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HUNTING IMPACT ON NEOTROPICAL PRIMATES: A PRELIMINARY CASE STUDY IN FRENCH GUIANA

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Introduction

Rainforest still covers more than 90% of French Guiana, affording this territory a rather favorable status compared with many Neotropical countries (Whitmore, 1997). Forest wildlife may nonetheless be locally threatened by uncontrolled agriculture, habitat fragmentation from roads, tracks, a hydroelectric dam, logging, legal and illegal gold mining, and hunting. Still, no conservation and natural resource management policies exist, and the impact of human disturbance is only a recent concern (Granjon *et al.*, 1996; Vié, 1998; Cosson *et al.*, 1999). Effects of hunting on mammal communities have not yet been evaluated, although it is one of the major threats to a significant part of French Guianan wildlife (de Thoisy and Vié, 1998).

As part of a multidisciplinary program on the impact of logging in a traditionally used rainforest (hunting, non-ligneous resource use), the Counami forest was surveyed to evaluate large bird and mammal abundances, in both heavily and lightly hunted areas. Abundances were also recorded in the Trinité Natural Reserve, an area lightly hunted in the past but which has now been effectively protected for four years.

Methods

Study sites

The Counami site, a lowland Neotropical rainforest (53°15'W, 5°20'N), is located in the north of French Guiana, approximately 50 km from the Atlantic Ocean (Fig. 1). The dominant tree families include: Lecythidaceae (22% of trees with DBH > 7.5 cm), Caesalpiniaceae (12%), Chrysobalanaceae (11%), and Sapotaceae (6%) (Teillier, unpub. data). Interviews with local hunters suggest that only the first 3 km of the forest, which can be accessed by cars, motorcycles, and/or boats, are regularly hunted. Two areas were sampled, one facing high hunting pressure ("CH+", at one to 3 km from the track serving the forest), and the other facing low hunting pressure ("CH-", four to 7 km from the track). The sites chosen were far from rivers or possible access by boat. The study area of Trinité (TNR, Fig. 1) is located in the northern part of the natural reserve (53°13'N, 4°43'W), in a lowland forest. Botanical surveys in this area are presently ongoing.

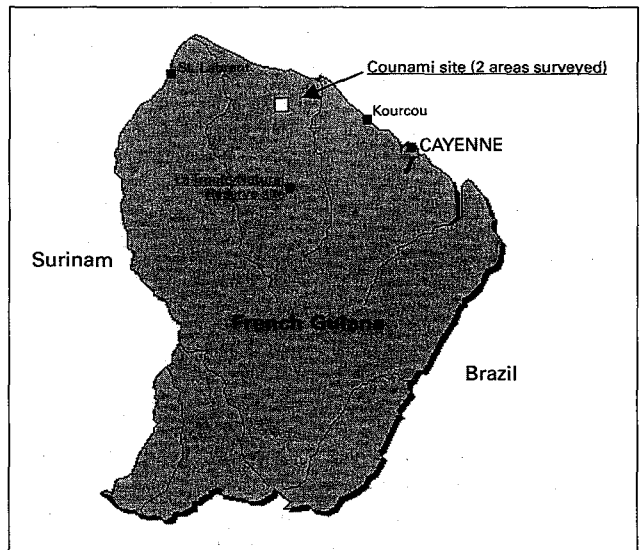


Figure 1. Site location of Counami and La Trinité Natural Reserve, French Guiana.

Sampling procedures

Line transects (Brockelman and Ali, 1987; Peres, 1999; de Thoisy, 2000) at the Counami sites were conducted in May and June (rainy season), and from September to November (dry season), 1998. The areas CH+ and CH- were covered by 93.5 km and 91.5 km of transect, respectively. In November 1999, 93.2 km of the TNR site were sampled and species abundance was expressed as number of groups per 10 km, with the addition of mean group size. Densities were calculated using Leopold's method, the mean of perpendicular sighting distances is used for estimation of the strip width (de Thoisy, in press). Crude biomasses (mean species weight * density, in kg.km⁻²) were determined using the weights given in Robinson and Redford (1986).

Results

Six primate species were noted to occur in the three areas surveyed: red howler monkeys *Alouatta seniculus*, black spider monkeys *Ateles paniscus*, brown capuchins *Cebus apella*, wedge-capped capuchins *C. olivaceus*, white-face sakis *Pithecia pithecia*, and red-handed tamarins *Saguinus midas*. The wedge-capped capuchin, however, was not observed during the transect period at the Trinité site. Abundance, mean group size, density and biomass from the three sites are given in Table 1. Data from the two study periods at Counami are considered together.

At the Counami sites, total density and biomass were respectively 40% and 60% lower in the area facing the heavier hunting pressure, the howler and the brown capuchin monkeys accounting for most of the variation (Fig. 2). At the Trinité site densities and biomasses were intermediate, but species contribution differs by the relative importance of the spider monkey. Contribution of the three largest species to the total primate density, i.e., spider and howler monkeys, and brown capuchins, decreases with the hunting pressure, from 73% (TNR site) to 47% (CH+ site). The contribution of these three species to the total biomass follows the same trend, decreasing from 94% (TNR) to 82% (CH+). Group size is not significantly affected by hunting pressure, except for *C. apella* at Counami (Table 1). Hunting pressure also affects species behavior. In capuchins, howler and spider monkeys, much more frequent vocalizations, alarm calls, and less cryptic behaviors were observed in the less disturbed areas (TNR and CH-, vs. CH+).

Discussion

Primate populations in French Guiana remain poorly documented except at l'Arataye (Guillot *et al.*, 1984), les Nouragues (Julliot and Sabatier, 1993; Simmen *et al.*, 1998), Petit Saut (Vié, 1998), and Counami and Trinité (de Thoisy, 2000), and even the distributional limits of the common squirrel monkey, *Saimiri sciureus*, and the bearded saki, *Chiropotes satanas* are still unknown (Norconk *et al.*, 1996).

The Counami forest is hunted by Indians, Creoles (intermixed population descended from slaves), and Hmongs originating from Laos. Typically, peccaries, deer, tapir, large rodents, large birds, and primates are hunted (de Thoisy, unpubl. data).

Among the primates, capuchins are a prime target for most hunters, and the brown capuchin is also commonly taken as a pet. Impacts on populations may nonetheless be difficult to assess. *Cebus olivaceus* has a naturally patchy distribution (Norconk *et al.*, 1996), and *C. apella* is able to support a certain harvest level by hunters (Baal *et al.*, 1988). The meat from larger primates, *Ateles* and *Alouatta*, is more widely appreciated but hunting impacts may vary locally.

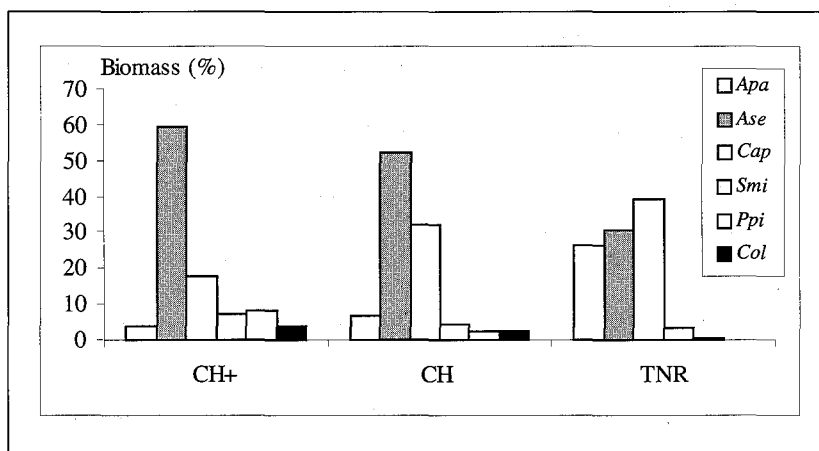
As reported for other Amazonian sites (Freese *et al.*, 1982; Johns, 1986; Bodmer *et al.*, 1988; Sussman and Phillips-Conroy, 1995; Peres, 1997a), our preliminary data suggest that hunting pressure in French Guiana has a major impact on primate communities. Species equilibrium, eco-ethological patterns (Johns, 1986), reproductive rates (Peres, 1990) and populations of the larger species, *Alouatta*, *Ateles* and *Cebus*, appear to be affected. Our surveys also indicate that population density and biomass also vary naturally, perhaps due to changes in floristic composition and differing spatial and temporal food resource availability. *Cebus olivaceus*, for example, is very rare in the northern part of the undisturbed La Trinité Natural Reserve, but more abundant than *C. apella* in the Les Nouragues Natural Reserve, 100 km away (Simmen *et al.*, 1998). Howler density was also low in the area surveyed at La Trinité, about 60% less than at Les Nouragues (Simmen *et al.*, 1998). Independent of hunting pressure, foliage quality is a predominant factor explaining species abundance (Queiroz, 1995; Peres, 1997b; Simmen *et al.*, 1998). Density and biomass contributions of each species to the total community should limit the bias of habitat quality, and could be considered a better indicator to assess hunting impact, than crude abundances data. With an apparent disappearance of *Ateles paniscus*, and drastic decrease of capuchins, howlers, and other species (de Thoisy, 2000), the situation at the Counami sites may reflect the accessibility to forest areas by roads, tracks and rivers, villages, timber and gold mining sites.

Until very recently, conservation policy in French Guiana has been more passive than active (Norconk *et al.*, 1996). Wildlife management is limited to the protection of some species and remains poorly enforced. Among the primates present in the study areas, the spider monkey and the saki are fully protected while other species can be hunted, but their commercial use is forbidden. Habitat protection is also only a recent concern; the two natural reserves of pristine

Table 1. Abundance, density and biomass of primates in 3 sites in French Guiana, facing a high hunting pressure (CH+), a low hunting pressure (CH-), and in a Natural Reserve (TNR).

Species (mean weight)	Groups / 10 km (group size)			Density (ind./km ²)			Crude biomass (kg)		
	CH+	CH-	TNR	CH+	CH-	TNR	CH+	CH-	TNR
<i>Ateles paniscus</i> (7.8 kg)	0.1 (3)	0.5 (2.5)	0.7 (2.7)	0.5	2.2	5.5	3.9	16.8	42.9
<i>Alouatta seniculus</i> (6.2 kg)	0.7 (5.7)	1.5 (5.6)	0.9 (4.5)	10.5	21.5	8	65.1	133.3	50
<i>Cebus apella</i> (3.4 kg)	0.4 (5.4)	0.9 (11.3)	0.9 (7.8)	5.7	24.4	19	19.4	83	64.5
<i>Cebus olivaceus</i> (2.9 kg)	0.1 (4.5)	0.1 (6)	n.d	1.4	1.9	n.d	4.1	5.5	n.d
<i>Pithecia pithecia</i> (1.8 kg)	0.4 (3)	0.3 (2.7)	0.1	5	3.5	0.4	9	6.3	0.7
<i>Saguinus midas</i> (0.5 kg)	1 (5.5)	1.4 (5)	1.2 (3.2)	16.2	21.8	11.3	8.1	10.9	5.6
Total:				39.3	75.3	44.2	109.6	255.8	163.7

a



b

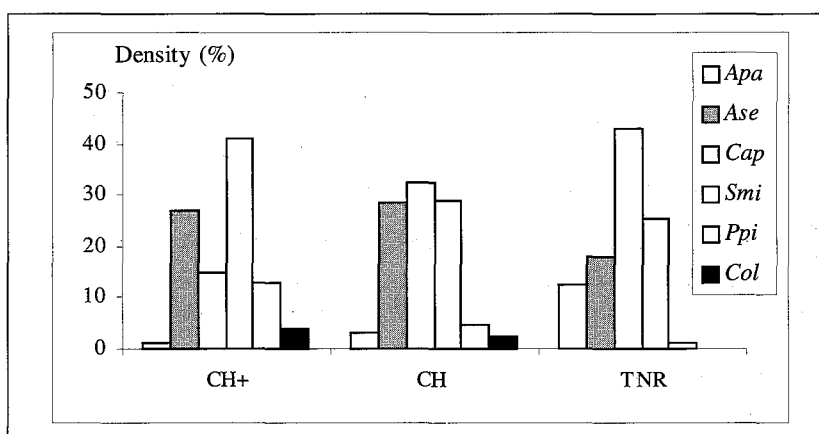


Figure 2a and 2b. Contribution of the different species to the total density and biomass of primates in the three sites. CH+: high hunting pressure, CH-: low hunting pressure, TNR: la Trinité Natural Reserve. *Ase*: *Alouatta seniculus*, *Apa*: *Ateles paniscus*, *Cap*: *Cebus apella*, *Col*: *Cebus olivaceus*, *Ppi*: *Pithecia pithecia*, *Smi*: *Saguinus midas*.

forests, Les Nouragues and La Trinité, were created in 1995 and 1996, respectively. The National Park project, in the southern third of the country, is developing very slowly and is still not fully accepted by local communities and authorities. Alternatively, it should be noted that a natural park, with sustainable development objectives, has just been created in the north of the country.

Our preliminary conclusions reflect those of Mittermeier (1991) for the primate community of Surinam. At the moment, taking into account the entire country of French Guiana, primates do not appear to be threatened by hunting, although dramatic depletions in some species may occur locally. Further surveys are urgently needed in order to: (i) obtain practical ecological data of species distributions and densities in both pristine and hunted habitats; (ii) assess the impact of human activities and (iii) evaluate the sustainability of current hunting levels. Involving local people

in wildlife management programs would be beneficial for species conservation, and implementing an active, enforceable conservation policy for one of the largest remaining pristine neotropical rainforests is imperative.

Acknowledgments

The study at the Counami sites was supported by the Groupement d'Intérêt Scientifique "Silvolab", French Guiana. The field work in the Trinité Natural Reserve was funded by the Réserve de la Trinité.

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CULTURAL PRACTICES BENEFITTING PRIMATE CONSERVATION AMONG THE GUAJÁ OF EASTERN AMAZONIA

Loretta Cormier

Introduction

The negative effects of human activities such as habitat destruction, the pet trade, and medical research on Neotropical primate populations have been well documented (Aquino and Encarnación, 1994; Chiarello, 1993; Hershkovitz, 1972; Mittermeier, 1987; Mittermeier *et al.*, 1978; Rylands *et al.*, 1997). However, insufficient attention is given to indigenous cultural practices that may benefit primate conservation. Primate hunting, particularly using indigenous methods, does not always threaten primate populations. Hunting pressure often becomes a serious problem only when it is combined with widespread deforestation (Lizarralde, 1997; Mittermeier and Coimbra-Filho, 1977), or when hunting moves from traditional subsistence activities to a commercial basis, such as with the African bushmeat crisis (Hutchins, 1999; Rose, 1996).

The research here explored the role of monkeys in the culture of the Guajá Indians on the Caru Indigenous Reserve in Maranhão, Brazil. Seven species occur there: the red-handed howler (*Alouatta belzebul*), the black-bearded saki (*Chiropotes satanas*), the brown capuchin (*Cebus*