Journal of Threatened Taxa

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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

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26 February 2018 | Vol. 10 | No. 2 | Pages: 11271–11284
10.11609/jott.3416.10.2.11285-11289

Journal of Threatened Taxa | www.threatenedtaxa.org | 26 February 2018 | 10(2): 11285–11289

SHORT COMMUNICATION

HUNTED SPECIES AND HUNTING EQUIPMENT USED BY RAINFOREST POACHERS IN GHANA

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ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

OPEN ACCESS

Abstract: This study investigated species that are hunted in protected rainforest areas and the methods used to hunt them, using data obtained by recording items in the possession of 17 poachers arrested in Kakum Conservation Area in Ghana over a period of 12 months. Twelve species were recorded among 69 total animals. Most were mammals, including primates. Shotguns and wire snares were the main hunting methods used. Primates must be given special protection and conservation attention, as they were found to be prominent among the animals poached.

Keywords: Conservation, hunting, hunting methods, Kakum, protected area.

Human activities have had major impacts on natural resources (Struhsaker 1997). Habitats have been devastated and an unknown number of plant and animal species have been harvested to extinction. Primates have not been spared in the ongoing catastrophe of biodiversity loss, as their populations have come under increasing pressure from encroaching humans and several species are on the brink of extinction (Cowlishaw & Dunbar 2000). The harvest of wild meat (bushmeat) by subsistence hunters in tropical countries has resulted in conspicuous population declines and extinctions at local to global scales for many species of birds and mammals (Diamond 1989; Bakarr et al. 2011). The methods used range from the active pursuit of wild animals to trapping, fishing and other means of harvesting (Cartmill 1993). Bennett & Robinson (2000) defined hunting as "all capture by humans of wild mammals, birds and reptiles, whether dead or alive, irrespective of the techniques used to capture them". Hunting usually involves killing animals for eating, traditional medicines or trophies, but it also includes taking live animals as pets or for the biomedical and/or zoo trades.

Since the beginning of the 20th century, land has been demarcated for conservation with little or no regard for the impact on the livelihood of fringe communities in Africa. As a result, these communities were alienated from the resources upon which their material well being depends. Instead of re-investment of the revenues derived from wildlife back into the area, they were channelled into the government's central treasury. In effect, many local hunters operate clandestinely for personal gain and it also compels many people into unlawful, concealed economy (Jachmann 1998).

In Ghana, according to the Wildlife Reserves regulations LI 710, it is illegal for anybody to enter and hunt, capture or destroy any plant or animal in any wildlife reserve without written permission from the

DOI: http://doi.org/10.11609/jott.3416.10.2.11285-11289

Editor: Hari Balasubramanian, EcoAdvisors, Nova Scotia, Canada. **Date of publication:** 26 February 2018 (online & print)

Manuscript details: Ms # 3416 | Received 22 April 2017 | Final received 24 October 2017 | Finally accepted 31 January 2018

Citation: Wiafe, E.D. (2018). Hunted species and hunting equipment used by rainforest poachers in Ghana. *Journal of Threatened Taxa* 10(2): 11285–11289; http://doi.org/10.11609/jott.3416.10.2.11285-11289

Funding: Presbyterian University College, Ghana.

Competing interests: The author declares no competing interests.

Acknowledgements: I thank the Manager and protection staff of Kakum Conservation Area for their support during the data collection period. I also thank the Wildlife Division of the Forestry Commission, Ghana for granting me the permit to conduct the research.

authority. This makes all forms of hunting in the wildlife reserves illegal.

This study aimed to investigate the animal species poached at the Kakum Conservation Area and the hunting methods normally used. This information will be used to inform decisions on protected area security operations, and to draw the attention of conservationists towards species that are heavily hunted and the methods used for the same.

Materials and Methods

Study area

Kakum Conservation Area (KCA) is located between 1.283333–1.450000 ^{0}W 5.333333–5.650000 ^{0}N and is made up of 210km^2 Kakum National Park (KNP) and its twin 150km^2 Assin Attandanso Resource Reserve (AARR). The Kakum and Assin Attandanso forest reserves were legally regazetted as a national park and resource reserve respectively in 1991 under the Wildlife Reserves Regulations (L.I 1525) under the administrative jurisdiction of the Wildlife Division of the Forestry Commission (Wildlife Department 1996).

The Kakum and Assin Attandanso forest reserves were demarcated between 1925 and 1926 and put into reserve and managed as forest reserves in 1931 and 1937 respectively as a source of timber production and protection of the watersheds of the Kakum River and other rivers which supply water to Cape Coast and its surrounding areas by the then Governing Council of the Gold Coast. The legal framework was supplied by Section 4(4) of the Colonial Forest Ordinance, Cap 63 and gazetted in the Gold Coast Gazette. The conservation

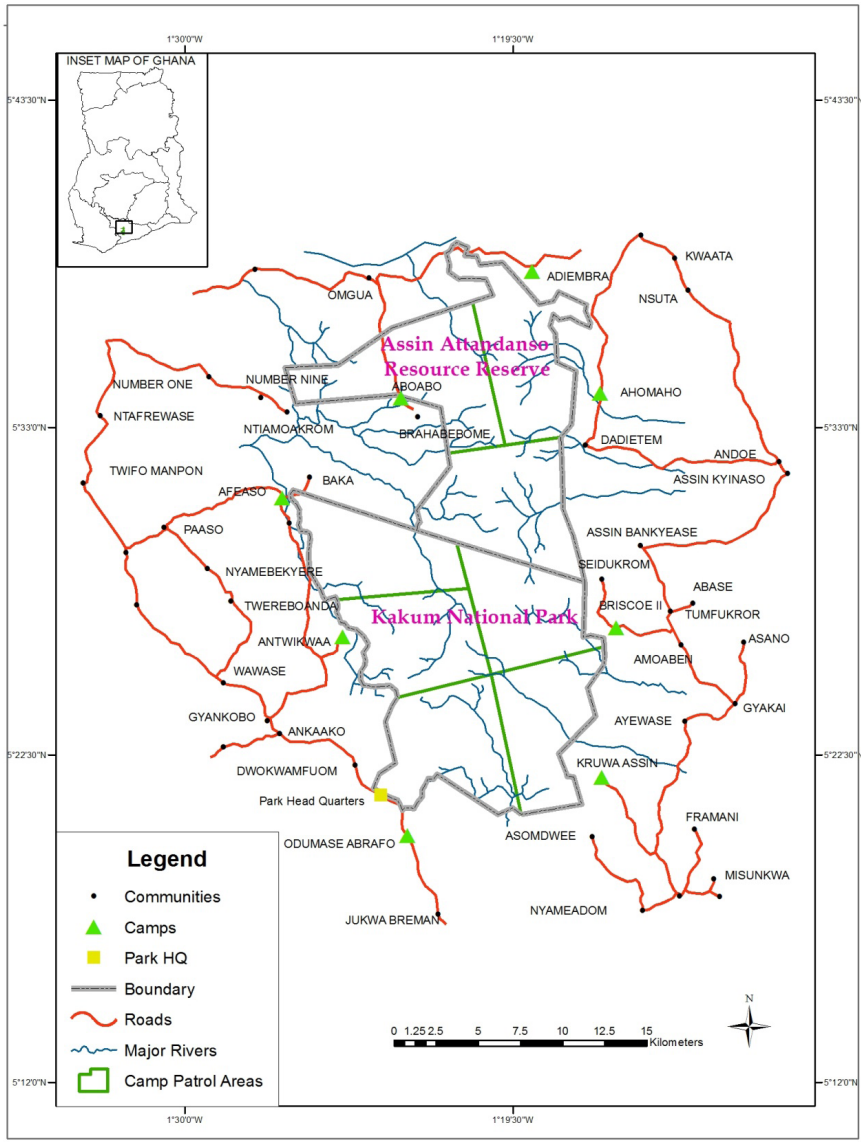

Figure 1. Study area

area has gone through a long period of disturbance as a result of commercial and subsistence hunting on the one hand and logging on the other. Prior to timber exploitation, the reserve was more or less a virgin forest since there was no evidence that farming might have taken place in the reserve for any considerable length of time (Paijmans & Jack 1960). It has, however, been alleged that the local people mined gold and clay several years before the area was reserved (Agyare 1995). About 52 communities are scattered around the conservation area. Prior to the transfer of administration of the area from the then Forestry Department to the Wildlife Department, the communities used to hunt and extract non-timber forest products from the area.

The faunal diversity is composed of mammals such as Forest Elephant *Loxodonta cyclotis*, Maxwell's Duiker *Philantomba maxwellii*, Black Duiker *Cephalophus niger*, Bongo *Tragelaphus eurycerus*, Lowe's Monkey *Cercopithecus lowei*, Olive Colobus *Procolobus verus*, Black and White Colobus *Colobus vellerosus*, and Yellow-billed Turaco *Tauraco macrorhynchus* and many other birds (Amoah & Wiafe 2012).

The management of the conservation area has adopted a militant approach in the form of foot patrol in the forest to deter poachers and/or arrest them. The patrol staffs are equipped with G.P.S. units, compasses, grid maps and riffles (Wiafe & Amoah 2012). This approach is backed by the statutory law under the Wildlife Reserves Regulations, 1971, L.I 710 with its subsequent amendments: no person shall at any time enter into a wildlife reserve unless with the written permission of the Chief Executive of the Forestry Commission (Amoah & Wiafe 2012).

Data collection

The conservation area has been imaginarily divided into eight parts (blocks) and protection camps have been established in the following nearest villages: Abrafo, Antwikwa, Afeaso, Aboabo, Adiembra, Ahomaho, Kruwa and Briscoe II (Fig. 1). Each camp is headed by a protection staff of a rank not less than Senior Technical Assistant (Wiafe 2016). The conservation area uses conventional law enforcement in the form of foot patrols that frequently emanate from each of the protection camps and the various patrol efforts have been documented by Wiafe (2016).

From November 2012 to November 2013, whenever a poacher was arrested by the wildlife protection rangers, data about the poaching activity was recorded. These include the animals that had been harvested, hunting methods used and number of poachers involved. Field patrol reports were analysed within the period to evaluate incidences of indicators of poaching activities in the rainforest protected area. These indicators include poachers arrested, poachers observed, snares, spent cartridges, fire arms etc.

Results and Discussion

Composition of Hunted Species

Within a period of 12 months, 17 poachers were arrested by the wildlife protection rangers on 13 different occasions. Arrests were not made in all the months within the period and the number of poachers arrested per operation ranged from one to three (Table 1). The total number of animals found harvested was 69 individuals contributed by 12 assorted species, with an average off-take of 5.8 animals per month. The Shannon index indicated that the diversity of the species affected by poaching was 1.9 (evenness=0.77). The mean number of all animals found to have been harvested by the arrested poachers were 5.3 (N=13, SD=7.3) per successful arrest. The ratio of primates hunted to all other animals was 1:4.9. The common primates found to have been hunted were Lowe's Monkeys (eight), Spot-nosed Monkey (two), pottos (two) and Olive Colobus (one) (Table 1).

Indicators of Hunting Activities and Hunting Methods

Indications of hunting, capture or destruction of wild animals were recorded. These were categorized as follows: (i) pile/deposits of carbide powder, (ii) empty cartridges, (iii) fire arms confiscated, (iv) human foot prints other than patrol staff, (v) gunshots heard, (vi) poachers arrested, (vii) poachers who escaped arrest, (viii) poachers' camp, (ix) wire snares, (x) saplings and climber cutting.

The presence of carbide powder gave an indication of night hunting. Calcium carbide is used to power a device to generate light, which blinds the targeted animal. Currently, this method of hunting is not common as flash lights have replaced the carbide powdered lights.

Empty cartridges from shotguns are also indicators of hunting activity. Pellets are embedded in a shell, which is discarded after shooting the target animal and replaced with a new one. The sound of gunshots was also an indication of hunting activity. The use of shotguns was evidence in all parts of the conservation area in all seasons.

Trapping was the commonest hunting method throughout the period. Trapping tends to be dangerous because it is elusive and non-selective one of the species hunting methods, sex or age. The predominant

Table 1. Information on poachers arrested from November 2012 to November 2013 at KCA.

Month of arrest	Poachers arrested	No. of animals killed	Method of hunting	Species identified killed by arrested poacher's
December, 2012	3	3	Shotgun	1 Maxwel's Duiker, 2 Pangolins
November, 2012	2	30	Snare Shotgun	2 Live Pangolins, 27 rat 1 Maxwel's Duiker
January, 2013	1	4	Shotgun	2 Maxwel's Duiker, 1 Lowe's Monkey, 1 Spot-nosed Monkey
February, 2013	1	6	Snare	1 Royal Antelope, 2 Maxwel's Duiker, 1 Tree Squirrels, 2 Potto
March, 2013	1	2	Shotgun	1 Maxwell's Duiker, 1 Lowe's monkey
May, 2013	4	10	Shotguns	5 Maxwel's Duiker, 1 Spot-nosed Monkey, 2 Lowe's Monkey, 2 Royal Antelope
July, 2013	3	4	Shotgun	1 Elephant, 2 Maxwel's Duiker, 1 Lowe's Monkey
August, 2013	1	5	Shotgun/ Snare	1 Royal Antelope, 1 Flying Squirrel, 1 Lowe's Monkey, 1 Olive Colobus, 1 live Pangolin
November, 2013	1	5	Shotgun	1 Maxwel's Duiker, 2 Lowe's Monkey, 2 live Pangolins
Total	17	69		

type of trap used is the cable snare, a noose set along an animal's trail. When an animal steps on a pressure pad, it releases a curved pole, which springs up to tighten the noose around the animal's leg. Neck snares capture animals as they try to pass through a cable noose that is perpendicular to the ground. A variation of the neck snare method is to build drift fence, a fence of branches and leaves (often palm) to direct animals to paths through the fence where several snares are set 2–5 m apart (usually at the frontiers of forest reserve and farmlands).

Permanent and temporary poaching camps were identified during the field visits. A temporary camp has no shelter with the hunters surrounding a fire with wooden poles. The hunters use the fire to smoke the meat for preservation and also to warm themselves. A permanent camp has a thatched roof made from the fronds of the raffia palm. The hunters use it for several months or years until detection by the park guards or abandonment by the poachers themselves. At permanent camps, hunters prepare and smoke meat and occasionally (normally on market days) send them to the traders and middlemen in the nearby villages. They cook their meals and mend their hunting gears at this camp.

Poachers' footprints were differentiated from park patrol staff by the sole prints of the boot (though not very reliable). Park patrol staff were given special boots for forest work and were not allowed to use any other.

The major hunting equipment used by the arrested poachers in KCA were shotguns and wire snares. This was similar to the results of Infield (1988) who examined the hunting habits of hunters in Korup National Park area in Cameroon and found that 38% of the hunters used shotguns while the remainder depended on trapping for their catch. The use of a shotgun is very effective and efficient, especially for arboreal species (e.g., monkeys), which are sometimes located higher than 50m in trees (Cowlishaw & Dunbar 2000). Shotguns could be the preferred hunting equipment if given ecologists the chance to choose because it is selective, but an illegal hunter may not like to use it because it makes a lot of noise which may result in arrests by wildlife guards. The hunters studied at KCA, however, mostly risk using the shotgun because it can kill a lot of animals within a short period. To avoid being arrested, hunters of KCA sometimes depended on the use of wire snares, which are silent but non-selective. In the Korup National Park the choice of hunting method was based on the season of the year, as thousands of traps could be laid during the wet season than the dry season (Infield 1988).

Animals Normally Hunted and Implications for Conservation

A variety of methods were used to kill or capture wild animals depending on many factors such as characteristics and behavior of the species, habitat requirements of the species, traditional background of the hunters as well as the security of the hunting locality (Bennet & Robinson 2000; FAO 2000; Bakarr et al. 2001).

During the 12-month period, poachers were arrested mostly in the months of July (three arrests) and May (two arrests). As the area is protected against hunting, this suggests that hunting is a clandestine activity, as a large number of people hunting could create disturbances. According to a former poacher, a hunting team of more

than three people is likely to attract wildlife officers, which in turn would cause an arrest. Moreover, some of the hunter groups may hide themselves and sneak to inform the family members at home about the arrest.

The number of animals found killed within the 12 month period was found to be below the estimate of Martin (1991) that 50 animals were killed each month in Kwamebikrom in Bia National Park, even this estimate included hunters operating outside the protected area where fear of arrest was lesser than those operating inside the protected area. The number of hunters involved was also not known in Martin (1991). The species of animals found to have been killed by poachers in KCA did not vary much from Martin (1991), even though no reptiles were recorded at KCA within the period. The ratio of primates hunted to other animals in KCA was 1:4.9, meaning that for approximately every five wild animals killed by poachers one animal is probably a primate. Among the primates killed, the highest number was the Lowe's Monkey. Conversely, Martin (1991) found that for approximately every three animals killed in Bia Conservation Area, one was a primate (ratio of 1:2.7). Similar to KCA, Lowe's Monkeys were found to be the most hunted primate species (Martin 1991) which may imply that Lowe's Monkey might be a conspicuous species (or easily recognized) as compared to its the other counterparts.

Conclusions

From the results of the study the following conclusions were drawn:

(1) The majority of the species were found to be mammals (12 species) with Lowe's Monkey being the highest number. The type of species targeted by the hunters was not different from that of hunters in other rainforest areas.

(2) The major hunting methods identified were the use of shotgun and cable snares. Two types of hunting were identified as commercial and subsistence and these erect permanent and temporary hunting camps respectively. Indicators of hunting activities include carbide powder, empty cartridges, firearms and footprints, gunshots heard, poachers arrested, poachers escaped, sapling cutting and snares found.

(3) Primates in general and Lowe's Monkeys in particular, were found to feature prominently in the catches of the hunters in KCA, one being featured in every five animals hunted.

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Journal of Threatened Taxa

www.threatenedtaxa.org

ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

February 2018 | Vol. 10 | No. 2 | Pages: 11245–11360
Date of Publication: 26 February 2018 (Online & Print)
DOI: 10.11609/jott.2018.10.2.11245-11360