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IS THE ZANZIBAR LEOPARD *(PANTHERA PARDUS ADERSI)* EXTINCT?

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ABSTRACT

The Zanzibar leopard, *Panthera pardus adersi* (Pocock, 1932), is a little-known island endemic assumed by some authorities to be extinct. In 1996 a survey of local practices, beliefs and knowledge about the leopard was conducted on Unguja Island. Data were collected through interviews with Zanzibaris in villages across the island and from official documents (records of the National Hunters). In total 52 villagers, over half of whom were former or current part-time hunters, were interviewed. The interviews yielded compelling indications for an extant population of leopards: interviews included reports of leopard sightings for every year between 1990 to 1996. Combining this with National Hunters' records, which documented killed leopards in each year from 1985 to 1995, we conclude that the species was probably still to be found on the island as of 1996. However, a subsequent effort undertaken by other researchers and involving camera traps, audio playbacks and searches for leopard sign failed to yield physical evidence of leopards.

INTRODUCTION

With recognition of the decisive role local people often play in the success of conservation initiatives, studies of local attitudes toward wildlife, protected areas, and conservation programmes have come to constitute an important part of the literature (*e.g.*, Infield, 1988; Hackel, 1990; Newmark *et al.*, 1993; Reading & Kellert, 1993; Akama *et al.*, 1995; Nepal & Weber, 1995; Badola, 1998; Bjerke *et al.*, 1998; Hill, 1998; Mehta & Kellert, 1998).

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Local perceptions of species, such as large felids, that pose direct threats to people and livestock are often particularly charged (Oli *et al.*, 1994; Saberwal *et al.*, 1994; Kellert *et al.*, 1996; Mishra 1997).

In 1996, the Jozani-Chwaka Bay Conservation Project engaged the authors (both anthropologists) to survey beliefs and practices concerning leopards on Unguja Island. The managers of this integrated conservation and development project were considering whether to include a leopard conservation initiative in their efforts to protect several endemic wildlife species and subspecies. Due to morphological differences (its small size and distinctive coat pattern), the Zanzibar leopard is recognised as a distinct subspecies, *Panthera pardus adersi* (Pocock, 1932; also Swynnerton & Hayman, 1951; Kingdon, 1977, 1989; Pakenham, 1984), but little is known about this felid.

At the time of the study, some sources in the literature had assumed the Zanzibar leopard was extinct (*e.g.*, Miththapala *et al.*, 1996; Nowell & Jackson, 1996). However, recent unpublished reports (Archer, 1994; Marshall, 1994; Selkow, 1995) indicated that Zanzibaris believed leopards were still to be found. Non-native residents and researchers had not been able to confirm the presence of the Zanzibar leopard, although pugmarks thought to be leopard were encountered in 1996 (A. Archer, R. Wild, pers. comm.). The last outside researcher to claim an actual sighting of the leopard was Swai (1983 and pers. comm.).

The aim of this study was to investigate people's knowledge of leopards, their attitudes toward the species, and whether there were indications that leopards were still extant on the island. This paper reports the findings which relate most directly to the question of whether leopards survived on Unguja at the time of the survey in 1996.

Background

In 1919 British authorities in the Zanzibar Protectorate prohibited the hunting of leopards by listing them in the Wild Animals Protection Decree. However, as the human population grew, attacks upon people and livestock increased. In 1950, the government lifted the total ban on leopard hunting by issuing the Zanzibar Leopard Exception Order.

After the Zanzibar revolution of 1964, the newly independent government sponsored a joint leopard-eradication and witch-purging campaign. Since at least colonial times, it has been believed that witches exercise their magical control over leopards to harass other people. Leopards thought to be controlled in this way are described as being "kept". Harming, or even just catching sight of, a witch's leopard was, and is, believed to result in a range of grave afflictions. The post-revolution leopard/witch eradication programme, known as the Kitanzi Campaign, gradually petered out, but widespread animosity towards leopards and their alleged "keepers" survives to the present day.

Today, the government supports leopard hunting by subsidising the National Hunters. This is a diverse group of men, mainly townsmen engaged in various occupations, who organise hunts in rural Unguja on the officially-sanctioned pretext of eliminating agricultural pests. The Zanzibar leopard is counted among these "vermin". The government pays for their transport and supplies, but National Hunters are not directly paid for their participation. They are, however, permitted to sell the products of what they succeed in killing.

Zanzibar enjoys a semi-autonomous status within Tanzania. Tanzania is party to CITES-endorsed hunting quotas for leopards and other endangered or vulnerable species. Although the conditions of international agreements made by Tanzania theoretically apply equally to Zanzibar, they are not enforced, and the mainland wildlife authorities do not monitor or interfere in Zanzibari affairs.

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Study Area

The main island of Zanzibar, Unguja (1,600 km^2) (figure 1), lies approximately 6° south of the equator and 40 km from mainland Tanzania. The deeper soil zone of the western part of the island formerly supported moist lowland forest, while a mosaic of thicket and dry lowland forest covered the coral rag zone of the east and much of the south. With an estimated population of 524,000 people, Unguja then had a mean rural population density of approximately 171 persons per km^2 (range 0–300) (figures based on 1988 census results and 1991 estimates; United Republic of Tanzania, 1991; Zanzibar Revolutionary Government, 1992). Rural Zanzibaris subsist from various combinations of cultivation, small-scale livestock husbandry, fishing, and charcoal and lime production. Hunting also contributes to some livelihoods.

Much of the island's wildlife inhabits the patches of intact or degraded thicket in the eastern part of the island, as well as the Jozani Reserve (25 km^2), which encompasses Unguja's only remaining older-growth forest (Robins, 1976; Williams *et al.*, 1998). The larger species of mammals in Zanzibar include Aders' duiker *Cephalophus adersi*, Zanzibar blue duiker *Cephalophus monticola sundevalli*, suni *Neotragus moschatus moschatus*, bushpig *Potamochoerus porcus*, Zanzibar red colobus *Procolobus kirkii*, Sykes' monkey *Cercopithecus mitis*, African civet *Viverra civetta schwarzi*, and a newly identified servaline genet, *Genetta servalina archeri* (Van Rompaey & Colyn, 1998).

METHODS

Undertaken in July 1996, the research consisted primarily of semi-structured interviews in Swahili with villagers and a review of National Hunt records. Nineteen villages located in the southern and eastern three-quarters of the island were visited. These areas contain the largest tracts of remaining forest and thicket. Recent reports and interviews with Forestry officials and National Hunters suggested that leopards were concentrated here.

In some cases, the Zanzibari members of the research team knew someone in the village who might be willing to talk about leopards. Other interviewees were encountered by chance. Most interviewees were men over 30 years old (table 1). This bias was not considered a disadvantage as men partake in hunting and have more direct knowledge of wildlife. Twenty-eight of the 52 villagers interviewed were current or former part-time hunters. Most preferred to hunt alone, but some participated in group hunts organised at the village level.

Table 1. Age and sex characteristics of villagers interviewed in a survey of beliefs and knowledge of the leopard (Panthera pardus), Unguja Island, Tanzania, 1996.

Age (years)[1]	< 18	18 - 30	31 - 50	> 50	Total
Male	1	2[2]	15[3]	26[4]	44
Female		3	1	4	8

[1] Some ages are estimates.
[2] One was a part-time hunter.
[3] Ten were current or former part-time hunters.
[4] Seventeen were current or former part-time hunters.

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Conducting semi-structured and open-ended interviews, we sought answers to the questions listed in table 2. Although all interviews were voluntary, many villagers were uneasy discussing leopards, fearing that a willingness to do so might result in them becoming targets of "leopard keepers" or would be construed as evidence that they themselves were "leopard keepers". Probably increasing their reserve was the fact that the researchers were affiliated with the government (the Commission for Natural Resources).

The second source of information was the records of the National Hunters. Although National Hunters are not closely monitored by the government, they keep records of their activities in the form of individual hunt reports and annual summaries. These are also supposed to include the results of village hunts. The records are stored in Zanzibar's Department of Regional Administration.

*Table 2. Questions guiding semi-structured interviews in a survey of beliefs and knowledge of the leopard (*Panthera pardus*), Unguja Island, Tanzania, 1996.*

1)	Did the interviewee engage in hunting, currently or formerly
2)	Did the interviewee believe there were leopards in the area he/she lived?
3)	Did the interviewee believe there were more or fewer leopards now compared to the past?
4)	What did the interviewee believe was the cause of any perceived increase or decrease?
5)	Had other wildlife increased, decreased, or remained stable in number? Why?
6)	Had the interviewee ever encountered signs of leopards, such as faeces or pugmarks, or ever heard leopard calls?
7)	Had the interviewee ever seen a leopard? If so, when, where, and under what circumstances?
8)	If the interviewee was or had been a hunter, had he ever killed a leopard? When, where, and under what circumstances?
9)	What could the interviewee tell us about the appearance and behaviour of leopards?
10)	Did the interviewee look positively or negatively on leopards?
11)	Did the interviewee believe that leopards should be protected?

RESULTS

Interviews

Interviewees varied widely in their level of contact with, and knowledge about, leopards and other wildlife. Informants' descriptions of the physical appearance of leopards—their size and body shape, the form of their paws, colouration and coat patterning, and facial features—all matched what we know of leopard morphology. This accuracy is partly accounted for by the sizeable proportion (54 %) of informants who reported having seen leopards at close quarters, including dead leopards that the informants themselves had directly participated in killing or which had been hunted by Kitanzi agents or National Hunters, and live leopards trapped during the Protectorate period or the Kitanzi era. Predictably, it was with respect to less directly observable aspects of leopard natural history, *e.g.* gestation length and longevity, that the accuracy of the information became more variable. Some informants offered good descriptions of behaviours which probably few Zanzibaris have directly observed (or seen on television), *e.g.* males' scent-marking behaviour and the habit of hauling kills into trees where these are available, suggesting that the accurate observations of some individuals have entered into the body of general Zanzibari knowledge. The scientific accuracy of some of the interviewees' information about leopards—such as crabs forming

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part of the diet of leopards whose ranges include mangrove forests—seems plausible but requires further work to confirm or discount.

All interviewees believed that there were still leopards on Unguja, but that they had decreased in numbers over the years, as had other wildlife. Interviewees attributed the reduction in leopards to the Kitanzi campaign and subsequent hunting pressure, combined with a slow reproduction rate and high cub mortality. Only one informant (2 %) offered habitat reduction and degradation as reasons for the decline in leopards.

Though interviewees were preponderantly negative in their attitudes toward leopards and a possible leopard conservation programme, 14 informants (27 %) did not support the complete extermination of leopards. These were mostly younger interviewees. Ten of them were of the opinion that if leopards could be securely contained, as in a zoo or fenced park, and thus kept from harming people and livestock, then the conservation of a small number leopards might generate much-needed tourism income in rural areas. It is widely known that thousands of tourists visit Jozani Forest annually to see Zanzibar red colobus monkeys. Generally, however, witchcraft levels and leopard numbers were perceived to have dropped in tandem during the last three to four decades and informants had no wish for these to rise to former levels.

Thirteen part-time hunters (25 % of informants) disclosed having killed leopards at some time in their lives. Most of these leopard kills reportedly occurred before 1990; some were in connection with pre-Independence British hunting parties or with Kitanzi campaign or National Hunter activities. One man reported having shot a leopard in 1990 and then another in 1994 (table 3).

The interviewees related numerous leopard sightings (table 3). Leopards were reported to have been seen during each of the years spanning 1990 and 1996. There were seven reported sightings for 1996. Five (10 %) interviewees reported indirect evidence of leopards (table 3). This included pugmarks and scat thought to belong to leopards, as well as attacks on domestic animals attributed by the interviewees to leopards.

National Hunt records

According to records of the National Hunters, leopards were reportedly killed in every year from 1985 through 1995. The records for this last year on file, which showed only one leopard killed, were recognised to be incomplete when we reviewed them in 1996 (table 4). As recently as 1994, 12 or 13 leopards had reportedly been taken. The figures in the annual summaries were sometimes higher than the totals in the individual hunt reports, suggesting that individual hunt reports were produced or filed somewhat sporadically.

DISCUSSION

Taken at face value, these findings support the conclusion that leopards were probably still present on Unguja at the time of the study. Leopards are probably the most versatile of the big cats, able to adjust their behaviour and diet to local conditions and known to survive in settled areas, including the suburbs of Nairobi (Seidensticker, 1991). Hamilton (1986) reported leopards in an area of western Kenya with a human population density of 150/km^2 (about the same as Unguja), large livestock numbers, and little undisturbed habitat or natural prey.

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Table 3. Summary of interviewees' reports of leopards (Panthera pardus) on Unguja Island, Tanzania (1990 to 1996).

Village	This study	Selkow (1995)	Marshall (1994)	Archer (1994)
Nungwi	1990 I [1]			1991 S [2]
Upenja		1993 I		
		1994 I		
Kiwengwa	1993 S			
	1996 S			
Pongwe		1995 S		
Ndudu	1995 S			
	1996 S			
Uroa	1996 S	1996 S		
Chwaka	1996 I			
Dimani	1996 S [3]			
	1996 S			
Unguja Ukuu	1996 S		1994 S	
	1996 I			
Pete	1991 S		1992 I	
	1993 S			
	1996 S			
Kitogani	1991 S [4]		1991 S	
	1996 I		1994 S	
			1994 I	
Muungoni	1992 S			
	1993 S			
	1996 I			
Charawe			1992 S	
			1992 S	
			1993 I	
			1994 I	
			1994 S	
Ukongoroni			1993 S	
			1994 I	
Dongwe			1990 S	1994 S
			1991 S	
			1992 S	
			1993 S	
			1994 S	
Bwejuu			1991 S	1994 S
			1994 I	
Paje	1990 S [5]		1990 S	
			1992 S	
			1993 S	
			1994 S	
			1994 I	
Muyuni C			1992 S	
Kizimkazi	1996 S			
Makunduchi	1990 S	1994 I		
	1990 S [6]			
	1994 S [7]			

[1] I = report of indirect indication of leopard. The latter includes observations of pugmarks and scat interpreted as belonging to leopards. It also includes hearing calls thought to come from

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leopards. Finally, it includes domestic animals (cattle, donkeys, goats, chickens, and dogs) thought to have been injured or killed by leopards. Some years are approximate.
[2] S = reported sighting of leopard. Some years are approximate.
[3] Part-time hunter reported that a groups of youths had found three leopard cubs; these were fed to their dogs.
[4] A youth reportedly attacked.
[5] A man reportedly attacked.
[6] Part-time hunter reported killing a leopard.
[7] Same interviewee as above reported killing another leopard.

*Table 4. Summary of leopards (*Panthera pardus*) killed, 1985 through 1995, as given in National Hunters documents. See Goldman & Walsh (1997), for details. Copies of this report are available from the authors.*

Year	Number from annual summaries	Number tallied up from individual hunt reports
1995 [1]	1	1
1994	13	12
1993	13	11
1992	12	9
1991	18	17
1990	12	10
1989	15	11
1988	11	2
1987	5	5
1986	4	4
1985	7	7
Total	111	89

[1] Records for this year (the year before our study) were not complete.

Judging the reliability of these results presents a challenge. Some reported leopard sightings may have been sightings of other animals, such as civets or servaline genets. Villagers' reports of pawprints, faeces, and leopard calls may also have been mistaken. Indigenous people's knowledge of their natural environment has achieved recognition as extremely intimate and is now prized by Western scientists as valuable (see *e.g.*, Alvard, 1993; Poizat & Baran, 1997; Stander *et al.*, 1997; Ferguson *et al.*, 1998). Yet indigenous knowledge is not infallible, and the accuracy of information about wildlife and other aspects of the natural environment varies among people depending on their degree of dependence on it and a range of other factors (Walsh & Harvey, 1997).

Hunters' reports of having killed (vs. merely seen) leopards are not easily dismissed. Misidentification of a carcass that a hunter actually handles seems highly improbable. Several studies have relied at least in part on interviews to determine the quantities and types of game hunted and consumed (*e.g.*, Ayres *et al.*, 1991; Silva & Strahl, 1991; Alvard, 1993; Alvard *et al.*, 1997). The possibility cannot be ruled out that hunters (and other informants) deliberately misinformed us, perhaps to hold our attention and thereby to gain prestige in their communities or to foster reputations as brave hunters. However, in light of what we know about people's deep-seated fear of "leopard-keeping witches", it is equally likely that villagers *under*-reported leopard kills (and sightings).

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The internal contradictions of the National Hunt records called into question their accuracy. Nonetheless, these records do strongly support the thesis that in the mid-1990s there was still an extant leopard population.

The results of this study are intriguing because, to our knowledge, no foreign researcher has come upon direct, irrefutable evidence of Zanzibar leopards in recent years. During the course of the study, we were shown pieces of leopard skin purportedly of local provenance, and received reliable reports from two foreign residents and a Zanzibari museum advisor who were offered the purchase of leopard skins on the island. However, the local provenance of these partial and whole skins could not be confirmed.

For about 3 weeks in 1997, two wildlife researchers sought firm evidence for the leopards' continued existence, but failed despite deploying two automatic "camera traps", playing audio-taped leopard calls, and searching for pugmarks and other sign (Stuart & Stuart, 1997). It is difficult to reconcile these results with our own. That the only wildlife represented in the 80 photographs produced by the camera trapping effort were African civet and crested guinea fowl (*Guttera pucherani*) may be attributed to its relatively short duration, the small number of camera kits deployed and their locations in the same area of forest, and the quality of the equipment.

In the years following the study reported here, reports of leopard sightings continued to come in from rural Unguja, particularly the Jozani area. Further fieldwork is required to determine whether there are still leopards on Unguja. Two fruitful avenues are more extensive camera trapping and direct observations of National Hunts. If a leopard population is confirmed, every effort should be made to protect these unique felids in their natural habitat (not in captivity). The outlines of a conservation programme, focussing on education, legislation and enforcement, are on file with the conservation authorities in what is now the Department of Commercial Crops, Fruits and Forestry.

Because of the complexity of this case and the difficult questions it raises, we believe the results of this study may prove interesting and useful to conservation biologists, and to scientists interested in species which play roles in complex indigenous belief systems.

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