VULNERABILITY OF HABITUATED GRAUER'S GORILLA TO POACHING IN THE KAHUZI-BIEGA NATIONAL PARK, DRC

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ABSTRACT Kahuzi gorillas lived without any major disturbances since their habituation started in 1970. The wars from October 1996 to May 1997 and from August 1998 to June 2003 in the East of the Democratic Republic of Congo led to a large-scale slaughter of gorillas. The results of this study based on interviews with ex-poachers suggest that when habituated and non-habituated gorillas are exposed to similar poaching-pressures, the habituated gorillas are more likely to be killed than the non-habituated. The estimated ratio of killed habituated gorillas was as high as 71% vs. 42% for non-habituated gorillas. Habituated gorillas were 1.6 times more susceptible to poaching than their non-habituated counterparts. It is recommended that habituation should not be expanded, although already habituated families should be maintained as such.

Key Words: *Gorilla g. graueri*; Habituation; Vulnerability; War; Kahuzi-Biega National Park.

INTRODUCTION

The wars from October 1996 to May 1997 and from August 1998 to June 2003 in the eastern Democratic Republic of Congo (DRC) has led, among other tragedies, to large-scale massacres of gorilla. All of the gorilla families habituated to human presence in the Kahuzi Biega National Park have been directly hit. Between 1996 and 2000, the number of gorilla decreased from 258 to 130 in the highland part of the Park (Inogwabini *et al.*, 2000; WCS, 2000). A similar decline, from 400-500 individuals in 1959-1960 to 260-290 individuals in 1971-1973, occurred in the populations of mountain gorillas (*Gorilla gorilla beringei*) in the Virunga National Park, due to intensive poaching during the years of post-independence unrest (Weber & Vedder, 1983). That decline was characterized by a strong decrease in the proportions of adult males. In the Kahuzi-Biega National Park, the five silverbacks leading the five habituated families were killed, sowing havoc in the surviving individuals. In August 1999, the guides were able to follow only one of the families, led by an alpha female, Mugoli, after the slaughter of most habituated gorilla families (Parc National de Kahuzi-Biega, 2000). The Mishebere family was retrieved later at

the end of 1999, with 39 individuals, assembling survivors from various former habituated families.

Kahuzi gorillas lived peacefully since their habituation started in 1970. Apart from man, adult gorillas have no natural enemy (Kalpers, 1993), although the old silverback, Casimir, was known to have succumbed to infected injuries in the aftermath of a fight between silverbacks (Parc National de Kahuzi-Biega, 1976). Despite the political unrest in the DRC at the beginning of the 1990's, Yamagiwa *et al.* (1993) from the census conducted in September-November 1990, and Inogwabini *et al.* (2000) from their surveys in June-July 1996, estimated that the gorilla population was stable in the montane forest of Kahuzi. In 1995, the silverback, Maheshe, was killed by poachers to honor an order from a local businessman in transaction with some refugees. The silverback Mushamuka was killed in 1997 (Ilambu, 1998). Members of his family ran away and a blackback took the leadership of the survivors. From then on, the massacre of gorillas went on unabated until the end of 1999.

In 1996, the military authorities ordered the disarmament of all park rangers. The tourism sector of the park, where the habituated gorillas lived, was no longer under control, and poachers gained free access. Most gorillas were massacred between August 1998 and October 1999 (Parc National de Kahuzi-Biega, 2000; 2001).

Since the re-armament of park rangers in May 2000, no gorilla has been killed in the tourism sector. Currently, 5 gorilla families comprised of 88 individuals are monitored, undergoing habituation since October 1999.

It is assumed that more habituated gorillas were massacred than the non-habituated ones. To verify that hypothesis, we consider it useful to know the behavioural changes that may expose the gorilla to poaching. The motivation, the equipment of the poachers and the rating of the gorilla as game in the study area have also been investigated. The query here is to know whether the habituated gorillas were more, less or equally vulnerable to poaching compared to the non-habituated gorillas.

Such information may be useful in reserves where wars have disrupted the conservation management. The results of the study may provide some enlightenment in the orientation of habituation of Grauer's gorillas. We do not question the touristic, the scientific and the cultural usefulness of gorilla habituation as well as its contribution to the conservation of Grauer's gorilla.

METHODS

I. Interviews

In September 2001, forty-two former poachers by then employed as park workers were interviewed separately in their local language, using a structured questionnaire. The interviewer was a social scientist in charge of tourism within

the park conservation support project. The questionnaire contained the following 11 questions:

a. How were your hunting activities organized (teams, park sectors)?
b. Which animals did you hunt mostly?
c. For which specific reason did you choose to hunt each animal species?
d. Which capture methods did you use for each animal species?
e. How could you distinguish a habituated gorilla from a non-habituated one?
f. What were the major obstacles you encountered in your attempt to kill a gorilla?
g. How did law enforcement affect your poaching activities?
h. In which case did you feel more guilty as a poacher: killing a habituated or a non-habituated gorilla?
i. From which gorilla family category (habituated vs non-habituated) is it easier to capture a baby gorilla?
j. How old are you?
k. What is your ethnic group?

Four of the 42 former poachers were infamous since 1990 with multiple jail-release episodes, and they provided the names of their fellows. In August 1999, the last attempt from a desperate and unarmed park management in the war situation, left with multiple carcasses of elephants and gorillas, was a talk with those famous poachers to sensitize them. All of these 42 former poachers were male Congolese, of whom 40 were aged 30-40 and two were aged 50-60. Most were Bashi (52.4%), but also included Pygmies (38.1%) and Batembo (9.5%), of the ethnic groups predominant in the vicinities of the park area where those gorillas lived. Thanks to these former poachers, the Kahuzi-Biega National Park re-discovered the Mishebere gorilla family with 39 individuals. From then on the slaughter markedly fell until the massacre of the Mishebere gorilla family in 2004. When the interviews took place, the 42 former poach-

Table 1. Number of poachers by sector.

Quoted poaching sector Status	Tshivanga	Kasirusiru	Mbayo	Tshibati
Main sectors	12	9	8	6
Secondary sectors	21	5	1	0

Quoted poaching sector Status	Musisi	Bunyakiri	Ninja	Mugaba	Biega
Main sectors	3	1	1	2	0
Secondary sectors	14	0	0	0	1

ers had become genuine park workers whose purpose was to mitigate poaching. They swore never to poach anymore.

The 42 poachers had partitioned the highland part of the park (600 km²) into 9 poaching sectors. Table 1 shows the distribution of the poachers within the 9 poaching sectors, as primary or secondary hunting-areas, as described by the 42 interviewed former poachers.

The main sector was the one which was demarcated and tacitly recognized as a specific hunting-area of a given group of poachers. According to their own oral conventions, a primary poaching sector was understood as the most exclusive, exploited by a given group, where other poaching-groups were not allowed to hunt. The secondary poaching sector was less exploited by a specific group and poachers of different groups were tolerated. Tshivanga and Musisi are known for their high concentration of wildlife. Most groups of poachers co-used these 2 areas. These reported poaching-sectors occurred in the areas of the park where animals are monthly observed during the patrols.

The responses of the 42 interviewees to each question were converted into percent scores. Student's T-test for independent samples was computed to validate the comparison between habituated and non-habituated gorillas. The coefficient of variation of the mean (cv) was lower than 25%, allowing the use of a parametric test.

II. Gorilla Surveys

Gorillas were identified during daily monitoring visits by patrol teams. Gorilla identification data included nose prints, skin colour, size, age estimate, daily activity, specific signs, habits and tolerance towards visitors. Gorillas that tolerate human presence are "habituated gorillas." Supplementary information on gorilla genealogy was obtained from a Kahuzi-Biega National Park report covering the period 1983-2000.

The proportions of survivors per family from the massacres in 1999 were based on the Kahuzi-Biega National Park's monthly monitoring-reports and also field notes. "Indices of vulnerability" were calculated as follows:

[1 - (number of gorilla per category (habituated vs. non-habituated) from the census in 2000 / number of gorilla per category (habituated vs. non-habituated) in the census in 1996)]∗100.

The comparison criteria were: (a) agressive behavior, (b) fleeing, (c) ease in locating them by following patrol tracks, (d) diarrhoea upon encountering a human, (e) located sector in the park, (f) hiding out (g) ease in poaching, (h) guilt, (j) ease of baby capture.

RESULTS

I. The Place of the Gorilla among the Animals Poached

According to our interviews, the most poached animals were (in decreasing order): antelopes (*Tragelaphus euryceros*), bush pigs (*Potamochoerus porcus*), elephants (*Loxodonta africana cyclotis*), colobus monkeys (*Colobus angolensis, Colobus abyssinicus, Colobus badius foai*), gorillas (*Gorilla gorilla graueri*), and bushbucks (*Tragelaphus scriptus*). Secondarily poached animals were the Gambia rats (*Cricetomys gambianus*), chimpanzees (*Pan troglodytes schweinfurthii*) and some monkey species (Table 2). Apart from chimpanzees, who were less targeted because of a traditional belief that they cause misfortune, their fast mobility in escape, and the lower demand for their babies for export, animals were hunted opportunistically, i.e. the most encountered were the most poached. The poachers were aware (100%) that there had been a sharp depletion of populations of large mammals in the Kahuzi-Biega National Park during the wars.

Table 2. Scores (%) indicating the hunter preference for animals poached and their scores of abundance in primary and secondary poaching sectors.

Preference and sector	Gorilla (Gorilla.gorilla graueri)	Elephant (Loxodonta africana cyclotis)	Antelope (Tragelaphus euryceros)	Bush pig (Potamochoerus porcus)
Hunter preference	10.8 (5)	13.8 (6)	30.0 (13)	23.8 (10)
Secondary sector	17.9 (8)	23.4 (10)	13.5 (6)	16.3 (7)
Main sector	21.7 (9)	19.4 (8)	17.6 (7)	18.5 (8)

Preference and sector	Chimpanzee (Pan troglodytes schweinfurthii)	Colobus (Colobus angolensis)	Bushbuck (Tragelaphus scriptus)	Baboon (Papio cynocephalı anubis)
Hunter preference	1.5 (1)	12.3 (5)	4.6 (2)	-
Secondary sector	9.8 (4)	0.5 (1)	7.1 (3)	5.9 (3)
Main sector	10.2 (4)	6.0 (3)	5.5 (2)	-

∗ Number of respondents per item in parentheses.

II.   Motivation of Gorilla Poaching and Hunting-Conditions

Most of the interviewees had hunted gorillas for meat (50.0%) or to capture baby gorillas for export (26.0%). Fur and other magic trophies (skull, bones and teeth) scored 23.4%. Gorillas had been hunted with fire-arms in most cases (52.5%), while alternative methods included spears (21.2%), arrows (18.7%), dogs (6.2%) and sometimes nets (1.2%). Fire-arms were used mainly against adult gorillas (habituated or not) while dogs, spears and machetes were used to kill juvenile gorillas. Law enforcement in the park was perceived to have negatively affected the activities of the poachers (70.0%), via jailing (78.2%), reduction of the frequency of hunting episodes (21.7%) and destruction of traps set in the forest, especially the snares (78.2%).

The poachers felt similar guilt, whether one had killed a habituated or a non-habituated gorilla (72.7%). However 27.2% of the respondents guessed that the guilt was more intensive when one had killed a habituated gorilla.

The major obstacles that a poacher encountered in his attempt to kill a gorilla ranked as follows (number of respondents in parentheses) in decreasing order of importance: fear of being in the park (39), aggressive behavior of the gorilla (27), fleeing gorilla (16), awareness on the part of the poacher (15), lack of fire arm (14), remorse in killing a man-like creature (12), and killing a gorilla leading to misfortune (6).

III. Indicators of the Vulnerability of Habituated Gorillas

Table 3 presents the signs which allowed the poacher to identify a habituated gorilla.

A habituated gorilla is described as being less aggressive. It practically does not defend itself against the poachers. The habituated silverback even emits no diarrhea when the poacher approaches. It lets the poacher come close. The habituated gorilla can be tracked by following the paths of the park monitoring

Table 3. Response frequency for the criteria which allow a poacher to distinguish a habituated from a non-habituated gorilla.

Criteria	Habituated gorilla	No. Respondents
Aggressive behavior	less	21
Fleeing	less	19
Following the tracks of the monitoring staff spacing	more	1
Diarrhoea	less	3
Located sector	more	1

staff.

The habituated gorilla was presumed to flee slower when a poacher approached (79.0%), and even tolerated his presence (91.5%); it did not readily attack (100%) nor hide (94.5%). The habituated gorilla performs with a much lower amplitude the normal behaviors of a gorilla, according to former poachers, which are listed here in a decreasing order of importance: aggression, running away, aggression and running away, diarrhea, raising the hair, putting up a barrier with branches, and hiding out. Some respondents mentioned that the habituated gorilla was undisturbed. The overall comparison of the 2 gorilla categories is presented in Table 4.

The interviewees were unable to discriminate the two gorilla categories from the number of nests. The habituated gorilla was estimated to be much easier to kill than the non-habituated one (96.1%). Even when sex and age were taken into account, the effect of habituation tended to prevail.

In any case, there was a consensus about the vulnerability of juveniles (96.7%) and the interviewees attributed that vulnerability to the assumption that gorillas might abandon their young during an attack as a way to protect the group (96.1%). Most probably a baby may have fallen off from its fleeing mother. In this regard, the former poachers recognized that a baby was easier to capture from a habituated family (69.0%). Yet it was asserted that poachers customarily killed the parents to capture the babies (43.0%). Seldom did they capture babies just by scaring off the family, without using any particular strategy (2.3%).

Table 4. Overall comparison of anti-porcher behaviors in habituated and non-habituated gorillas.

	Running away	Not tolerating the presence of poachers	Fast while fleeing	Hides out
Habituated	1	4	3	3
Non habituated	41	43	48	52

	Difficult to kill	Causing guilt	Difficult to capture a baby gorilla
Habituated	1	33	13
Non habituated	28	24	29

Table 5. Name, age class, family of origin, current family of surviving members from formerly habituated groups in the highland part of Kahuzi-Biega National Park.

No.	Name	Age class	Family of origin	Current family
1	Mpaka	adult female	Nindja	Birindwa (2000)
2	Iragi	adult female	Nindja	Birindwa (2000)
3	Kamba	adult female	Nindja	Birindwa (2001)
4	Bibi	adult female	Nindja	Mishebere (1999)
5	Kwale	adult female	Nindja	Birindwa (2000)
6	Nzovu	adult female	Nindja	Birindwa (2000)
7	Mugaruka	silverback	Mushamuka	Mugaruka
8	Lushasha	adult female	Mushamuka	Mugaruka
9	Mwinja	adult female	Mufanzala	Mugaruka (2000)
10	Mulisa	adult female	Birindwa	Mugaruka (2000)
11	Mwoga	adult female	Mubalala	Mugaruka (2000)
12	Ngoma	adult female	?	Mugaruka (1998)
13	Mishesbere	silverback	?	Mishebere
14	?	adult female	Mubalala	Mufanzala
15	?	adult female	Mubalala ?	Mufanzala

IV. Estimation of the Vulnerability Indices of Habituated and Non-Habituated Gorillas

Among the five families with 88 gorillas which are daily monitored currently, 17 individuals are survivors of the families formerly habituated until 1996. Two individuals, Tunda and Singa from these 17 left the Mugaruka family in April 2000, and went to an unknown destination. The Mufanzala family, at the boundary of the current tourism sector contains two such habituated survivors. Table 5 presents the names, age class and the family of origin as well as the current family of the survivors from the formerly habituated families.

Considering that there are only 17 survivors from the 59 known habituated gorillas from 1996, the index of vulnerability of habituated gorillas could be estimated as follows: (1-17/59)∗100=71.2%. Inogwabini *et al.* (2000) reported 258 gorillas inhabiting the highland part of the Kahuzi-Biega National Park.

The census in August 2000 recorded 130 gorillas (WCS, 2000), and the index of vulnerability of the gorillas was estimated as $(1-130/258)*100=49.6\%$. Again, considering that there were 59 known habituated gorillas monitored daily until 1996 $(258-59=199)$ among which only 17 survivors were reidentified within 2000 and 2001 to date, $(130-17=113)$, the index of vulnerability of the non-habituated gorillas could be approximated as $(1-113/199)*100=43.2\%$, suggesting that the habituated gorillas exhibited a surplus of 60% mortality as compared to the non-habituated ones.

DISCUSSION

I. On the Reasons Why Gorillas Were Poached

In the hinterland of the Kahuzi-Biega National Park, there are traditional beliefs that a hunter who kills the bushbuck, the chimpanzee or the gorilla merely attracts misfortune onto himself. Thus, the frequencies for hunting are low in the case of the bushbuck and chimpanzees. Surprisingly, the hunter preference score is high for the gorillas: the extinction of elephants from the area (771 in 1996 and <5 in 2001), the biggest game, may have exacerbated the hunting of gorillas, the second largest animal in the park. Moreover, the massive arrival of Rwandan refugees and the onset of the wars in 1996-2001 increased the foreign exports of baby gorillas from the park. Meat and capture of baby gorillas were mentioned as the major reasons for hunting the gorillas. As early as July 1992, a young Grauer's gorilla was confiscated at Kigali airport; about to be sent as freight to Cairo by an Egyptian (Kalpers, 1993). The same author reported that in the Virunga National Park (DRC) the mountain gorilla, *G. g. beringei*, was the direct target of poachers who worked for a network of animal merchants, and that entire families of gorillas were decimated to capture young individuals destined to foreign zoos.

II. Location and Identification of Survivor Habituated Gorillas after the Slaughter in 1999

The habituated gorilla families contain well habituated individuals and some non-habituated ones. Non-habituated families may well contain some habituated individuals as a result of interactive fights between silverbacks, a natural factor of family recomposition. Thus, the individuals that have not been seen during the routine monitoring are not necessarily dead, but might have migrated into the wilder non-habituated families. It is accepted that in the Kahuzi-Biega National Park a family of gorillas does not defend a specific territory but wanders over an area as large as 35km[2] (Steinhauer-Burkart *et al.*, 1995). However, considering that the number of gorillas in the highland part of the park routinely monitored is 88 out of 132 (67%) as recorded by the census in 2000,

we have the feeling that the assumptions have been based on a representative majority.

The survivors among the formerly habituated gorillas have been reidentified within habituated families (of recently habituated silverbacks) in the same sector where they thrived before the decimation. It is established that, in the absence of experienced males, a group of gorillas undergoes interactive fights and loses several of its members (Kalpers, 1993). Gorillas, whether habituated or not, seemingly sought refuge in the most monitored sectors additionally dominated by secondary forests: 82 out of 258 gorillas lived there until 1996 and by now 87 out of 132 (Chi-square=15,39; P=0.0001**). Numbers of gorillas by group and numbers of groups are known to increase in well protected park sectors (Kalpers, 1993). Yamagiwa *et al.* (1980) stated that gorillas aggregate their nests in secondary forests.

III. Comparison of the Vulnerability of Habituated and Non-Habituated Gorillas

In the absence of park conservation measures in times of insecurity, the gorillas which were habituated to human presence appeared to be more vulnerable to poaching than the non-habituated ones. In the habituated families the silverback and the well habituated members tolerate the presence of man, and the silverback is therefore most exposed for a rather long time. The habituated gorilla is known to perform the complete set of nine behaviours identified by Kalpers (1993) when threatened although the sequence may be versatile: shouting, eating, rising on the two feet, throwing vegetation, beating the chest, hitting the ground with the feet, running away, beating or throwing vegetation, and beating the ground with the arms. When the male charges, the members of the family seek shelter. However, the non-habituated silverback is quite rarely encountered or seen, and when encountered by surprise, it furiously bellows and violently attacks. So, a poacher might only kill it if he himself survives the gorilla's defensive attack or gets the fast-fleeing silverback within his gun's range.

CONCLUSION

The slaughter of gorillas is one of the environmental consequences of the war in the eastern DRC. The purpose of the present paper, based on the information from the highland part of the Kahuzi-Biega National Park, was to comparatively evaluate the vulnerability of the habituated gorillas as opposed to non-habituated ones.

The results show that gorillas are hunted mainly for meat and to capture baby gorillas to be sold for export. Surveillance in the park significantly hampers the activities of poachers via arrests, reduction of the frequency of hunting-episodes, and destruction of traps set in the forest, especially the snares. The habituated gorillas are described as less aggressive than the non-

habituated ones. The habituated silverback barely defends itself from poachers. It does not readily emit diarrhea as does a typical silverback as soon as it recognizes aggression. It lets the poacher come close, probably mistaking him for a park-ranger. The gorilla can be easily tracked by following the paths of park monitoring teams. Thus, under similar conditions of insecurity when park surveillance is disrupted, the habituated gorilla is more vulnerable than the non-habituated one. The "index of vulnerability" of habituated gorillas reached about 71% as opposed to 50% in the overall population and 42% for the non-habituated gorillas.

It is recommended that the gorillas should be secured in their native habitats without any attempt of translocation to avoid further loss of wildness. Habituation should be maintained at the current level rather than expanded, so that there is a compromise between the need to attract tourists and the imperative to conserve. Surveillance matters most in the protection of gorillas: instead of limiting it to the tourism area, it should cover as much of the whole park as possible.

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