

Short Communication

Hunting of Microchiroptera in south-western Madagascar

Steven M. Goodman

Abstract In February 2005 clear evidence was found of extensive hunting by local people of microchiropteran bats in south-western Madagascar. *Hipposideros commersoni* (Family Hipposideridae) accumulates heavy fat deposits during this period, weighing on average about 50 g, and is the targeted species. The capture of other smaller species of microchiropterans appears to be incidental. The exploitation of bats for bushmeat in this

region takes place during a period of food shortage, and because the level of collection surpasses the breeding potential of these animals it may over time result in extirpation of local populations.

Keywords Caves, *Hipposideros commersoni*, hunting, Microchiroptera, south-western Madagascar.

Implicit in Madagascar's conservation programme is the notion that two of the major threats to Malagasy animals are forest degradation in the form of slash-and-burn agriculture and conversion of natural habitats into cattle pasture. Except for a few cases hunting on the island by humans has not been generally cited as an important pressure on natural animal populations. However, recent work has shown that a variety of animals, including turtles, primates, tenrecs, fruit bats and carnivores, are heavily hunted, often within a localized area, and that certain local extirpations are associated with such pressures (Ganzhorn *et al.*, 1990; Randriamanalina *et al.*, 2000; Garcia & Goodman, 2003; Goodman & Raselimanana, 2003; MacKinnon *et al.*, 2003; O'Brien *et al.*, 2003; Goodman *et al.*, 2005). However, little information has been previously available on this topic for microchiropteran bats. On a recent field trip to the extreme south-western portion of Madagascar evidence was found of local heavy exploitation of cave-dwelling Microchiroptera as bushmeat.

South-western Madagascar is an arid zone receiving on average 400 mm of rain per year, which is often highly irregular both between years and in its extent (Battistini, 1964a). Associated with these meteorological patterns, as well as impoverished soils, local agricultural production is localized and unpredictable. The late 2004/ early 2005 famine in this region, associated with devastating cyclonic winds followed by a serious drought and then

an invasion of locusts, led to the death of several hundred local inhabitants.

The dominant natural vegetation of the region is spiny bush. An extensive limestone plateau is aligned along a north-south axis and runs parallel and within 10 km of the coast. This karstic zone, known as the Mahafaly Plateau, contains hundreds of caves and sinkholes (Guyot, 2001), and holds considerable areas of both relatively intact and disturbed forests (Fenn, 2003).

Two distinct cultural groups live in the region between the Onilahy and Linta rivers: the Vezo, a coastal tribe making their living from the sea, and the Tanalana, living a little further inland, who are primarily agriculturalists and pastoralists. During the first portion of the unpredictable local rainy season, which normally commences in December or January, the Tanalana often face food shortages, and certain individuals turn to bushmeat and wild tubers for nourishment. A number of animal species are taboo (*fady*) to these people, including often significant local populations of lemurs (*Lemur catta* and *Propithecus verreauxi*) and land tortoises (*Geochelone radiata* and *Pyxis arachnoides*). These people do, however, consume megachiropteran and microchiropteran bats.

During February 2005 I conducted an inventory of bats on the Mahafaly Plateau, specifically inland from the village of Itampolo (24°41.1'S, 43°56.8'E), a zone that had not been previously surveyed for this group. Most of the trapping was done at the rims of vertical sinkhole entrances and, because of the difficulty of entering these caves without special climbing equipment, they were not explored. Thus, no information was obtained on relative abundance and species richness of bats in these caves. While conducting this survey I encountered local Tanalana bat hunters at four caves, carried out multiple interviews with one of them, and examined their catches.

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At one of these caves, the Grotte d'Androimpano, 4.2 km north-east of Itampolo (24°39'S, 43°58'E) more detailed information was obtained on bat exploitation. This cave is a large open sinkhole that drops vertically at least 130 m and is surrounded by partially disturbed spiny bush forest. From the edge of the sinkhole's surface rim hunters had cleared several 2 m wide radiating trails into the surrounding forest. Along portions of these trails, particularly at the opening of the sinkhole, narrow vertical fence-like barriers of 1.5–2 m high had been erected with large tree branches, which act to funnel bats emerging from the cave and flying within 2 m of the ground. Numerous hardwood thin whip-like batons, with the bark removed, and with an intricate series of terminal smaller intertwining branchlets were found within metres of the sinkhole rim.

On the evenings of 22 and 23 February 2005 I encountered a Tanalana bat hunter at the Grotte d'Androimpano. At dusk as microchiropterans started to emerge from this cave, the hunter took up a position on one of the trails, about 5 m from the sink rim, and with remarkable precision started swatting bats with a whip-like wooden baton. He did not have any supplementary form of illumination other than the remaining light of dusk and the evening stars. Approximately two-thirds of his swatting attempts resulted in the capture of a bat and the blow killed most individuals. The hunting period lasted about 45 minutes. On the first evening 38 leaf-nosed bat *Hipposideros commersoni* (Family Hipposideridae) were obtained, and on the second evening 30 bats, including 26 *H. commersoni*, one *Miniopterus gleni* (Family Vespertilionidae) and three *Triaenops rufus* (Family Hipposideridae).

An interview conducted with this hunter indicated that during the start of the season of food shortage in early January, and for approximately 3 months, he visited the cave almost every night to hunt bats. He has been collecting bats at this site during this same yearly period and with more-or-less the same intensity for at least 4 years. On some nights up to three hunters take up positions along the sinkhole rim. The freshly killed bats obtained by the interviewee were taken back to his house, c. 3 km away from the cave, roasted and eaten. During the period of food shortage, which in some years continues to result in severe local famines (Decary, 1930; Battistini, 1964b), these animals serve as the major source of protein for his family. Most evenings during the 3 months of hunting he can kill on average 30 bats, mostly *H. commersoni*, which is the target prey; other smaller microchiropterans are incidental captures. The estimate of 30 bats per night is within the range of individuals recorded during the two nights I was able to check his catch. This bat species has, in south-western Madagascar at the end of the dry season, an average forearm

length of 82.8 mm (range 81–85 mm, $n = 5$) and an average body mass of 38.9 g (range 32.5–45.0, $n = 5$; J. Ranivo & S.M. Goodman, unpub. data). Under current Malagasy law this species does not receive any special protection and an April 2005 Global Mammal Assessment workshop in Antananarivo concluded that it should be categorized as Near Threatened (IUCN, 2001) on the IUCN Red List (IUCN, 2004).

The interviewee mentioned that during the 3 months of hunting per year individuals of *H. commersoni* become progressively more fatty. Several of the *H. commersoni* collected at the site had significant deposits of subcutaneous and interperitoneal fat and the average body mass was 50.4 g (S.M. Goodman, unpub. data). Furthermore, the hunter noted that after the end of March few *H. commersoni* exit the cave until September. He suggested that they slept in the 'mud of the cave floor'. Information from several other sites in the southern half of the island indicates that during certain periods this species is common and during other periods it is absent. It is unclear if this species remains inactive within caves or more likely the local population migrates to other sites, as has been found on mainland Africa in the closely related species *H. gigas* and *H. marungensis* (McWilliam, 1982; Churchill *et al.*, 1997; Cotterill & Fergusson, 1999; taxonomy follows Simmons, 2005). In late May 2005 I revisited the Grotte d'Androimpano and during one night at the sinkhole rim no *H. commersoni* were observed or captured. I encountered the hunter interviewed earlier, in late February 2005, and he mentioned that it had been at least 1 month since this species had 'started to sleep'.

Over the course of the 3 months of hunting per year at the Grotte d'Androimpano, with an average of 30 *H. commersoni* captured per night by one hunter, c. 2,700 individuals are collected. Given that this figure does not include the catches of other hunters at the site, it is probably conservative. The interior of the sinkhole was not explored and we do not have estimates of the number of individuals of this species inhabiting the cave. Nonetheless, on the basis of a few natural history parameters certain extrapolations can be made. *H. commersoni* is broadly distributed across most of the remaining forested areas of Madagascar, including the east. It is only known to give birth to a single infant and have one litter per year (S.M. Goodman, unpub. data), as is the case in closely related African members of this genus (Brosset & St. Giron, 1980). Thus, given its population demography and the level of recruitment into the breeding population, the intensity of collection of *H. commersoni* at the Grotte d'Androimpano does not appear to be sustainable in the medium-term. Unless there is considerable immigration to the site from other portions of the island, the local population is doomed to extirpation.

At the three other cave sites I encountered bat hunters that used the same technique observed at the Grotte d'Androimpano. At an additional seven cave sites in the vicinity of Itampolo trails were found radiating from sinkhole rims, with a nearby ready supply of swatting sticks and a description by local people of the target species that fits that of *H. commersoni*. On the basis of these observations and discussions with local informants, the exploitation of *H. commersoni* and to a lesser extent other microchiropterans is widespread across parts of the Mahafaly Plateau within the range of the Tanalana. Furthermore, at other sites in the immediate region clear evidence was found for the massive capture of *Mormopterus jugularis*, as well as other techniques for trapping *H. commersoni* (Goodman *et al.*, 2002). Given that the area that I studied around Itampolo represents <10% of the total length of the karstic Mahafaly Plateau, which has a myriad of caves and sinkholes, it can be conservatively estimated that 50–100 caves are exploited for bats. If the annual level of exploitation at each of these caves is half that at the Grotte d'Androimpano (1,350 per site), something on the order of 70,000–140,000 microchiropteran bats may be collected annually in the region.

As has been found with several species of terrestrial mammals on the island (Garcia & Goodman, 2003), hunting of microchiropterans in south-western Madagascar threatens the continued existence of local populations. To properly evaluate the role of this hunting pressure on their long-term viability, studies are urgently required of the breeding ecology and population dynamics of these animals. Furthermore, more famine relief aid is desperately needed for the local people at certain times of the year. This would reduce their need to turn to bushmeat during what are nearly annual crises.

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Biographical sketch

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