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DE BRAZZA'S MONKEYS *CERCOPITHECUS NEGLECTUS* IN THE KISERE NATIONAL RESERVE, KENYA

Abstract: *De Brazza's monkeys* Cercopithecus neglectus *are rare in Kenya. We report on the population of de Brazza's monkeys in the Kisere Forest National Reserve, which is one of only two relatively large populations in the country. Our observations in 1996, along with those made by other researchers in the previous decade, suggest that while birth rates are low, many young survive to sub-adulthood. What happens to sub-adults is unknown, however: they may simply be replacing adults who face high levels of mortality, or they may be attempting to disperse. No new breeding groups have been established in Kisere in 10 years, although solitary males, pairs of animals, and an all-male group were observed. We found no evidence for the presence of de Brazza's monkeys in the main block of the Kakamega Forest. While the population has remained stable, its habitat is under severe threat from human encroachment, and the animals themselves are often victims of human harassment since they are found in the same areas as crop-raiding baboons* Papio anubis.

Resumé:

The french abstract is coming.

Introduction

De Brazza's monkeys *Cercopithecus neglectus* are rare in Kenya, occurring in a few isolated areas in the western part of the country. Although they have been reported to occur in the Cherangani Hills, Mt. Elgon, Mt. Kenya and Maralal areas (Wolfheim, 1983), recent surveys have documented mainly isolated groups or single individuals. Only in Saiwa Swamp National Park and in the Kisere Forest National Reserve are multiple groups with adjoining home ranges known to-occur (Brennan, 1985; Wahome *et al*., 1993; Decker, 1995; Mugambi *et al*., 1997).

In 1985, Brennan reported 28 de Brazza's monkeys in Saiwa Swamp National Park. She counted another 54 individuals distributed among 17 sites outside the park in the Trans-Nzoia area but did not identify these sites. In half of these sites (8/17), only one or two individuals were detected. The implication of Brennan's work was that by the early 1980's, de Brazza's in Kenya were found only in isolated pockets of suitable habitat (riverine forest), whereas a decade or two earlier they had a more continuous distribution (Brennan, 1985). A more recent survey (Mugambi *et al*., 1997) largely confirmed the disjunct and limited distribution of this species in western Kenya.

Our study followed-up on previous censuses of the population of de Brazza's monkeys resident in the Kisere Forest National Reserve in Western Province, Kenya (34.89^{o}E, 0.4^{o}N; Fig. 1). This 4.6 km^{2} forest island is separated from the larger Kakamega Forest block (178 km^{2}) by about 2 km of populated, agricultural land. The population of 35-40 de Brazza's inhabiting Kisere was overlooked by Brennan's survey, but later discovered by Morioka and Tsingalia (1992), and more thoroughly investigated by Wahome *et al.* (1993). Follow-up censuses were carried out by Walker (1992), Matsuda (pers. comm., 1993), and Kirathe (1997). Our main goal was to determine the current status of the de Brazza's population in Kisere. That is, was it stable, decreasing or increasing over the last decade, and what are the prospects for its long-term survival?

Figure 1. Map of the Kakamega Forest, Kenya, showing the Kisere and Kakamega National Reserves at the northern end.

Kisere Forest is bounded by two rivers, the Nandamaywa on the southeast, and the Isiukhu on the west (Fig. 1). Previous studies of de Brazza's suggest they occur mainly along rivers or in swampy areas (Gautier-Hion & Gautier, 1978; Brennan, 1985). At Kisere the three resident troops of de Brazza's also occur only along the rivers' edges (Wahome *et al*., 1993; this study). Our observations were made in these areas. Because one side of the river was not in the reserve, and was used for agriculture, it was easy to move along this riverbank opposite the forest where the monkeys lived, and to look into the forest from a slightly elevated vantage point. Observations were made by JC and three field assistants between 11 July and 2 August 1996 and focused on Group C. The monkeys were observed for a total of 58 hours on 13 of 17 days in the field, with complete or nearly complete counts made of group C on 11 of these 13 days.

Results

In 1987-89, Wahome *et al*. (1993) found 40 de Brazza's monkeys living in three groups plus three solitary adult males in Kisere Forest. Here we use Wahome's group designations (A, B, C) to refer to the three de Brazza's groups at Kisere. In 1991, Walker (1992) reported a total of 35 de Brazza's in these groups. She found that while Group A increased in size from 11 to 17 animals, the other two groups decreased. Group C had only half as many monkeys in 1991 as in 1989, and at least one individual from this group was trapped in 1990. A 3-week survey carried out by Matsuda in 1993 found that all groups had apparently decreased in numbers but the brevity of her visit, combined with the poor observation conditions, make it difficult to interpret these results. In 1996, Kirathe (1997) counted 37 monkeys in the three groups. He found Group A to contain about half as many animals as in 1991, while Groups B and C had about the same numbers as in 1989, increasing in size since 1991.

The number of sub-adults counted in each census, including the most recent one (Table 1), indicates that the population is able to sustain enough young to maturity so that sub-adults are available both to replace their parents as breeding adults and to disperse to form additional groups if sufficient habitat were available. Also, while yearly production of infants appears low, with 3-5 adult females in each group apparently producing about one infant among them (not each) in most years (with 1989 being an exception), numbers of juveniles and sub-adults suggest good infant survival.

Table 1. Changes in the de Brazza's monkey population in Kisere Forest, Kenya (1987-1996). Groups are labeled as in Wahome et al. (1993).

Study	Month/ Year	Group	Adult males	Adult females	Sub-adult males	Sub-adult females	Juveniles	Infants	Total
Wahome et al. (1993)	12/87	A	1	3	0	2	5	0	11
	3/89	B	1	3	0	3	6	0	13
		C	1	4	0	2	6	3	16
Walker (1992)	7/91-	A	1	4	1	5	5	1	17
	10/91	B	1	3	1	2	2	1	10
		C	1	4	0	2	0	1	8
Matsuda Pers. comm. 1993	6/93-	A	1	2	2*		2	2	9
	7/93	B	1	2	0*		1	0	4
		C	1	2	0*		4	2	9
Kirathe (1997)	10/95-	A	1	3	0	3	1	0	8
	4/96	B	1	5	1	5	2	1	14
		C	1	4	1	5	3	1	15
This study	7/96	C	1	4	6*		3	1	15
		all-male	1	O	1	0	2	0	4

* Indicates total number of sub-adults when sex of all individuals could not be determined

Since the three groups of de Brazza's are producing sub-adults which must either join one of the existing groups, form new groups or disperse out of the area, one is led to ask, "What is the fate of these individuals?" Numbers of adults in the three Kisere groups have been remarkably stable over the last 9 years, especially given the high numbers of sub-adult females identified. One possibility is that this apparent stability conceals high adult mortality with adults being replaced by maturing sub-adults. Such high mortality among adults would stand in contrast to what is known about other Kakamega guenons (red-tailed monkeys *Cercopithecus ascanius* and blue monkeys *Cercopithecus mitis*; Cords unpublished), however. Another possibility is that neither male nor female sub-adults are being recruited into the existing groups. As there is no evidence that they have been founding new breeding groups in Kisere Forest, they may be dispersing. Wahome *et al*. (1993) saw three solitary males in the study area but none has been reported by subsequent observers. We identified a fourth group of de Brazza's in the home range of Group C containing an adult male, a sub-adult and two juveniles of different sizes. This appeared to be an all-male group rather than a new breeding group. We also observed simultaneously two pairs of monkeys in the home range of Group C, each including a juvenile and an adult-sized individual. The adult-sized monkeys were not fully adult males, and the size of the juveniles did not match those of the juveniles in the all-male group. The two pairs were so

far from Group C that we consider it unlikely that they belonged to this group. While sightings like these are consistent with dispersal attempts, they do not confirm successful dispersal. It is possible that mortality is high among sub-adults who try to disperse.

The de Brazza's at Kisere have not been observed far inside the forest but poor observation conditions or the narrowness of the forest corridor might be responsible for this, rather than the habitat preference of the monkeys as such. At least in Group C's home range, the process of clearing and cattle grazing in the interior of the National Reserve has left only 200 m or less of intact forest along the river's edge. Kirathe (1997) found no major differences in distribution of plant food resources to account for the de Brazza's preference for river edges, but as just noted, there is really only edge remaining in many areas. At the southern end of Kisere Forest the Nandamaywa River joins the Isiukhu River which flows into and through the main block of Kakamega Forest (Fig. 1). Thus, the Isiukhu may previously have provided a route of dispersal for de Brazza's into the Kakamega Forest National Reserve (Tsingalia, 1988). Now the river runs through a densely populated area between the two forests and its banks are cleared of forest and intensively farmed. It is unlikely that de Brazza's are currently able to disperse successfully along this river.

We found no reliable evidence that De Brazza's occur inside the Kakamega Forest National Reserve. This finding agrees with the conclusions of previous studies, and would be expected if successful dispersal from Kisere were impossible. However, assuming similar population dynamics in the past, it is difficult to explain why such dispersal would not have occurred previously, leading to the establishment of these monkeys in the main block of the Kakamega Forest.

Nothing obvious in the physical structure or plant composition of the forests suggests why de Brazza's should be able to inhabit the forest at Kisere but not in the Kakamega Forest National Reserve. Kirathe (1997) compared the distribution and abundance of de Brazza's plant foods in the Buyangu area of the Kakamega National Reserve and in Kisere and came to the same conclusion. Either there must be other factors that researchers have not yet been able to identify which are responsible for the absence of de Brazza's from other parts of Kakamega Forest, or dispersal away from Kisere has always been difficult, thus preventing successful establishment in new areas. Direct evidence for either of these scenarios is lacking at present.

Conclusions

While the number of de Brazza's in Kisere Forest appears to have been relatively stable over the last decade, there are factors at work in the Forest Reserve which indicate an uncertain future for the long-term survival of this population. These include intensive human use of the forest resources, harassing of monkeys during actual or suspected crop raiding (pers. observ.), and trapping of monkeys either for sale, for food, or because they are seen as agricultural pests (reports from local people). Local farmers can distinguish between the different primate species when asked to do so. They refer to de Brazza's as "the bearded ones". But they make no distinction when it comes to harassing monkeys by throwing stones or using slingshots on them in response to crop raiding.

De Brazza's are reported to do some minor crop raiding, mostly of avocados and guavas, although we did not observe them to do so. They do not have the destructive potential of a troop of olive baboons *Papio anubis*, however. In July, for example, when maize was ripening, baboons resident in the forest frequently crossed the river to raid the fields. Children are predominantly employed to thwart the baboons' raiding activity. Understandably, children and adults are not too selective about which species they hurl stones at when attempting to drive off crop raiders.

The main effect of human harassment is to disrupt the de Brazza’s feeding and ranging behavior for a large part of each day during the maize harvest. De Brazza's are especially vulnerable to this harassment because they forage low in the forest right along the river's edge where baboons are also often found. This habit puts them well within range of the stones thrown even by young children. The likelihood of being hit by stones is increased by the de Brazza's tendency to stay put and hide in the undergrowth rather than to flee through the canopy as other guenons and the black and white colobus *Colobus guereza* do. Thus, the habitat preference of de Brazza's and their alarm response appear to make them more vulnerable to human harassment than are the other monkeys in the forest. All other species of monkey move farther from the river's edge to avoid human activity.

The forest habitat at Kisere appears to be in a very vulnerable state. Where the rivers abut the National Reserve they provide some protection for the forest as farming occurs right up to the rivers' edges but not across the rivers into the forest itself. However, the northern border of the reserve has no river boundary and here human activity, predominantly grazing of cattle and cutting of trees for firewood, encroaches on the reserve (Fig. 1). In addition, a wide path runs through the middle of the reserve. This path is used to bring cattle into the centre of the reserve to graze and as a major thoroughfare for local people traveling from one settlement to another. In some areas the forest has been reduced to a narrow band only 100-200 m wide along the edge of the river while the interior has been

almost completely cleared. Cattle graze in these cleared areas, and guava, an invasive alien, predominates. As noted above, the narrowness of the remaining forest may already have an adverse effect on the de Brazza's ability to avoid human harassment and to forage away from the river's edge. Not enough is yet known about the feeding ecology of this population to determine whether this may limit the monkeys' food sources at certain times of the year.

Despite a determined effort by rangers from the Kenya Wildlife Service (KWS) station at Buyangu charged with patrolling Kisere Forest National Reserve, the distance between these two locations (about 20 km over poorly maintained roads, or a 2 hour walk across country) makes it difficult to maintain adequate surveillance. Local people seemed to have little hesitation about using the National Reserve to collect firewood or graze cattle during our study. Thus, we conclude that the best policy to ensure the stability and protection of the de Brazza's population in Kisere Forest National Reserve is to ensure that the forest is adequately protected so that it continues to provide suitable habitat for this species. Given the limited resources available for wildlife conservation in Kenya, we think that the best strategy for ensuring adequate protection, and one that should be implemented without delay given the fragile state of this forest, is to enforce the laws against grazing cattle and cutting firewood in the reserve. This could perhaps best be done by establishing a KWS Ranger Post in Kisere National Forest Reserve. Over the longer term, however, conservation education and the development of solutions to crop-raiding by baboons will also be essential components of a successful conservation strategy for de Brazza’s at Kisere.

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