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# Wildlife Snaring in Budongo Forest Reserve, Uganda

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*Snaring is an indiscriminate vertebrate trapping method that has maimed more than 36% of an estimated 700 resident chimpanzees (Pan troglodytes) of Budongo Forest Reserve. This study was conducted in two phases to assess this problem. First, we administered questionnaires to 240 randomly selected households in villages around the reserve to look at socioeconomic and cultural contexts within which snares are set. Second, hunters identified in the first phase were purposefully selected for deeper discussions into snaring; 12% of the farmers set snares. Logistic regression showed a significant relationship between snaring and socioeconomic variables such as education. Hunters considered bushmeat an integral part of their livelihood and thus, snaring may continue or increase from current levels. Alternative sources of protein and cash for local people will be necessary to offset snaring problems. Conservationists need to address in-forest diversity and strategies that improve food security and income for forest edge communities.*

**Keywords** human–wildlife interaction, conservation, snaring, bushmeat, livelihoods

## Introduction

Throughout the tropics, wild animals and in particular large vertebrates are facing competition caused by anthropogenic disturbances of their habitats to the extent that some have been recorded as endangered, some driven to extinction because of the resulting habitat fragmentation, shrinkage, and loss of food source (Chapman, Lawes, & Eeley, 2006; Plumptre et al., 2003), yet others are facing an increasingly threatening problem of hunting for bushmeat, cultural values and income (Bushmeat Crisis Task Force, 2000;

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Chapman et al., 2006; Robinson & Bennett, 2004). Generally, many methods are used to kill wildlife and this article discusses one aspect of wildlife trapping and killing using snares.

Snares are wire or nylon traps that are set on the forest floor along paths of targeted animals or at water points where the animals go drinking. Snares are indiscriminate and catch all animals including humans (Bushmeat Crisis Task Force, 2000; Muller, 2000). They are very simple to make. It generally takes less than thirty minutes to make a snare (Muller, 2000). Related to snares are man traps, which are made of stronger metals and are leg hold traps. Around Budongo Forest Reserve (BFR), man traps are almost exclusively set in gardens while snares are set in both gardens and the forest reserve. Although hunters always select sites where animal numbers are known to be high, they often set snares in locations where such snares are less likely to be seen or removed. This makes tropical rain forests like Budongo ideal for snare setting.

BFR is the largest natural forest in Uganda and one of the country's tropical rain forests with abundant fauna, some of which are endemic. The reserve is home to globally threatened fauna such as the chimpanzee (*Pan troglodytes*) (Howard, 1991). Waller (1995), Fawcett (2000), Waller and Reynolds (2001), and Grant and Ralston (2002) have shown Budongo's fauna to be threatened by snaring. Some efforts have been made to alleviate the effects of snares. For instance, a snare removal team is employed by the Budongo Conservation Field Station (BCFS) to patrol and remove snares. BCFS is a long-term research field station based in the Budongo Forest. No studies, however, have been carried out to understand how the snared bushmeat is used as a source of livelihood as well as the socioeconomic and cultural patterns of snaring. Snaring as any hunting technique is a concern both as a conservation and human livelihoods challenge. It leads to a reduction in animal population, particularly important in the case of rare or endangered species but also with potential cascading effects on the entire forest system; for example, on regeneration of plant species that depend on the snared animals for dispersal while at the same time the ensnared bushmeat can be a source of livelihood, either consumed at home or sold to earn some cash. As such, it is invaluable to gain a clear understanding of both the anthropogenic facet of snaring and the magnitude of the effect of snaring to the forest biota. This study: (a) analyzed the cultural and socioeconomic contexts of snaring; (b) determined the patterns of snare recovery by the patrol team; and (c) identified possible strategies for controlling snaring to enhance wildlife conservation.

## Methods

### *Study Area*

Budongo Forest Reserve was gazetted a central forest reserve in 1932. It covers 825 $km^2$ on gently undulating slopes averaging 1,050 m a.s.l in Masindi district (Figure 1). The annual minimum temperature ranges between 17–20$^oC$ and maximum 28–29$^oC$. Rainfall is bimodal with an annual range of 1,150–1,500 mm (Johnson, 1993).

The fauna includes 159 species of forest birds, 42 species of forest swallowtail and Charaxes butterfly, and 5 species of diurnal forest primates. Other species include weyns duiker (*Cephalophus weynsi*), blue duiker (*Cephalophus monticola*), guinea fowl (*Guttera edouardi*), bush buck (*Traglelaphus scriptus*), and bush pigs (*Potamochoerus porcus*) that are frequently snared. The flora consists of grassland and forest vegetation types (Eggeling, 1947; Howard, 1991) categorized into four forest types (colonizing, mixed, swamp, and climax) (Eggeling, 1947; Langdale-Brown, Osmaston, & Wilson, 1964).

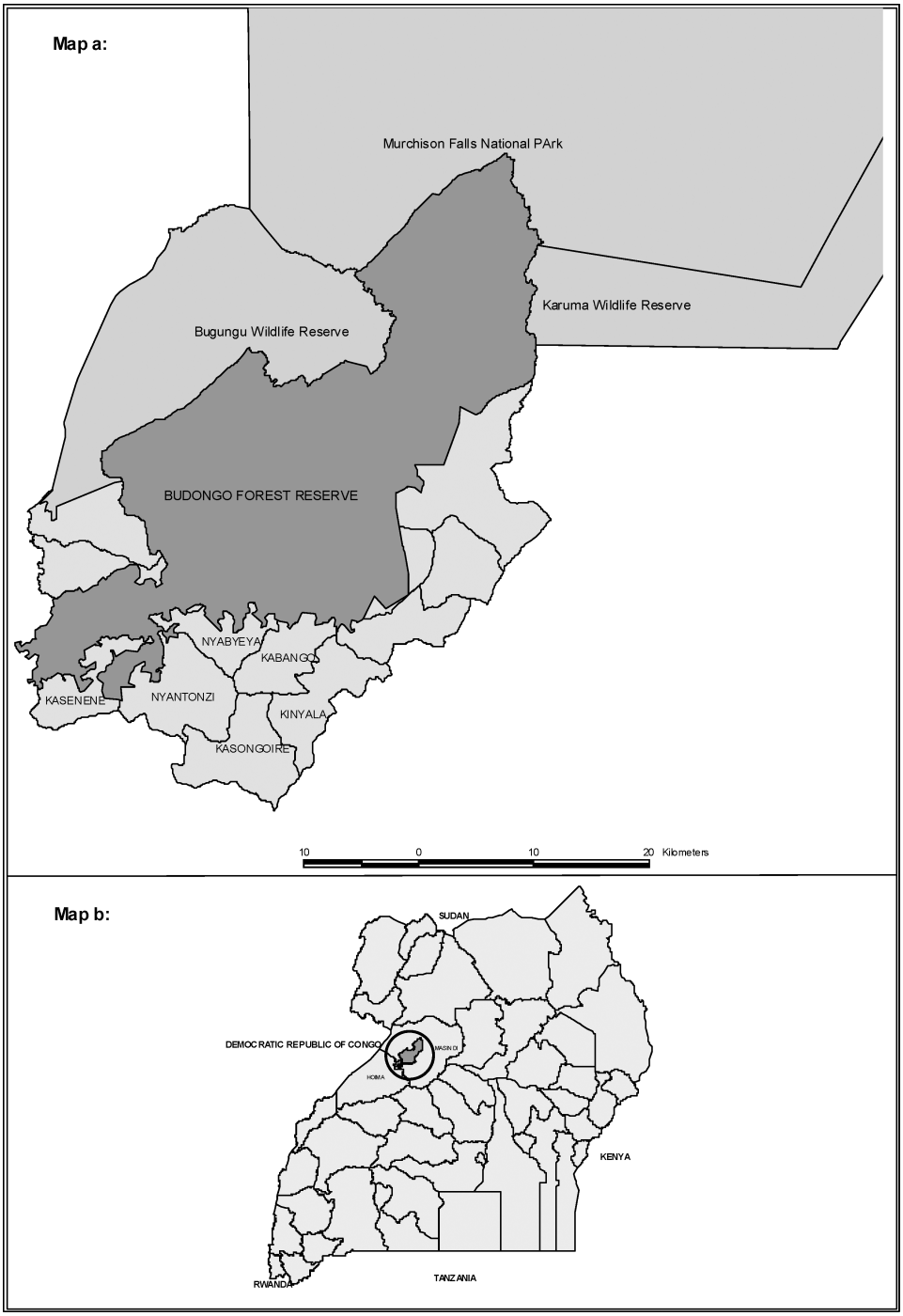


**Figure 1.** Map of Budongo Forest Reserve. (a) Detailed map of Budongo Forest Reserve showing neighboring land uses and the sample parishes. (b) Location map of Budongo Forest Reserve within Uganda.

The local communities living at the edge are from different ethnic origins (Johnson, 1993); and a majority (80%) are subsistence farmers. Crop raiding by the reserve's resident fauna has resulted in substantial human–wildlife conflicts (Brooks & Buss, 1962; Hill, 1997; Hill, 1998; Hill, 2000; Tweheyo, Hill, & Obua, 2005). The southern edge of Budongo is bordered with sugar cane plantations. This has compounded the crop-raiding problem. The sugar cane growers are against the chimpanzees and other crop-raiding animals. The Budongo forest is also important for the livelihood of the surrounding communities that depend on the reserve for resources that are consumed by households (e.g., medicinal plants) and others sold for income (e.g., timber, bushmeat).

### *Field Methods*

A combination of purposeful and random sampling methods was used to select sample households. The surveys were carried out in two phases: (a) initial insights into snaring as a hunting technique and its socioeconomic and cultural patterns were gained through the interviewing of randomly selected households, and (b) potential alternative livelihood activities that can substitute for snaring were identified by purposefully targeting hunter households identified in the first phase.

### *Snaring as a Hunting Technique and its Socioeconomic and Cultural Context*

A numbered list of parishes within Budongo sub-county that border the reserve was generated. The structure of local government in Uganda is a five-level system that starts at the village level and, in order of geographical area, rises up through the parish, sub-county, and county levels to the district level. For this study, six parishes (Kasenene, Nyantonzi, Kasongoire, Kinyara, Nyabyeya, and Kabango) were randomly selected (Figure 1). For each selected parish, two villages neighboring the forest were selected. For each sample village, the village leader was approached, the study was introduced to this leader, and its purpose explained as purely scientific and academic. It was thoroughly explained this had no legal implications whatsoever and that all the responses were to be treated anonymously and with confidentiality. This assurance was necessary not only for ethical reasons but also because snaring is illegal in Uganda. After providing this background, the leader was requested to help us identify four to six individuals s/he considered most knowledgeable on the subject matter. These constituted a group of key informants for that sample village and a Focus Group Discussion (FGD) was held with each such group. In the meetings: (a) it was again clarified that the research was for purely scientific and academic purposes and had no legal implications whatsoever; (b) a checklist of questions was used to gain initial insights into snare setting. FGDs were used to obtain people's perspectives about snaring. Participants, mostly men discussed issues relating to snaring including why people set snares, what kind of people often set snares, the sources of materials used to make snares, how bushmeat is sold, and cultural hunting practices. Participants were also asked to suggest alternative livelihood activities they felt would be best substitutes to snaring. In all, 12 FGDs were conducted, one for each sample village. The data collected from FGDs were augmented and validated by semi-structured questionnaires administered through individual interviews. Also conducted were field observations and informal field discussions.

For the semi-structured interviews, a total of 12 villages were randomly selected from the 6 parishes of Budongo sub-county and a total of 240 households (20 from each village) were interviewed. To select these, a numbered list of all households in the village was obtained from a village leader and for each sample village 20 households were randomly

selected for the first phase of the interviews. The semi-structured interviews were conducted at the respondents' homes with the household heads and in a few circumstances with the most senior and knowledgeable of the adults available. The interviews were conducted with the help of a research assistant who understood all the local languages. The principal investigator understands the native language. Although this area has a number of immigrant households, most of them have been around for a long time, and can speak the native language. The native language was used as the medium of communication with the multi-lingual research assistant as a backup to explain where necessary, but overall there was no communication problem. Before conducting the individual semi-structured interviews, it was clarified to each respondent that the purpose of the study was purely scientific and academic and had no legal implications whatsoever. They were also assured of anonymity and confidentiality. However, prior to these interviews, a draft semi-structured questionnaire prepared in advance was discussed with the staff of BCFS together with the field assistant. The discussions focussed on the flow of the questions, clarity, and whether the questions would generate the required information. Following this discussion, a pre-test questionnaire that reflected appropriate suggestions was made out of the draft questionnaire.

Pre-testing was done in two randomly selected villages (Nyakafunjo and Kapeka II) that were not part of already selected sample villages. Pre-testing allowed the research assistant additional familiarity with the questionnaire and offered an opportunity to apply and review the method. The focus was on respondents' understanding of questions (and how these understandings differed from the intended) and the problems respondents encountered answering the questions. Additional changes were proposed, reviewed, and incorporated into the questionnaire.

### *Patterns of Snare Recovery*

Data of snares confiscated between January 2004 and December 2006 were used to determine the success of the snare removal initiative. These data are part of the long-term program by Budongo Conservation Field Station (BCFS) to eradicate snaring in Budongo. Four ex-hunters working with BCFS patrol the forest an average of 20 days per month locating and removing snares. The four-man team follows paths used by hunters as a clue to locating the concealed snares. Given that the team is comprised of ex-hunters, they were familiar with the paths used.

### *Strategies for Controlling Snaring*

To gain a deeper insight into the patterns of snare setting and possible strategies for controlling snaring, five villages (Maramu, Karongo, Nyakafunjo, Lugazi, Kanyege) were selected for more interviews. These villages were selected because from the first phase of this fieldwork they were found to have a relatively higher concentration of hunters. Purposive sampling ensured that only hunters were visited. In total, 24 individual hunters were identified and interviewed.

### *Data Analysis*

Binary logistic regression (Agresti, 2002) was used to show how socioeconomic factors influence the decision to set snares since snare setting is a dichotomous variable. Ethnic origin was categorized into: (a) Banyoro (the natives); (b) immigrants from other parts of Uganda; and (c) immigrants from West Nile region of Uganda and Democratic Republic of Congo (DRC). The distinction between the natives and immigrants was made because

these two groups typically use forest resources in different ways. The natives often have long-term experience- based associations with the forest and may also have social taboos against extracting particular forest products. The immigrant group was further divided into two groups (b and c) because it is believed that people from the West Nile region of Uganda and DRC are particularly fond of bushmeat. The education level was categorised into three: (a) no formal education; (b) primary education; and (c) above primary-level education. The family size was categorized into three: (a) 1–5; (b) 6–10; and (c) >10 household members. The main occupation was defined as that activity that contributes most to the household's livelihood. For our analysis, the main occupation was treated as a binary response categorized into subsistence farming and others.

Using Minitab 14, qualitative factors that had more than two levels (ethnic origin, education level, family size, and age) were input as factors to show the variation between levels. Variable levels expected to have a significantly different influence on snare setting were assigned a value of 1, so that they were the basis for comparison across the different levels of a factor. *P*-values were used to show the significance of the difference in influence by the different levels of a factor, and the odds ratio to show the variation in the probability of setting snares by households at different factor levels. By having more than 1 degree of freedom these predictors were amenable to a Chi-Square test. The test was therefore specified for them when running the model, to show the significance of the relationship between the predictor and snare setting. Factors with only two levels (main occupation, whether one set snares in the garden, and kept domestic animals) were only specified in the model and treated as binary responses. The respective Chi-square values and the associated *p*-values were used to test the significance of the factors.

To determine the patterns and the rate of snare confiscation, the mean number of snares recovered per day for each month was calculated. We opted to compare the daily recovery rate since the number of working days per month varied. Thereafter an average daily recovery rate was computed for each month across the three-year period.

## Results

### *Basic Sample Characteristics*

The households around Budongo differ in terms of socioeconomic and demographic factors (Table 1). The majority of respondents (78%) were males. The average age was 37 years and average household size was seven people. Sixty-two percent considered subsistence farming their main occupation and 38% other activities (employment with Kinyara sugar works (KSW) and sugar cane outgrowing (15%); carpentry and woodwork (5%); beer brewing (3%); brick making (2%); civil servants (3%); business (4%); pit sawing (6%)).

In general, people living around the reserve reported to rarely eat meat, but up to 90% reported they can eat bushmeat when available. Only a small fraction disregarded bushmeat. The animals most frequently hunted are bushpigs (*Potamochoerus porcus*) and duikers (*Cephalophus spp.*) accounting for 30 and 29 percent of all catch, whereas the baboons (*Papiocynocephalus anubis*) accounted for 16%. Others include the cane rat (*Tryonomus swinderianus*) and porcupine (*Hystrix cristata*).

### *Snaring as a Hunting Technique*

Snares were regarded the most common tool used for hunting with up to 31% of the respondents acknowledging their use (Figure 2). Other tools used included arrows and

**Table 1**
Socioeconomic characteristics of the communities surrounding Budongo Forest

| Parameter/Response | Frequency | Percentage |
|---|---|---|
| *Sex* | | |
| Male | 188 | 78 |
| Female | 52 | 22 |
| *Age* | | |
| <25 | 22 | 9 |
| 25–50 | 174 | 73 |
| >50 | 44 | 18 |
| *Main occupation* | | |
| Subsistence farming | 148 | 62 |
| Others | 92 | 38 |
| *Education level* | | |
| No formal education | 37 | 15 |
| Primary | 139 | 58 |
| Above primary | 64 | 27 |
| *Keep domestic animals* | | |
| Yes | 168 | 70 |
| No | 72 | 30 |
| *Tribe* | | |
| Banyoro | 72 | 30 |
| Immigrants from elsewhere | 25 | 10 |
| Immigrants from West Nile & DRC | 143 | 60 |
| *Household size* | | |
| 1–5 | 80 | 33 |
| 6–10 | 104 | 43 |
| Above 10 | 56 | 24 |
| Total | 240 | 100 |

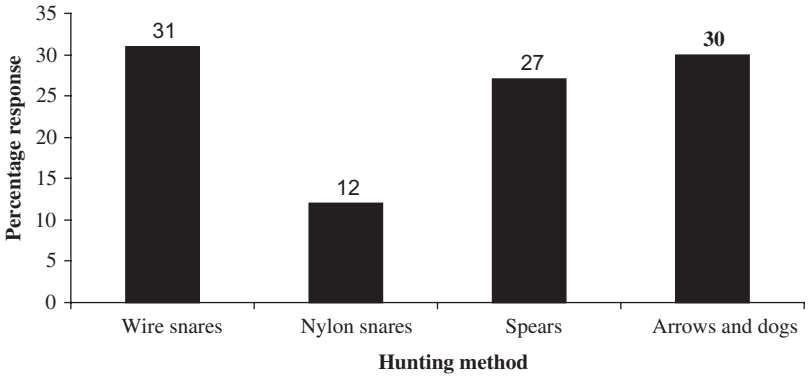


**Figure 2.** Hunting techniques used around and inside Budongo Forest Reserve.

dogs, spears, and nets. And over 80% of the respondents admitted that there has been a gradual change in the tools and methods of bushmeat hunting over time to the use of snares.

### *Cultural and Socioeconomic Patterning of Snaring*

*Snaring and the Rural Livelihoods.* Twenty-three percent of the respondents admitted to have made snares sometime. Out of these, 85% used wires and the rest used nylon. Nylon was obtained from nylon sacks bought from the local markets. Wires were obtained from a number of sources (Figure 3). The lethal wires were the most abundantly used material, and KSW, the main source. This was emergent from the FGDs as well. Payment for wires obtained from both employees of KSW and other people was either by cash or a promise to share the catch while market sources were paid for in cash.

Twenty-five percent of the respondents reported to have eaten bushmeat. Of these, 47% hunted while the rest reported to buy from hunters. Bushmeat sales contributed to the incomes of 86% of the people who set snares. The money generated was used, like income from other activities, on a number of household necessities such as buying food and kerosene and paying health and education bills. Bushmeat was an important component of some concerned households' "survival kit" although generally raised less than 15,000 Uganda shillings (less than USD 10) per month per hunter (Figure 4). For example, a wild pig sold at USD 8.8 while a bushbuck fetched USD 5.8 and a duiker USD 1.5. However, there were seasonal variations in the market price, varying from species to species based on local buyers' perceived taste, but prices were generally higher in the wet season.

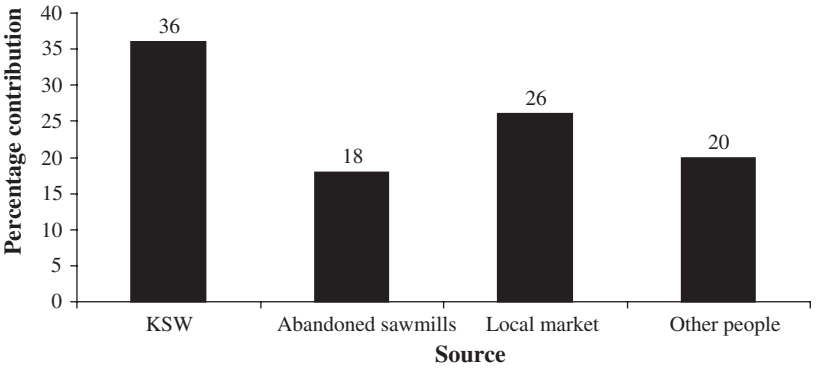


**Figure 3.** Sources of wires for making snares.

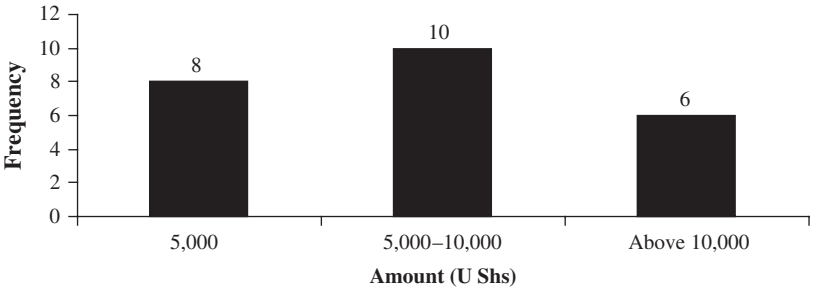


**Figure 4.** Monthly incomes derived from the sale of bushmeat around BFR.

Eighteen percent of the farmers responded to be setting snares in gardens. Targeted crop- raiding animals were baboons (*Papio anubis*), wild pigs (*Potamochoerus porcus*), porcupine (*Hystrix africaeaustralis*), monkeys (Cercopithecus sp.), and squirrels (Xerus sp.). Baboons were reported not only to destroy crops but also to kill chickens and discourage livestock rearing among households settled adjacent to the forest edge. A total of 12% of the respondents reported setting snares in the forest.

Almost all animal parts were valued. For example, skins were sold to traditional healers, horns served either as crafts or trumpets in hunting, and meat including offals was eaten. Snare setting was mainly done in groups of 2–6 people. Desire for bushmeat was reported to be strong and upon learning that a hunter had entered the forest, people kept monitoring and at times booked the meat in advance. In rare cases, hunters moved from house to house as hawkers for bushmeat.

Over 85% of the individuals setting snares in the forest had lost some of their snares. The losses were blamed on three factors: snares being removed by Budongo Conservation Field Station staff (62%); irregular checking on snares resulting in forgetting the exact locations (25%); and theft by pit sawyers (13%).

*Snaring and the Cultural Context.* Traditionally, local people hunted using nets, not snares. They hunted believing they were serving "Irungu," the god of hunting. Hunting has for a long time been part of the culture of the Banyoro. It is believed that one of their prominent traditional kings, Kabalega, hunted around Budongo's "royal mile," which is today named Kabalega Drive. The local people claimed that snaring as a hunting technique was mainly attributable to immigrant tribes, but in general various reasons were cited for setting snares: (a) the search for meat for domestic consumption; (b) source of income from the sale of bushmeat; (c) bushmeat being more delicious than domestic meat; (d) the lack of money to buy meat; (e) domestic animals could not be relied on because they took long to mature and were prone to raids by baboons; and (f) domestic animals were a source of income (not for domestic consumption).

*Local Socioeconomic Profile and its Effects on Snaring of Vertebrates.* Important factors in relation to snare setting were ethnic origin, formal education levels, household size, main occupation, and snare setting on farm (Table 2).

*(a) Ethnicity of forest edge communities.* Snaring was significantly related to ethnic origin (Table 3) ($\chi^2 = 6.1$, $df = 2$, $p \leq .05$). The probability of setting snares in the forest increased from natives to immigrants from other parts of Uganda and immigrants from either West Nile in Uganda or DRC, in that order. From the odds ratio, the chance of setting snares increased by more than two-fold if one was an immigrant from either West Nile or DRC as compared to immigrants from elsewhere, and more than 10 times when compared with the Banyoro natives.

*(b) Level of formal education.* There was a strong relationship between formal education levels and snare setting ($\chi^2 = 9.6$, $df = 2$, $p = .008$) and the probability for an individual to set snares in the forest decreased with increasing levels of formal education as indicated by the negative coefficients (from –2.2 for primary education to –21 for above primary education) and the falling odds ratio (from 0.11 for primary education to zero for above primary education). The odds ratio for above primary-level education was zero because none of the individuals who admitted to setting snares had this level of education.

**Table 2**
Socioeconomic and demographic factors that affect snare setting in Budongo

| Predictor | Coefficient | Std. dev. | Z | *p*-value | Odds ratio |
|---|---|---|---|---|---|
| Constant | 5.923 | 2.364 | 2.510 | 0.012 | |
| *Ethnic origin: Immigrants from* | | | | | |
| Elsewhere | 1.550 | 1.617 | 0.960 | 0.338 | 4.710 |
| West Nile & DRC | 2.318 | 0.957 | 2.420 | 0.015 | 10.150 |
| *Education* | | | | | |
| Primary level | –2.174 | 0.701 | –3.100 | 0.002 | 0.110 |
| Above primary | –21.000 | 3823 | –0.010 | 0.996 | 0.000 |
| *Family size* | | | | | |
| 6–10 | –1.871 | 0.657 | –2.850 | 0.004 | 0.150 |
| Above 10 | –2.466 | 1.027 | –2.400 | 0.016 | 0.080 |
| *Age* (in years) | | | | | |
| 25–50 | –0.796 | 1.111 | –0.720 | 0.474 | 0.450 |
| Above 50 | 0.480 | 1.157 | 0.410 | 0.678 | 1.620 |
| *Main occupation* | –2.309 | 0.914 | –2.530 | 0.011** | 0.100 |
| *Sets snares in garden* | –2.389 | 0.633 | –3.770 | 0.000*** | 0.090 |
| *Keeps domestic animals* | 0.242 | 0.606 | 0.400 | $0.689^{ns}$ | 1.270 |

Log-likelihood = 42.51, G = 87.88, $df = 11$, $p < .001$.
Main occupation was coded as a dummy variable; 1 = subsistence farming, 0 = Others.
*** = significant at p < 0.01, ** = significant at p < 0.05, * = significant at p < 0.1, and ns = Not significant

**Table 3**
Chi-square test for factors affecting snare setting in Budongo

| Term | Chi-square | *df* | *p*-value |
|---|---|---|---|
| Ethnic origin | 6.099 | 2 | $.047^{**}$ |
| Education | 9.618 | 2 | $.008^{***}$ |
| Family size | 10.454 | 2 | $.005^{***}$ |
| Age | 3.375 | 2 | $.185^{ns}$ |

*** = significant at p < 0.01, ** = significant at p < 0.05, * = significant at p < 0.1, and ns = Not significant

*(c) Household size and age of respondents.* Household size was significantly related to snare setting ($\chi^2 = 10.5$, $df = 2$, $p \leq .005$) and the probability of one setting snares in the forest decreased with increasing family size (coefficients; –1.9 for a household with 6–10 people to –2.5 for a household with >10 members). Odds ratio fell from 0.15 to 0.08, respectively, for the two household sizes, thus supporting our observations. Age of respondents and snare setting was not significant ($p \leq .2$) implying no age-specific snaring. However, the chance of setting snares decreased for the age group 25–50 compared to the below 25 and above 50 age groups. Whereas both latter age groups had odds ratio of at least 1, age group 25–50 had an odds ratio of 0.45 (<1) showing a strong likelihood of forest snare setting in the former two groups.

*(d) Respondents occupation and snare setting.* The respondents' main occupation was significantly related to snare setting ($p \leq .01$). From the odds ratio (Table 2), a household that had subsistence farming as its main occupation had a 10 times more chance of setting snares as compared to one that had some other main occupation. However, some of these subsistence farmers set snares on their farms as well to trap destructive animals. Baboons and wild pigs were identified as the most destructive animals as shown by 29% and 27% of the responses, respectively. Other crop raiders identified as problematic included other monkeys (23%), chimpanzees (16%), and porcupines (6%). However, farmers who set snares in their gardens were more likely to set snares in the forest as well. The relationship between setting snares in the gardens and in the forest was very significant ($p < .001$). From the odds ratio (Table 2) a person setting snares in the garden had a 9 times chance of setting snares in the forest as compared to one who did not. Among farmers, keeping domestic animals had no influence on one's decision to set snares in the forest reserve ($p \leq .7$).

### *Patterns of Snare Recovery*

Over a three-year period, an average of seven snares was confiscated per day. There was no change in the number of snares confiscated over the progressive years. Nonetheless, the team appeared to recover more snares during the rainy months of April–June and August–October (Figure 5).

### *Strategies for Controlling Snaring*

Of the hunters interviewed, 52% reportedly had stopped snaring, 20% set snares, 20% denied setting snares, and only 10% used man traps. A number of alternative livelihoods (to snare setting) were considered feasible. The alternatives as suggested by the hunters in their order of importance were: agriculture (48%); livestock rearing (20%); business (12%); casual laborer (8%); and poultry keeping (8%). Former hunters had varied reasons for stopping setting snares. A majority of the ex-hunters indicated confiscation of their snares and the community conservation program conducted by BCFS as the main reasons for abandoning snare setting (Figure 6). Many of the ex-hunters have taken up other forms of occupation, such as subsistence farming; pitsawying; casual laborer; and regular jobs (e.g., with KSW).

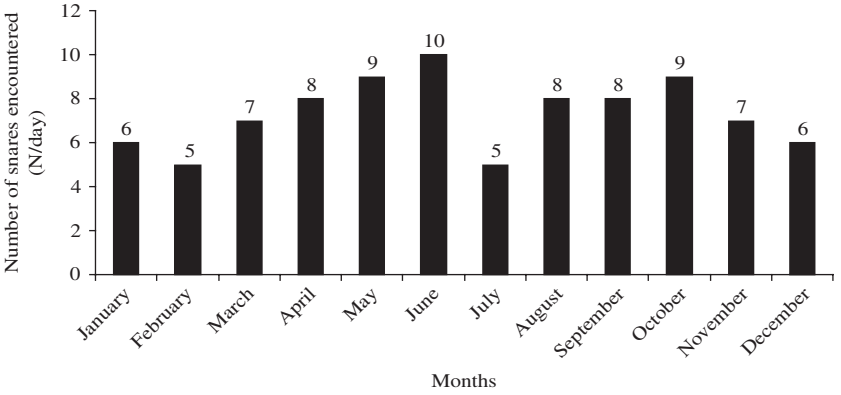


**Figure 5.** Mean number of snares confiscated per month in Budongo Forest Reserve between January 2004 and December 2006.

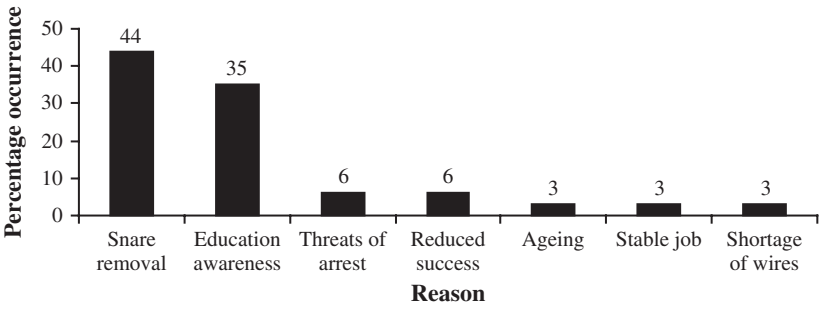


**Figure 6.** Reasons advanced by former hunters for stopping setting snares.

## Discussion

### *Snaring as an Activity and Hunting Technique*

A majority of the respondents were males because snaring as well as hunting in general is a male activity. The ensnared bushmeat is considered a popular source of livelihood to the participating households. Increased use of snares as a hunting technique emanates from the need to use a conspicuous method that can pass undetected by other people whose presence in the reserve for activities such as research, forest patrols, as well as snare confiscation is generally on the increase. Also, hunters tend to prefer methods that are less time consuming and snares come in handy as a hunter can stealthily enter the forest (say in the evening) after he has done all the other work, set many snares within a short period of time, and check for success some other evening without having to put on hold any other essential livelihood activity.

### *Socioeconomic and Cultural Context of Snaring*

*Snaring and the Rural Livelihoods.* The households around BFR hunted the reserve's fauna as a livelihood strategy to supplement their protein and cash sources, but also as a strategy to control crop raiding. These reasons seem to cut across Africa (e.g., see Bushmeat Crisis Task Force, 2000; Chapman et al., 2006; Robinson & Bennett, 2004). Bush pigs and duikers are hunted mainly for their meat while the baboons are often hunted in the process of fighting crop raiding although they too were eaten. Kinyara Sugar Works (KSW) as the main source of wires for making snares implies the factory has a role to play. Collaboration could be established such that KSW management discourages its employees from taking wires out of the factory.

In 1993, Johnson reported 37% of residents of Nyabyeya Parish to eat bushmeat but in our study, which covered Nyabyeya Parish as well, we find an estimate of 25%. This reduction in the number of people using bushmeat was possibly due to: (a) increase in the number of people with salaried jobs and being able to afford buying butcher's meat; (b) many hunters losing snares to the patrol team; (c) increased access to formal education; (d) increased conservation awareness brought about by the community education program; (e) shunning the eating of bushmeat; and (f) the reduction in wildlife numbers, but also, quite possibly (g) some hunters might have refused admitting so in fear of perceived sanctions even though an effort had been made to ensure them of anonymity and that this investigation was for purely academic and scientific reasons and had no legal implications whatsoever.

However, despite the reported reduction, there is some trade in bushmeat as a source of income. Prices were usually higher in the wet season because few people went hunting, as the majority turned to farming activities. In the dry seasons, people had plenty of time to spare because they had little farm work and could go hunting instead; thus an increase in bushmeat supplies and reduction in price. The observed bushmeat trade is an important component of the livelihoods of many communities living adjacent to forest reserves and national parks (Afrikeye, 2005; Bushmeat Crisis Task Force, 2000). Given that bushmeat sellers derive an income from this activity, investing in sustainable rural livelihoods might contribute to reducing the dependence on bushmeat. Snares featured as a main hunting technique and evolution of hunting techniques has been more to their use.

*Local Socioeconomic and Cultural Contexts and Their Effects on Snaring.* Human demographic factors affect conservation of the forest. For example, the problem of snares is mainly attributable to the immigrant communities as the natives around the reserve traditionally used other hunting techniques, notably nets. To them it is claimed hunting was more of a sport, although there is some empirical evidence suggesting traditional hunting for a range of animals, including bush pigs, porcupines, and bushbucks by the Banyoro for bushmeat (Beattie, 1971). Effective strategies of controlling hunting require that these groups are handled differently. For the immigrants, this could be through provision of alternative sources of livelihood while pedagogic tools could in this case appeal to the natives and if a further investigation confirms this as truly a sport, then its regulation could be instituted. We noted that the immigrant tribes from West Nile and DRC have traditionally eaten bushmeat, which was not the case with other tribes. In addition, other tribes only hunted ungulates but the immigrants feed on all vertebrate species including all species of primates in this region. Evidence shows that from about 2,400 years ago, people in the Congo Basin hunted primates (Chapman et al., 2006) and other tribes could have learned from them. The commonly eaten primates around Budongo were the baboon and black and white colobus monkeys. This is set to become a serious problem to the conservation and management of wildlife populations in and around Budongo given that the population of the immigrant tribes is increasing. Interventions like education can help reduce snaring and improve conservation of wildlife. In our study, we found that highly educated individuals were less likely to set snares in the forest. This is supported by empirical evidence elsewhere that has suggested with more formal education, individuals have better access to more profitable livelihood activities and may give less priority to environmental incomes, such as collecting bushmeat, often considered "employment of the last resort" because these activities often have lower return to labor and are typically more strenuous to acquire (Angelsen & Wunder, 2003). Consequently access to formal education may be key to saving the remaining wildlife populations in the Budongo Forest.

In West Africa, Fotabong and Gartlan (2001) found that bushmeat was harvested mostly by food-insecure households with incomes of less than 1 USD per day. Snaring around Budongo was found inferior to agriculture and other sources of income since households with large farms never hunted. Subsistence farmers set snares in the forest to supplement the income and food derived from agriculture. Hunting here, as in other areas, is by people at the margins of the cash economy and whose lives are intertwined with natural areas (Robinson & Bennett, 2004). Forest incomes are an important component of the diversified portfolio of activities adapted by households living adjacent to forest areas. Their recognition is thus important to conservationists who might have to consider alternative sources when they restrict extractive (including subsistence) use of forest areas (Tumusiime, 2006; Vedeld, Angelsen, Sjaastad, & Kobugabe, 2004). Snaring by subsistence

households has also been observed in the lower Zambezi National Park, where snaring closely relates to the degree of hunger in the area emanating from crop failure due to lack of rainfall (Afrikeye, 2005). Given their small land holdings, the subsistence farmers around Budongo usually have a food shortage that is often aggravated by crop raiding (Hill, 2000) and the tendency is to snare all year round.

Informal observations showed households having significant numbers of young and elderly people, which together with the large family sizes heightens the dependence ratio, straining the productive age groups, and encourages dependence on the forest reserve for such resources as bushmeat for subsistence.

### *Patterns and Effectiveness of Snares Recovery and Strategies to Control Snaring*

For effective protection of large vertebrates against snares, the current confiscation initiative does not fully deter snaring. Although some hunters have given up on hunting due to the frustration of losing their snares, many snares are still being set, as indicated by the same number of confiscations over the three-year period. Consequently, it is important to augment this initiative with others, for instance, providing access to education and alternative sources of livelihood such as developing chimpanzee tourism and subsequently employing more local people in the business.

The snare removal team appeared to recover more snares during the rainy seasons as opposed to the dry seasons. This is contrary to the fact that hunters set more snares during the dry season when after harvesting their farm crops and thus have more "spare time." The higher recovery of snares during the rainy season could be attributed to easier identification of wet foot marks along the paths used by hunters. This provides an indication as to when the snare patrols should be intensified. In addition, given that most hunters set snare during the dry season, it is important that the alternative sources of livelihoods should target activities that occupy the hunters during the dry seasons. However, pursuit of alternative livelihoods needs to be approached cautiously as there is some evidence that under such circumstances people might instead adopt the new option as an additional income source instead of taking it up as an alternative to the previous activity (Hill, 2008).

It is evident that snaring is both a conservation and human livelihoods challenge. As a conservation concern, snaring injures wildlife, reduces their populations, and has potential to cause local extinction of particular species. This is exacerbated by both the tendency for humid forests such as Budongo to have lower wildlife biomass compared to drier ones (Robinson & Bennett, 2004) and the large-bodied animals having low biological production that may fail to cope with hunting (Robinson & Bennett, 2000). Moreover, many hunted species play a key role in maintaining ecological functions of forest ecosystems (Schmitz, 2008). Consequently, maintenance of ecological integrity of such ecosystems may, to some extent, be dependent on successful initiatives to reduce snare setting as this is currently a threat to the survival of primate species that are key dispersers of fruit trees through their feeding (Tweheyo et al., 2004).

## Conclusion

Immigrant communities who often have limited access to education were more involved in snare setting and/or bushmeat consumption. The snare confiscation team tended to be more successful in the rainy season as then the hunters' footprints served as clues, especially in areas with less activity. Most hunters were aware of the snare confiscation

initiative and attempted to conceal the snares but also depicted willingness to adopt livelihood sources other than hunting. This means there may be an opportunity for management and conservation organizations to design appropriate strategies for controlling snaring, but possibly a further investigation could be carried out into their motives as it is crucial that these are understood.

Although the current snare confiscation initiative is forcing some hunters to abandon their trade, the long-term strategy should include increased access to formal and informal education, provision of alternative sources of livelihoods, and, perhaps more importantly, long-term local legitimacy and commitment to sustainable biodiversity management should be secured through conservation education coupled with a physical share of the benefits of conservation. But also, if the sustainability of the animal population can be ascertained, possibilities for more discriminating hunting techniques could be explored as this can manage hunting both as a source of food and as a sport.

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