, otairemu obwire obwo kugyenda nokugaruka kuruga omu kicweke ahi waiha ekyobutungyi?)</p>
<p>38d. What amount do you collect on each trip? (Oraihayo ebintu biringana nkahe?)</p>	<p>38e. What amount do you collect on each trip? (Oraihayo ebintu biringana nkahe?)</p>
<p>38e. If you could not get the item from Kibale National Park, how much (Ugandan shillings) would you be willing to pay for the item (in order to get it)? (do not forget to include units) (Ku wakubaire otari wokwihayo ekintu mu park ya Kibale, wosaswire sente zinghe, habwekyo kintu kukitunga?)</p>	<p>38f. If you could not get the item from Kibale National Park, how much (Ugandan shillings) would you be willing to pay for the item (in order to get it)? (do not forget to include units) (Ku wakubaire otari wokwihayo ekintu mu park ya Kibale, wosaswire sente zinghe, habwekyo kintu kukitunga?)</p>

39. Is permission needed to collect these resources in the park?

(Oretagisha orusa kwiha ekyobutungu omu park?)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

40. Does the use of these products damage the park? (Kukozesa kwebyo bintu kurasisa park?)

- a. Yes (Yego)

- b. No (Ingaha)
- c. Don't know (Tinkamanya)

40a. If yes; which items collected damage the park and how do they damage it?
(Ku erabe yego, ni kintu ki ekyoraihayo kusisa park kandi kiragisisa bata?)

For registered resource users only:

41. How many shillings do you earn per month/per season from collecting _____ (rattan cane, bee products, or fish)? (Ni sente zingaha ezoratasya buri kwezi naiga buli season kuruga mu kushoroza? (Enga/obwokyi, ebyenyanja)

Sente.....shillings (*note if per month, or per season*)

42. Do you consider this amount a (Notekateka ezo sente):
- a. Large part (Nezekicweka kihango)
 - b. Medium part or (Nekyarwagati)
 - c. Small part (Nekiweka kiche)

Of your monthly income? (Habwentasya yawe eya buli kwezi?)

43. For how long have you been collecting the resource? (Omazire bwireki orikwiha ebyobutubgi eki?)

44. Before you became a registered resource user did you collect the resource? (kare otakehandikyise kukozeza ebyobutungyi okaba orazayo kwihayo ebyobutungyi?)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

44a. If yes; from where did you collect the resource? (ku erabe yego, ninkahe ahi wabaire araiha ebyobutungyi?)

- a. Inside of Kibale National Park (Omunda ya KNP)
- b. Outside of Kibale National Park (Aheru ya KNP)

45. Compared to before you started collecting the resource inside of the park, are you economically better off, worse off, or about the same? Why?
(Noyenengsha ote obuwabire otaine ekyoriha omunda ya park omubyamaguzi, orikurungi munonga, kubi munonga, ninga tariho mpiduka yona. Habwenki?)

Feels (Embera):	Reasons (Enshonga)
1. Better-off (Kuba kurungyi kukyiraho)	1.
	2.
	3.
2. Worse off (Kuba kubi munonga kushembayo)	1.
	2.
	3.
3. Just the same (Kushushana)	1.
	2.

Household Profile

(Akacweka)

46. Sex:

1. Female (Oryo omukazi)
2. Male (Oryo omusheija)

47. What is your age? (Oine emyaka ingahe?)

48. What is your marital status? (Oine amaka?)

- a. Married(oine omusheija - married female)
(oine omukazi - married male)
- b. Single (taine musheija - unmarried female)
(taine mukazi - unmarried male)
- c. Widowed (enfakazi)
- d. Other (ebindi)

48a. If married, (man): do you have more than one wife? yes, no
if yes, how many do you have?

(woman) does your husband have more than one wife? yes, no
If yes, how many wives including yourself does he have?

(Ku orabe osweire oine abakazi barengire hari omwe?) yego, ingaha
Ku erabe yego oine bangahe?

(Omukazi) (Omusheija wawe aine omukazi orengire hari omwe) yego, ingaha
(Ku erabe yego nibangahe naniwe wayebarramu?)

49. What is the age and sex of all the people who cook, eat and live in this household?
(emyaka eyabantu ob’o rateka mukarya kandi mukara hamwe abasheija n’abakazi?)

Sex (Emyaka) _____ age<10 age 11-20 age 21-30 age 41-50 age≥51

Female (Abakazi)

Male (Abasheija)

50. Do you have any children? (Oine abaana?)

- a. Yes (Yego)
- b. No (Ingaha)

50a. If yes, how many do you have? (Oine bangahe?)

50b. Are all of your children that are eligible (age), attending primary school?

(Abaana baawe abakubire barashoma mu primary, barashoma boona?)

- a. Yes (Yego)
- b. No (Ingaha)

50c. If no, why are they not attending school?
(nahabwenki batara shoma?)

51. What is the highest level of education you have attained? (Okwega kwawe okurakwirayo nikuha?)

- a. No formal education (Toregyire)
- b. Primary education (Okega puraimare)
- c. Lower secondary (s1-4) (Okega seniya zahasi)
- d. Upper secondary (s5-6) (Okega seniya zahaiguru haya)
- e. College (ttcs) (Okega omumatendekero za college)
- f. University (Univasite)

51a. If married, what is the highest level of education your spouse has attained ? (if the person has more than one wife, ask this of the oldest wife.) (Oswirwe/osweirwe, okwega kwamukazi wawe/omusheija wawe kuraingana nkahe) ?

- a. No formal education (Toregyire)
- b. Primary education (Okega puraimare)
- c. Lower secondary (s1-4) (Okega seniya zahasi)
- d. Upper secondary (s5-6) (Okega seniya zahaiguru haya)
- e. College (ttcs) (Okega omumatendekero za college)
- f. University (Univasite)

52. What is your tribe? (Eihanga lyawe niriha?) (Batoro, Bakiga, Bahororo, Banyankole, Banyarwanda or other)

53. Were you or members of your family evicted from Kibale in the early 1990s (iwe nanga abeka yawe bakabingwa kuruga mu lhamba lya Kibale kare mummyaka ye 1990)?

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

54. How long has your household been settled here (in this particular community? (eka yawe amazire bwirekyi eratura mukyaro ekyi mpaha?)

- A) ≤5 years b) 5-9 years c) 10-14 years d) 15-20 years e) ≥21 years

54a. (If settled in the last 5 years (1998 and later) (Ku orabe otwire hanu kumara emyaka etaano yonka 1998 nokugaruza haiguru) from where did you shift (Okaruga nkahe okwija kutura omuri ogu mwanya)?

54b. (If settled in the last 5 years (1998 and later) (Ku orabe otwire hanu kumara emyaka etaano yonka 1998 nokugaruza haiguru) Why did you choose to settle in this area(Habwekyi wacwiremu ku tura muri ogu mwanya/ekyaro) ?

55. What are your household's main sources of income presently? (Entasya yeka yawe obwahati neha?)

Which activity is the most profitable? (Kandi ni murimo kyi ogurakyira kukugobeesa?)(Rank them) (Ogihe enamba) 1=most profitable

Present economic activities (Emirimo yentsya obwahati)	Rank (Omwanya ogweratwara omukutahiza)
1.	
2.	
3.	
4.	
5.	

56. What were your household's main income sources 1 year ago? (Entasya yeka yawe omumwaka oguhingwire ekaba eraruga nkahe?)

Which activity was the most profitable? (Ni murimokyi ogwakyizire kukugobeesa/kukutahiza) (Rank them) (Ogihe enamba)

(If the income sources have changed) (Entasya eheraruga ekahinduka); Why have your income sources changed? (Habwenkyi entasya yawe aheraruga habairemu empinduka)?

Household income sources 1 years ago (Entasya yeka mu mwaka 1 enyima)	Rank (Omwanya)	Cause of change (Ekyaresire empinduka)
1.		
2.		
3.		
4.		
5.		

57. What would you say your household's income is in shillings per month or per season? (Notekateka entasya yekayanyu omukwezi kumwe nainga mu season emwe, erainegana sente zingahe?)

58. How do you compare yourself with other people in your village who have the same size and fertility of land, but who live farther away from the park? (Iwe oregeranisa ote nabandi bantu mukyaro kyawe abaine ebibiira kandi bine orwezo nkeyawe kandi ebiringana nomubuhango. Kyonka batatwire haihi na park?)

Feels (Embera):	Reasons (Enshonga)
1. Better-off (Kuba kurungyi kukyiraho)	1.
	2.
	3.
2. Worse off (Kuba kubi munonga kushembayo)	1.
	2.
	3.
3. Just the same (Kushushana)	1.
	2.

59. The land you live on is (Nitaaka kyi eryotwiremu):

- Leasehold (official title) (Eryekyapa)
- Customary tenure (Eryobugwetwa/obusika)
- Rented (Orapangyisa)
- Public lands (Kalandalanda)
- Bought land (Kugura ekibira)
- Other (Ebindi)
- Don't know (Tinkamanya)
- Mailo land (Ekibira kya bakama ba tooro)

60. How many acres (of those checked above) do you have (Kandi riraingana hika zingahe)?

61. Has your work or somebody from your household ever been related to Kibale National Park? (Omurimo gwawe nainga ogwomuntu womunju yawe gwine akakwate na Kibale?)

- Yes (Yego)
- No (Ingaha)
- Don't know (Tinkamanya)

61a. If yes, in what capacity was (or is) your work related to KNP? (Ku erabe yego, gukaba guri nainga nogwa kakwatekyi?)

62. Does this household own any means of transport? (Omuka egi mwine ekiruka kyoona ekyi murakozesa nkentambura?)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

62a. If yes; what type of transport? (Ku erabe yego nikiruka kiiha eki mwine?)

- a. Car/truck (Matooka ence/empango)
- b. Motorcycle (Pikipiki)
- c. Bicycle (Egaali)
- d. Boat (Eryato)
- e. Other (Ebindi)

63. Do you keep any animals? (Hariho ebikoko byoona ebi mutungire?)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

63a. If yes; what types of animals do you keep and how many? Ku erabe yego; ni bikoko biiha ebimutungire?)

Animal (Ebikooko)	Number (Omuhendo)
Cattle (Ente)	
Goat (Embuzi)	
Chicken (Enkoko)	
Guard dogs (Embwa)	
Pigs (Empunu)	
Other (Ebindi):	

64. Do you or a member of your household have a bank account?

(Iwe nainga abatuzi bomunju yaawe hariho alikwahura esente mubank?)

- a. Yes (Yego)
- b. No (Ingaha)
- c. Don't know (Tinkamanya)

65. Do you face a problem of crop-raiding by wild animals from the park? (Oine ekizibu kyo kwonerwa enyamaiswa ezo mwihamba eziraruga mu park?)

- a. Yes (Yego)
- b. No (Ingaha)

66. What meat have you eaten in the past year? (Ninyamaki eyiwarirho omuwaka oguhwire?)

(Write the number assigned to particular animal on your data sheet.)

- | | |
|----------------------|-------------------------------|
| 1. Giant forest hog | 1. Ensenge |
| 2. Bush pig | 2. Empunu (domestic or wild?) |
| 3. Bush buck | 3. Engabi |
| 4. Red duiker | 4. Ensuku |
| 5. Blue duiker | 5. Enende |
| 6. Guinea fowl | 6. Entajumba |
| 7. Crested francolin | 7. Endahi |
| 8. Chicken | 8. Enkoko |
| 9. Cow | 9. Ente |
| 10. Goat | 10. Embuzi |
| 11. Buffalo | 11. Embogo |
| 12. Other | 12. Ebindi |

Behaviors

67. Some people place snares in Kibale National Park, other people do not. Have you or people from your household placed snares/traps inside of Kibale National Park in the past year?

(Hariho abantu abaratega emitego omu Kibale National Park iwe rundi abantu bomuli eji nju hariho arategire emitego omu Kibale National Park omuwaka oguhwire?)

- Yes (Yego)
- No(Ingaha)
- Other (Ebindi)
- Don't know(Tinkamanya)

How many times in the past year have you:

Nemirundi ingahe eyiwategiregire emitego omwaka oguhwire:

68. Prevented bush fires in Kibale National Park? (Kutangira omuriro omu Park ya Kibale?)

- 0 times
- 1-2 times
- 3-4 times
- ≥ 5 times

69. Reported an illegal activity in Kibale National Park? (Waratabarize emirimo etaraikyirizibwa mu Park ya Kibale?)

- 0 times
- 1-2 times
- 3-4 times
- ≥ 5 times

70. Removed wire snares from Kibale National Park? (Kutegurura emitego kuruga mu Park ya Kibale?)

- a. 0 times b. 1-2 times c. 3-4 times d. ≥ 5 times

Now I am going to read you some statements about your opinions and activities. Remember, as I have said before, there are no right or wrong answers. (Obu ndaza kukushomera ebi bigambo. Mukutekateka kwawe nomikorere. Oijuke, enyimaho mbaire nagambire, tihariho engarukamu ehikyire nainga eye'gwire. Ninkushaba ongambire ku orabe, noikyiriza orakihimisiriza, noikyiriza, orabamganisa, torakyiriza orangirakimwe.)

71. Sometimes you have to place snares/traps in your fields to prevent animals from raiding your crops. (Haliho obwaratega onitego omundimiro yaawe kuzibira ebikooko kwona ebyokurya.)

- a. Yes (Yego)
b. No (Ingaha)
c. Don't know (Tinkamanya)

72. Since animals from the park raid crops, it is your right to go to the park and hunt animals. (Ku enyamaiswa kuruga mu park ziraija kwona ebyokurya, tiburi bugabe bwawe kugenda mu park okahiga enyamaiswa .)

- a. Yes (Yego)
b. No (Ingaha)
c. Don't know (Tinkamanya)

73. Firewood is scarce and the park has a lot of wood therefore there is no problem if you go and take some firewood from inside of the park. (Enku tizirarebeka, kandi park eine enku nyingi, mbwenu hariho eshonga kuba ogenda okagira eziwaiha omunda ya park.)

- a. Yes (Yego)
b. No (Ingaha)
c. Don't know (Tinkamanya)

74. Meat is scarce and sometimes you have to hunt inside of Kibale National Park to find it. (Enyama terakyira kurebeka kandi akaire akandi oine kuza kuhiga munda ya park ya Kibale kugisherura.)

- a. Yes (Yego)
b. No (Ingaha)
c. Don't know (Tinkamanya)

75. Water is plentiful in the park, therefore you sometimes go to the park to collect it. (Amiizi nisingi omu park, hariho obworazaya kivenda amiizi.)

- a. Yes (Yego)
b. No (Ingaha)
c. Don't know (Tinkamanya)

Perception of Enforcement

76. If a person enters the park illegally to extract a resource his/her chance of getting apprehended by park authorities is:

(Kuba omuntu agenda mu park ataikyirizibwe, okwihamu ekyobutungyi. Ogwe,, omugisha gwe ogwokufubirwa abakuru ba park nigushushakyi:)

- a. Very high (Nogwa haiguru munonga)
- b. High (Nogwahaiguru)
- c. Medium (Nogwa rwagati)
- d. Small (Nimuche)
- e. Very small (Nimuche munonga)
- f. Don't know (Tinkamanya)

77. What would occur if you were caught in Kibale National Park illegally extracting resources? (Ni kiiha ekyakubasa kubaho kuba okwatirwa mu park ya Kibale oraihamu ebyobutungyi otaikyirizibwe?)

- a. Fined (Oratangibwa)
- b. Jailed (Barakukoma/kukusiba)
- c. Taken to LC 1(Barukutwara owa LC1)
- d. Don't know (Tinkamanya)
- e. Other (Ebindi) (specify):

Thank you so much for your time. I have asked you many questions, now do you have any questions?

78. (Observe the exterior of the house; is it painted?)

- a. Yes
- b. No

79. (Observe the roof-material of the main house and circle appropriately)

- a. Iron sheets (Amabate)
- b. Tiles (Amategura)
- c. Concrete (Ceminti n'amabare)
- d. Polythene paper (Ekivera)
- e. Grass-thatched (Obunyasi)
- f. Debe roof (Debe)

80. What kind of walls does the house have?

- a. Brick
- b. Mud
- c. Plaster
- d. Other

81. End time (Eshaaha yokumara)

APPENDIX B
ENGLISH/RUTORO LANGUAGE SURVEY OF RANDOMIZED RESPONSE TECHNIQUE
SURVEY

1. Respondent ID number (Rukugarukamu akokurorwaho)
2. Interviewer's Code (Kikaguzibwa)
3. Variation of Survey: A/B ?
4. Date (Ebiro byómwezi)
5. Start time (Esaha yokutandiika)
6. Language Used: 1 = Rutooro; 2=Rukiga 3=English
7. Translator Used? Yes/No
8. Village Name (Ekyaro)
9. Parish Name (Omuruka)

Socio-Demographics

In the first part of the interview, I will ask you questions about yourself and your family.
(Omu kicweeka kinu ekyokubanza, ninyiga kukukaguza ebikaguzo ebirikukwata hali ime
na'maka gawe.)

10. Sex(oliki): a. Female (Mukazi)
b. Male (Musaija)

11. What is your age (Oine emyaka ingaha)?

12. What is your marital status (Oine eka?)?
- | | |
|------------|-----------------------------|
| a. married | oswirwe (married female) |
| | oswire (married male) |
| b. single | toswirwe (unmarried female) |
| | toswire (unmarried male) |
| c. widowed | mufakati (widowed) |
| d. other | ebindi (other) |

12 a. If married, (man): do you have more than one wife? Yes, No
if yes, how many do you have?

(woman) Does your husband have more than one wife? Yes, No

If yes, how many wives does he have including yourself?

(Obworaba oswire: oine abakazi abarukukira hali omu? Ego, Nangwa

Obweraba ego: oine abakazi baingaha?)

(Obworaba oswirwe : omunyoro wawe aine abakyara abarukukira hali omu? Ego, Nangwa

Obweraba ego, aina baingaha obu naiwe oyebaliremu?)

13. What is the highest level of education you have attained? (Okusoma okuwatungire okurukikirayo nukuha?)

- a. No formal education (Atasome)
- b. Primary education (Akamara idara lya'puraimare)
- c. Lower secondary (s1-4) (Akamara idara lya siniya)
- d. Upper secondary (s5-6) (Akamara idara lya haya)
- e. College (tcs) (Akamara itendekero)
- f. University (Akamara university)

13a. If married, what is the highest level of education your spouse has attained ? (*if the person has more than one wife, ask this of the oldest wife.*) (Obu oraba oswire/oswirwe, okusoma kwamunyoro/mukyara wawe okurukikirayo okuyatungire nikuha?)

- a. No formal education (Atasome)
- b. Primary education (Akamara idara lya'puraimare)
- c. Lower secondary (s1-4) (Akamara idara lya siniya)
- d. Upper secondary (s5-6) (Akamara idara lya haya)
- e. College (tcs) (Akamara itendekero)
- f. University (Akamara university)

14. Now I would like you to tell me the age and sex of all the people who cook, eat and live in this household? (Baine emyaka ingaha boona abantu abarukucumba, nibalya kandi nibarara omuka enu? Olimuki?)

Sex	Age (Emyaka)	≤10	11-20	21-30	31-40	41-50	>51
Female (Mukazi)							
Male (Musaija)							

15. How many children have you produced? (Oine abana baingaha abu wazire?)

15 a. Are all of your children that are eligible (age), attending primary school? Abaana baawe abasemeriire kuba nibasoma mu bitebe ebya primary, boona nibasoma?

- a. Yes (Ego)
- b. No (Nangwa)

15. B. If no, why not? (Obubaraaba batarukusoma habwaki?)

16. What is your tribe? (Ihanga lyawe oli muki?) (Batoro, Bakiga, Bahororo, Banyankole, Banyarwanda or other)

17. How long has your household been settled here (in this particular community) (Iwe omazire kasumiki neka yawe otembwire hanu (omukikaro kinu)?)

- A) ≤5
- b) 5-9
- c) 10-14
- d) 15-20
- e) ≥21

17 a. (If settled in the last 5 years (1999 and later) (Obworaba otembwire emyaka etaano enyuma (1999 no-kweyongeraho) from where did you shift ? (Okafuruka/okarugirra nkaha?)

17 b. (If settled in the last 5 years (1999 and later) (Obworaba otembwire emyaka etaano enyuma (1999 no-kweyongeraho). Why did you choose to settle in this area? (Habwaki okakomamu kutembura omukikaro kinu?)

18. What are your household's main sources of income presently? (Kiki ekirukutahiza entashya yeka yawe biro binu?) Which activity is the most profitable? (Mulimoki ogurukutahiza rundi ogurukugobesa muno?) (rank them) (1=most profitable) (Gihe enamba nosigikira ogwokubanza nogukweyongeraho omuntashya.)

Present economic activities (emirimo eyentashya kasumi kanu)	Rank (enamba)
1.	
2.	
3.	
4.	
5.	

19. Have your income sources changed since the year 2000? (Entashya yawe ya'kahinkukireho kwiha omwaka gwe 2000?)

- a. Yes (Ego)
- b. No (Nangwa)

19 a. If yes, please indicate how they have changed and the reason for the change. (Bweraba ego, nikusaba onyoleke nikwo ehindukire kandi ne'nsonga habwakyi ehindukire.)

Household income source (please order from oldest to most recent (#1 is oldest and #5 is most recent)	Cause of change (Ekyalesere empindahinduka)
1.	
2.	
3.	
4.	
5.	

20. What would you say your household's income is in schillings per month or per season? (Entashya yeka yanyu omusente buli kwezi rundi buli season nizingana zingaha?) (Note: if seasonal write note how many seasons per year.)

21. The land you live on is (Itaaka oine riri):

- a. Official land title (Lyekyapa)
- b. Customary tenure (Lyobugwetwa)
- c. Rented (Lyempangisa)
- d. Public lands (Kalandalanda)
- e. Bought land (Likagurwa)
- f. Other (Ebindi)
- g. Don't know (Tindikumanya)
- h. Mailo land (Ly'obukama bwa tooro)

22. How many acres (of those checked above) do you have (Oine hiika zingaha? (hali eryo itaaka eligambirweho)?

23. Does this household own any means of transport? (Eka enu ine entambura yoona?)

- a. Yes (Ego)
- b. No (Nangwa)

23 a. If yes; what type of transport? (Ebweraba ego, ntamburaki?)

- a. Car/truck (Motor car/ roole)
- b. Motorcycle (Piikiipiiki)
- c. Bicycle (Egaali)
- d. Boat (Eryato)

24. Do you keep any animals? (Oine ebitungwa ebyo'linzire?)

- a. Yes (Ego)
- b. No (Nangwa)

24 a. If yes; what types of animals do you keep and how many? (Ebweraba ego, bisoroki ebyokulinda kandi bingaha?)

Animals (Ebisoro)	Number (Enamba)
Cattle (Ente)	
Goat (Embuzi)	
Chicken (Enkoko)	
Guard dogs (Embwa)	
Pigs (Empunu)	
Other (Nebindi):	

Please answer the following questions to the best of your knowledge. I just want to know what you think. Do not worry if you do not know an answer to a question. If you do not know, just tell me. (Nosabwa kugarukamu ebikaguzo binu kurungi muno omukwetegeza kwawe. Ninyenda kumanya kiki ekyorukutekereza. Otafayo obworaba otarukumanya, ongamibire.)

25. Is there a protected area owned by the government nearby? (Haroho ekikaro ekya'government ekinyakulinzirwe haihi?)

- a. Yes (Ego)
- b. No (Nangwa)
- c. Don't know (Tindikumanya)

A. If yes (obweraba ego):		B. If no or don't know (obweraba nangwa rundi tindikumanya):	
25 a. What is the name of the protected area closest to your house (ibara ly'ekikaro kinu ekinyakulinzirwe haihi muno n'enju yawe nikiha ?)	Name provided (ibara lihairwe) Don't know (tindikumanya)	25 b. Do you know of Kibale National Park(omanyire irindiro ly'e bihangwa erya Kibale)?	Yes (ego) No (nangwa)

↓	↓
<i>If name provided is correct, proceed If incorrect, ask 25b.</i>	<i>If yes, proceed If no, thank the respondent and complete questions at end of survey</i>

Rating Benefits/Costs

Now I would like to ask you about how you are affected by the park. Remember there are no right or wrong answers. We just want your opinion. (Hati ninyenda kukukaguza nkoku paaka erikukutwaza. Ijuka nkokuhataroho ekig'arukwanu ekigwiire, byona bihikire habwokuba ninyenda entekereza yaawe.)

26. The park provides benefits to you. (Park ekuletera amagoba.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

26 a. If agree or strongly agree; in your opinion, what are those benefits? (Ebya magoba binu nibiha obworaba noyi'kiriza?)

b. Please rate those benefits you mentioned using the scale provided. At one end of the scale (5), the benefit you mentioned may be very trivial, while at the other end of the scale, the benefit you mentioned may be very important to you(1). (Amagoba ganu gahe amadara.)

Very important (Amagoba agamani)			Very trivial (Amagoba mataito muno)		
1	2	3	4	5	

27. The park hurts you. (Paaka nekusaasa.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

27 a. (if strongly agree/agree) in your opinion, list the ways you are hurt by the park. (Oboraba no yikiriza, ebyamagoba binu nibiha.)

Please rate the items you listed using the scale provided. (1=hurts you very much, 5=hurts you very little). (Bine eno)

Hurts you very much (Nekusaasa munono)			Hurts you very little (Nekusaasa kataito)		
1	2	3	4	5	

27 b. Do you feel you benefit more from the park than it hurts you? (Nkoku orukwe hura, nogira paaka nekuletera ebyomagoba kukira nkoku erukusera?)

- a. Yes (Ego)
- b. No (Nangwa)

Neighbor's Behavior

Please use the “ladder” to indicate how strongly you feel about the following descriptions of your neighbor’s behavior. At one end you may believe that your neighbor’s behavior is very acceptable (#1), at the other end you may believe that your neighbor’s behavior is very unacceptable (5). Again, remember, there are no right or wrong answers. I am just asking for your opinion. After asking you how you feel, i will ask you why you feel that way. (Nibusaba okozese idara kworeka nikwo okwehurra habigambo ebinkukwataho enyetwaza ya mutahi wawe. Aharubaju rumu enyetwaza ya’ mutahi wawe nosobora kuhurra neyikirizibwa muno (1). Kandi orubaju orundi etakwikirizibwa nakati (5). Ijuka ngu busaho ekigarukwamu ekihikire rundi ekigwire. Kwihaho ninkaguza kwolikutekereza. Obundamara kukukaguza nkoku olikwehurra, ninyija kuku kaguza habwak noyehurra nkoku wangambira.

Very acceptable behavior (Nikikirizibwa muno)	Acceptable behavior (Nikikirizibwa)	Neutral (Ninsobona kukyigumyo)	Unacceptable behavior (Tikinkwikinzibwa)	Very unacceptable behavior (Tikirikwikirizibwa nakati)
1	2	3	4	5

28. A neighbor goes to the park and collects water. (Mutahi ‘wawe kugya mu paaka kuletayo amaizi.)

a. Why did you answer that way? (Habwaki ongarukiremu omulingo ogu?)

29. A neighbor goes to the park to collect firewood. (Mutathi wawe kugya mupaaka kusenyayo enku.)

a. Why did you answer that way? (Habwaki ongarukiremu omulingo ogu?)

30. A neighbor goes to the park to graze animals. (Mutahi wawe kugenda kulisiza mu’paaka.)

a. Why did you answer that way? (Habwaki ongarukiremu omulingo ogu?)

31. A neighbor goes to the park to collect poles. (Omutahi kugenda mu paaka kutemayo emiti).

a. Why did you answer that way? (Habwaki ongarukiremu omulingo ogu?)

32. A neighbor sends a child to the park to collect herbal medicinal plants. (Mutahi wawe kutuma omwana mupaaka kuserrayo omubazi.)

a. Why did you answer that way? (Habwaki ongarukiremu omulingo ogu?)

33. A neighbor goes to the park to set snares in hope of acquiring meat. (Mutahi wawe omunaku kugenda mu’paaka akaserrayo omukubi.)

a. Why did you answer that way? (Habwaki ongarukiremu omulingo ogu?)

34. A neighbor goes to the park to make charcoal. (Mutahi wawe kugenda mu'paaka kwihayo amakara.)

a. Why did you answer that way? (Habwaki ongarukiremu omulingo ogu?)

35. A neighbor enters the park to collect timber. (Omutahi kugenda mu'paaka kuletayo embaho.)

a. Why did you answer that way? (Habwaki ongarukiremu omulingo ogu?)

Kibale-Related Questions

36. How do you compare yourself with other people in your village who have the same size and fertility of land, but who live farther away from the park? (Iwe noyerenga ota naabantu abandi mukyaro kyawe abanyakwine itaka lyorwezo no bwingi kyonka batarukwikara haihi na paaka?)

Feels: (Embera)	Reasons (Ensonga)
1. Better-off (Kurungiho)	
2. Worse off (Kubi muno)	
3. Just the same (Kwisanaaisana)	

37. Were you or members of your family evicted from Kibale in the early 1990s? (Iwe rundi abeka yawe bakabingwaaga omwirindiro lyebihangwa erya Kibale National Park omu myaka ya 1990 nekyatandiika?)

a. Yes (Ego)

b. No (Nangwa)

c. Don't know (Tindikumanya)

38. Has your work or the work of somebody from your household ever been related to Kibale National Park? (Omulimo gwawe rundi omuntu ondi kuruga omuka yawe gwine akakwate/obuzale nirindiro lyebihangwa erya Kibale?)

a. Yes (Ego)

b. No (Nangwa)

c. Don't know (Tindikumanya)

38 a. If yes, in what capacity was (or is) the work related to KNP? (Ebweraba ego, mulingoki omulimo gwali rundi gwine obuzale/akakwate na knp?)

39. Do you face a problem of crop-raiding by wild animals from the park? (Oine ekizibu ekyokwonerwa ebyokulya enyamaiswa ezo mu park?)

a. Yes (Ego)

b. No (Nangwa)

c. Don't know (Tindikumanya)

40. Other than your fields that are close to your home, do you have other fields are closer to the park border? (Oihire ho emisiri yaawe enyakuli haihi neeka, oine endi yoona, erikusangwa haihi nensaro ya paaka?)

- a. Yes (Ego)
- b. No (Nangwa)
- c. Don't know (Tindikumanya)

Support for Conservation

Now I am going to read you some statements that people have made about the park and its lands. Please tell me whether you strongly agree, agree, are neutral, disagree or strongly disagree. Sometimes I will also ask you to tell me the reason why you answered the way you did. There are no right or wrong answers, I am only asking you for your opinion.. If you do not understand a question, please ask me to repeat it. (Hati ningenda kukusomera ebigambirweho abantu hali park nitaaka lyayo. Ninkusaba ogambire obworaba nokigumiza kimu, nokigumya, nosobora kukigumya, tokukigumya rundi torukukigumya nakake. Akaire akandi ninyija kukukaguza kungambira ensonga habwaki ongarukiremu omulingo ogu. Busaho ebigarukwamu ebihikire rundi ekigwire, oihireho ninkukaguza omu'ntekereza yawe. Obworaba otetegezize ekikaguzo, ninkusaba ongambire nkigarukemu.

41. Your relationship with staff from Kibale National Park has been good. (Enkoragana yawe n'abakozi ba Kibale National Park ebaire nungi.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

41 a. Why did you answer that way? (Habwaki ongarukiremu omulingo ogu?)

42. Park staff do not take time to listen to the troubles of people who live in this village. (Abakozi aba park tibarukufayo kutunga obwire kuhuliriza ebizibu by'a bantu abarukwikara omukyaro kinu.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

43. Park staff take local people to be wrongdoers. (Abakozi aba park nibatwara abantu ababulikiro kuba nkozi z'ebibi.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

44. People are poor because they live near the park.

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

45. Management of Kibale National Park is your responsibility as well as the government of Uganda. (Kurolerra Kibale National Park bujunanizibwa bwawe hamu na government ya Uganda.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

46. Kibale National Park should be given to Ugandans living around the park for conversion to agriculture. (Kibale National Park esemerire kuhebwa abantu ba Uganda abarukwikara haihi na park nukwo bakorremu ebyobulimi.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

47. Kibale National Park should be given to Ugandans living around the park for conversion to grazing lands. (Irindiro lyebisoro eya Kibale National Park basemerire barihe abantu abalikulikara haihi balihindutemu eryo kulisizamu.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

48. People should be allowed to collect resources from the park. (Abantu basemereire kwikirizibwa kwiha mu paaka ebibakwetaaga.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

48 a. Why? (Habwaki?)

49. If there were no laws regulating access to resources, all the wildlife in the park would be killed. (Kakuba hataroho ebiragiro ebyokutanga kukozeza eby'obuguda, ebisoro byoona ebyo mu park bya kwisirwe.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

50. These days, animals that live in the park are important sources of meat for people living around the park. (Biro binu, enyamaiswa ezo ezirikwikara omu park zine omugaso omu nyama hali abantu abarukwikara haihi na park.)

50 a. (If agree) What types of animals from the park are important sources of meat? (Ebweraba ninkigumya) /nyamaiswaki kuruga mu park ezine omugaso omu nyama?)

51. What people need from the forest, grasslands and lakes is more important than protecting the forest, grasslands, lakes and-wild animals. (Abantu ebi barukwetaga omu kibira, mu park, n'omunyanja bine omugaso gw'amani kukira kulinda ekibira hamu n'enyamaiswa ezirumu.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

52. Wild animals are very valuable because they bring money to Uganda. (Enyamaiswa zina omugaso muno habwokuba zireta sente omu Uganda.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

52 a. Why did you answer that way? (Habwaki ongarukiremu mulingo ogu?)

53. Wild animals should be protected for future generations.
(Enyameiswa zisemerire kurindwa habwa ensinganto ezo busumi bwo mumerso
(oburukwija).

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

53 a. Why did you answer that way? (Habwaki ongarukiremu mulingo ogu?)

54. Local people benefit from Kibale National Park. (Abantu ababulikiro bagoba ahaki
Kibale National Park.)

- a. Strongly agree (Ninkigumya muno)
- b. Agree (Ninkigumya)
- c. Neutral (Ninsobora kukigumya)
- d. Disagree (Tindikukigumya)
- e. Strongly disagree (Tindikukigumya nakake)

54 a. Why did you answer that way? (Habwaki ongarukiremu mulingo ogu?)

Behavior

I have a few more questions for you.

First, I need you to flip this coin. Let me show you what you are going to do. You flip the coin like this. (Flip coin.) And then look at what it lands on. There are two choices, it may land showing you a head, or it may land showing you a building. Don't tell me what it lands on. You just need to remember what it lands on, but don't tell me what it landed on. It is your secret.

Next, I am going to show you two pictures. One is of a coin with a head on it, similar to the one you may see on the coin. On another is a picture depicting an activity you may have done inside Kibale National Park without permission since the year 2000 began (collecting firewood, charcoal, grazing animals, hunting animals, collecting timber, poles). I am going to put both of these pictures in envelopes and place the envelopes in the bag. You will choose one of the envelopes. It is random. I don't know which one you will choose.

Open up the envelope and look at the picture. Don't tell me which one you are looking at. If you are looking at the head, tell me "yes" if you saw head when you flipped the coin. If you saw the building, then tell me "no." If you are looking at the picture, tell me yes, if you have ever gone to the park since 2000 to do the particular activity without permission depicted in the picture. If you have not gone to the park to do it, tell me no. Please be honest with me, as i have no way of knowing which picture you are looking at.

(Nyine ebikaguzo ebindi bitaito. Ninyenda obake esimoni enu. Leka nkwoleke ekyokuroraho. Esimoni no gibaka oti (baka), nukwo no rora kiki ekyagya haiguru. Haroho

ebisani bibiri ebisobora kwija haigu ru: nihasobora kwija omutwe, rundi ekyombeko. Iwe otanyoleka nikiha ekiraija haiguru, oinireho oikale nokijuka; enu nsita yawe.

Hanyima njakukwoleka ebisani bibiri. Kimu kiroho esimoni eroho omutwe, nigwisana nko gwo sobora kurora hasimoni. Ekisani ekindi nikyoleka ebintu ebyo sobora kuba waka kerahoga omupaaka otaikirizibwe kwiha omuwaka gwe'nkumi-ibiri gutandika. Kusenya enku, kwokya amakara, kulisa, kuhiige, kwihayo embaho, kutema emiti. Ninyija kuta ebisani bibiri binu omu nsahu, nukwo okomemu kimu. Okomemu otarozereho. Oihemu kimu oroleho; otangambira nikiha ekyoyihiremu. Obworaba norona omutwe, ngambira oti "ego" obworaba obeinege omutwe mukubaka esimoni. Obworaba obeinege ekyombeko, ongambire oti "nangwa". Obworaba norora ekisani kindi, ngambira "ego" obworaba wakagyaga mupaaka kwiha ogwenkumi'ibirigutandika kukora ekirikwo lekwa otaikirizibwe. Obworaba otakagyayoga kukikora, ngambira "nangwa."

Nikusaba ombere wamazima habwokuba tiharoho nkoku nsobora kumanya kisaniki ekyorukuroraho.

- a. Coin and firewood (Esimonineuku)
- b. Coin and charcoal production (Esimoni na makara)
- c. Coin and hunting (Esimoni no kuhiiga)
- d. Coin and poles (Esimoni ne miti)
- e. Coin and grazing (Esimoni nokhiisa)
- f. Coin and timber (Esimoni ne mbaaho)

The following questions involve your activities in the park since the year 2000 began. Please feel at ease to tell me what you have done, as this information is private and I will not ask for your name. (Hati twahika hakicweka kyokumalirra. Kinu kirimu ebikorwa byanyu mu paaka kwiha ogwe nkumi ibiri gutandika. Ninkusaba oingambire ebiwaka koraga otaine kutiina kwona habwokuba bulikintu kyona nikiikara kiri kyensita, kandi niibara'lyawe tinkwija kulikukaguza.)

Since 2000 began have you done any of the following activities in the park without permission:

(Kwiha ogwe nkumi ibiri gutandika, wakakoraga kimu hali ebyagya kugambwaho hali paaka otainekwikirizibwa:

61. Collect firewood? Kusenyayo enku?
62. Hunt animals? Kuhiigayo?
63. Make charcoal? Kwokyayo amakara?
64. Collect timber? Kwihayo embaaho?
65. Graze animals? Kulosizaayo?
66. Collect poles? Kutema yo emiti?

Please answer the following statements with yes, no or don't know. (Nosabwa kugarukamu binu ebikaguzo na ego, nangwa rundi tindukumanya.)

67. People are permitted to hunt all wild animals in the protected area. (Abantu nibaikirizibwa kuhiga enyamaiswa zo'mukisaka omu'kikaro ekinyakulinzirwe.)

- a. Yes (Ego)
- b. No (Nangwa)
- c. Don't know (Tindikumanya)

68. Grazing of animals is not allowed inside the protected area (Kulisa ebisoro tukulikwikirizibwa omunda ye' kikaro ekirinzirwe.)

- a. Yes (Ego)
- b. No (Nangwa)
- c. Don't know (Tindikumanya)

69. Placing snares inside the protected area is prohibited (Kutega emitego omunda y'ekikaro ekinyakulinzirwe nikitangwa.)

- a. Yes (Ego)
- b. No (Nangwa)
- c. Don't know (Tindikumanya)

70. A person needs to get permission before he or she can collect resources inside the protected area. (Omuntu nayetaga kutunga okwikirizibwa kubanza nukwo asoroze ebyentahya kuruga omunda y'ekikaro ekinyakulinzirwe.)

- a. Yes (Ego)
- b. No (Nangwa)
- c. Don't know (Tindikumanya)

71. Placing snares in your fields is permitted by park staff if an animal has been raiding your crops. (Okutega emitego omu misiri nikirizibwa abakozi bomu park kakuba ebisoro biba nibyoona.)

- a. Yes (Ego)
- b. No (Nangwa)
- c. Don't know (Tindikumanya)

72. People are allowed to make charcoal inside Kibale National Park. (Abantu baraikirizibwa kwosya amakara omunda ya Kibale National Park.)

- a. Yes (Ego)
- b. No (Nangwa)
- c. Don't know (Tindikumanya)

73. If baboons are raiding your crops, you are permitted to kill them with a spear. (Kuba enkerebe nizona emisiri no'yikirizibwa kuzita nichumu).

- a. Yes (Ego)
- b. No (Nangwa)
- c. Don't know (Tindikumanya)

Resource-Related Questions

We have come to the last series of questions. Again, please feel at ease to be honest with me, as what you are sharing with me is private and I will not ask for your name. (Twahika

ha' bikaguzo byokumalirra. Ninyongera kukusaba kuhuurra otatinire kandi ombere wamazima habwokuba ebyolikungambira nsinta yange naiwe; kandi tinkwijakukukaguza ibara lyawe.)

74. Kibale became a national park in 1993, eleven years ago. Before it became a national park, did you go to the area now called Kibale National Park to collect resources? (Kibale ekaforwa paaka omumwaka gwa 1993,emyaka ekuminagu mu eyenyuma. Etakafwokere paaka wayyaga mukicweka kinu hati ekirikwetwa Kibale National Park kwihayo ebyobutungwa byona.)

- a. Yes (Ego)
- b. No (Nangwa)
- c. Don't know (Tindikumanya)

75 a. If yes, what did you collect? Ebweraba ego, (Bworabe oikirize wayihayoga ki?)

76. If you were allowed to collect any resource from Kibale National Park that you wanted, what would you collect? Please rank order them. (Kakuba noikirizibwa kuosoroza ebyobuguda byoona ebyorukwetaga okuruga omu national park eya Kibale, osobora kwihayoki? (Nosabwa kubiha enamba omu order).

Products (Ebintu oihire mu park)	Rank (Enamba zabyo)
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77. If a person enters the park illegally to extract a resource his/her chance of getting apprehended by park authorities is: (Kakuba omuntu ataha omu park ataine ekiragiro kyokwikirizibwa okwihamu ekyobuguda akozeseze omugisagwe natunga okufubirwa abakuru ba park)

- a. Very high (Muno muno)
- b. High (Muno)
- c. Medium (Kake)
- d. Small(Kataito)
- e. Very small (Kataito muno)
- f. Don't know (Tindikumanya)

78. What would occur if you were caught in Kibale National Park illegally extracting resources? (Kiki ekirukubaho kakuba okwatirwa omwirindiro lyebihangwa erya Kibale otaine kiragiro noihamu ebyobuguda?)

Socio-Demographics

I have asked you many questions. Thank you for answering them. Do you have any questions for me? (Nkukagurize ebikaguzo biingi; webale muno kubigarukamu. Iwe oina ekakaguzo kyona?)

79. (Observe the exterior of the house; is it painted?)

- a. Yes (Ego)
- b. No (Nangwa)
- c. Don't know (Tindukumanya)

80. (Observe the roof-material of the main house and write it down)

- a. Iron sheets (Amabate)
- b. Tiles (Amategura)
- c. Concrete (Cement n'amabale)
- d. Polythene paper (Obuvera)
- e. Grass-thatched (Obunyansi)
- f. Debe roof (Edebe)

81. What kind of walls does the house have?

- a. Brick
- b. Mud
- c. Plaster
- d. Other

82. End time (Esaha yókumara)

GPS coordinates:

APPENDIX C
PHOTOS USED TO CARRY OUT RANDOMIZED RESPONSE TECHNIQUE



Figure A-1. Photo representing collection of charcoal



Figure A-2. Photo representing hunting



Figure A-3. Photo representing collection of poles



Figure A-4. Photo representing collection of timber



Figure A-5. Photo representing collection of firewood



Figure A-6. Photo representing grazing

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BIOGRAPHICAL SKETCH

Jennifer N. Solomon was born in 1971 in Hudson, New York. Raised in Spencertown, New York, she graduated from Chatham High School in 1988. The next year was spent in Lucelia, Sao Paulo, Brazil, where she was a Rotary International Exchange student. In 1993 she earned a B.A. in environmental studies and political science from State University of New York at Buffalo. After graduation she moved to the western part of the United States where she worked in the fields of environmental education and political research. In 1995 she joined the Peace Corps in Nicaragua where she worked with a Dutch non-governmental organization training primary and secondary school teachers to incorporate environmental education into the curricula. After her Peace Corps experiences, she traveled throughout Central and South America and co-directed an environmental education program in Ecuador. In 2000 she earned a M.A. in environmental policy from Tufts University. The same year she entered the Ph.D. program in Wildlife Ecology and Conservation at University of Florida. Upon completion of her Ph.D. program Jennifer will pursue work in the conservation and development field.