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COMMUNITY ATTITUDES TO TORTOISES *(Geochelone pardalis babcocki)* AND THEIR CONSERVATION IN NORTHERN TANZANIA

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ABSTRACT A survey of local attitudes to tortoises and their conservation was conducted in Robanda and Mto wa Mbu in northern Tanzania between October 1994 and March 1995. Leopard tortoises damaged crops in Robanda village, Serengeti District. The Ikoma tribe of this district esteems the leopard tortoise as a totem animal, and the scutes have medicinal value. Trade was reported only in Mto wa Mbu, but most respondents were very reluctant to state the number of animals collected.

Most respondents favoured conserving tortoises and biological diversity in their area. Given the close proximity to the road and Arusha, Mto wa Mbu residents placed more emphasis on cash values of the wildlife trade and tourism. In contrast, in Robanda, culture values may favour conservation. The low income *per capita* in Robanda, and the decline in culture norms among the young generation might change the people's attitudes to tortoises. The paper recommends for raising public awareness among the youths in order to elicit community support for conservation.

Key Words: Northern Tanzania; Leopard tortoise; Community attitudes; Conservation.

INTRODUCTION

The leopard tortoise *Geochelone pardalis babcocki* is widespread in Sub-Saharan Africa. Its range extends from Sudan, Ethiopia and Somalia south through Tanzania to Natal, and west to Angola and Namibia (Loveridge & Williams, 1957; Broadley, 1989). Humans have killed leopard tortoises for food for hundreds of years. Archaeological studies in the western Cape coast of South Africa have shown that tortoises were eaten by the early hunter-gatherers of the region (Boycott & Bourquin, 1988). In northern Tanzania, archaeological remains around Lake Eyasi have shown that leopard tortoises were used as a source of food in the area some 45,000-2,180 years BP (Mehlman, 1989).

Today, leopard tortoises form an important part of the rural economy. They are used as food throughout their range, and the species is usually rare in densely populated areas as a result (Broadley, 1989). Greig & Burdett (1976) have attributed the extermination of leopard tortoises in the western Cape coastal areas of South Africa largely to consumption by local people. Loveridge & Williams (1957) reported that the Kalahari bushmen prized meat of this species. Wilson (1968) also reported exploitation of leopard tortoises for food by local communities in eastern Zambia. In Tanzania, the species is known to provide meat for various tribes (Loveridge & Williams, 1957). Hadza women living around Lake Eyasi are known to eat tortoises,

but men (Mehlman, 1989; Moll *et al.*, 1993) consider them taboo. Other tribes include the Nyamwezi, Pare (Loveridge & Williams, 1957), and Wandamba (F.A. Mturi, pers. comm.). However, the effect of such use on the populations has not been studied.

There are few details on the role of the leopard tortoise in the customs and traditions of rural communities. In addition to meat, leopard tortoises are also prized for their shell by the Kalahari Bushmen. The carapace is used as water containers, ladles, and the shields of snuffboxes (Loveridge & Williams, 1957). In Tanzania the leopard tortoise was among the most exploited species for the export trade, before the introduction of the zero-quota system on tortoise trade (Kabigumila, 1998). Although the leopard tortoise is said to be widespread in Tanzania (Loveridge & Williams, 1957; Broadley, 1989), its current status may be uncertain and it may no longer inhabit some of its former range presumably due to exploitation.

Very little is known about community attitudes to tortoises, their conservation and importance in the rural economy. Studies elsewhere have shown that local attitudes influence the support and participation of communities in wildlife conservation and management (Kabigumila, 1991; Newmark *et al.*, 1993).

The study described in this paper was part of a project on aspects of the ecology and management of leopard tortoises in northern Tanzania. The study investigated the relative abundance of tortoises, their damage to crops, their socio-economic uses, resident attitudes to tortoises and willingness to participate in conservation of biological diversity in northern Tanzania.

STUDY AREA AND METHODS

I. Villages Selected for Questionnaire Survey

Four villages, three from Mto wa Mbu Ward (Mlimani Park, Migombani Kati, Migombani Juu) and one from Ikoma Ward (Robanda) were selected for the survey on the basis of their proximity to the leopard tortoise sites in the Lake Manyara and Serengeti National Parks, respectively (Fig. 1).

1. *Robanda village*

Kauzeni & Kiwasila (1994) have reviewed the socio-economic profile for Robanda village. Robanda is a traditional village established by the Ikoma tribe long before the Government villagisation programme of 1969. It is situated in Serengeti District along a dry weather road from Musoma and Mwanza to Arusha. According to the 1993 estimates, the village covers an area of 13 km^2 and has a population density of 121.7 per km^2. The average number of persons per household is 9.1. It is one of the most densely populated and fastest growing villages in the district. The major economic activity is agro-pastoralism (Kauzeni & Kiwasila, 1994). Cotton is grown as a cash crop while sorghum and finger millet are grown for food. The livestock population is about 2,876 animals, comprising cattle (920), goats (1060), and sheep (896). Poaching for meat is also conducted (Kauzeni & Kiwasila, 1994). Among 190 households in the village, about 40 people engaged in poaching (Campbell &

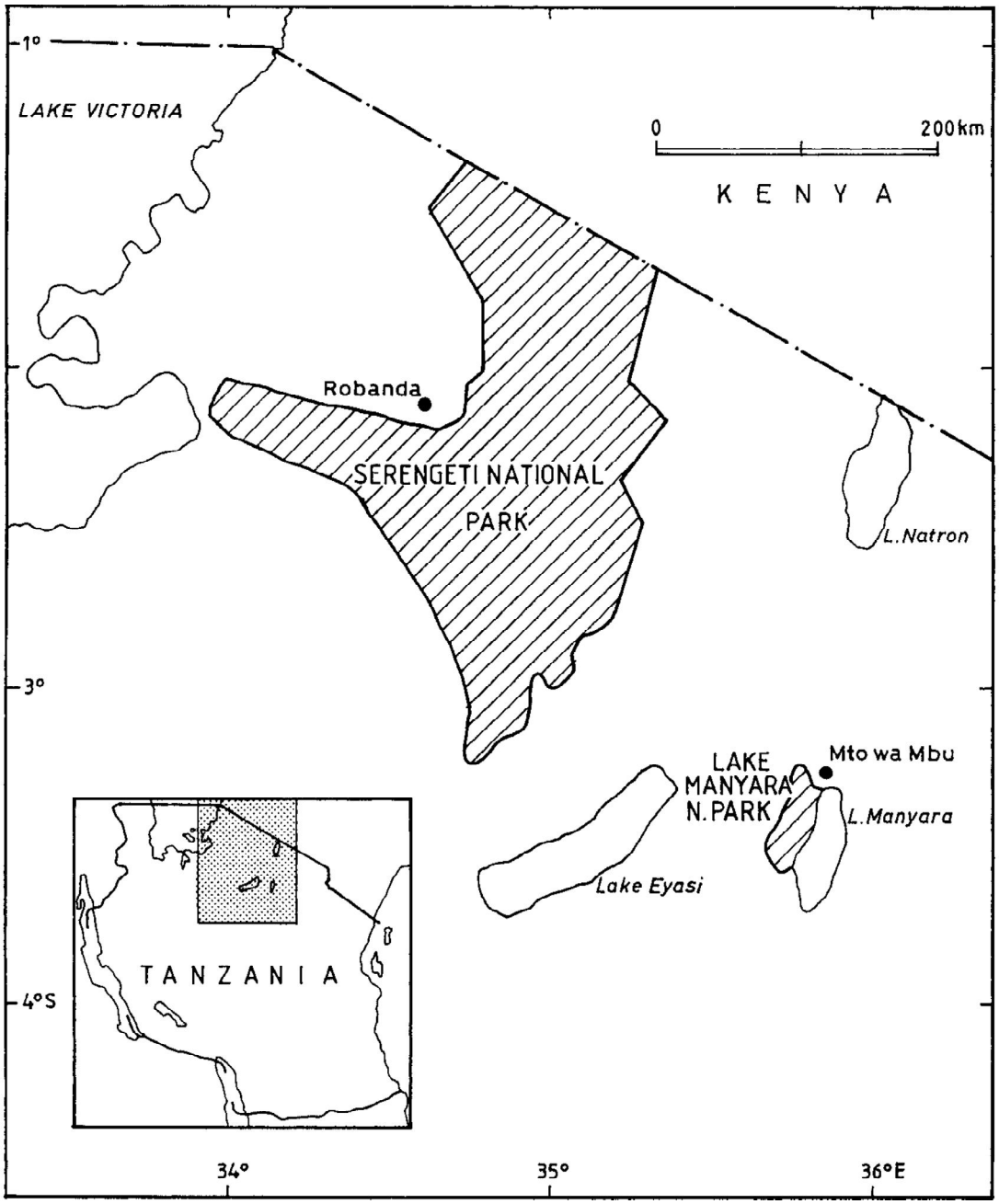


Fig. 1. Map of northern Tanzania showing location of Mto wa Mbu Ward and Robanda Village.

Hofer, 1995). However, the Serengeti Regional Conservation Strategy (SRCS) established in 1989 has been addressing this issue through conservation education, and wildlife utilisation schemes (Mbano *et al.*, 1995). The Village Wildlife Committee is supported by SRCS in a number of social and income-generating projects.

The village faces a number of problems including food scarcity caused by prolonged drought, wildlife damage to crops, poor communication and transport, cattle rustling, and lack of clean water.

2. *Mto wa Mbu Ward*

The history of the Mto wa Mbu settlement dates back to the early 1920's when

the land in the area was first cultivated by the Sukuma and Nyamwezi World War I veterans (IRA, 1994). Before that, Mto wa Mbu was an uninhabited forest belt avoided by the Masai, and presumably the Iraqw. The population remained small and stable until the construction of the Arusha-Oldeani road during the 1930's, when the demand for fruits and vegetables in Arusha attracted immigrants with opportunities for growing cash crops. In 1935 the population was reported at 300, and by 1950 it had grown to 1,200, through immigration of various ethnic groups including Iraqw and Chagga. The 1988 census reported the population at 14,418 (average household size=4.5), with a growth rate of 2.8% per annum (Bureau of Statistics, 1989).

Maize, beans, bananas, rice, vegetables and fruits are grown mainly for subsistence with some cash crops for sale in Arusha. Irrigated and rain-fed cultivation provides the local community with a steady source of income, but soil salinity is having a negative effect on crop yields (IRA, 1994). Food security is good but less reliable for rain-fed cultivation.

Mto wa Mbu lies along the popular northern tourist circuit from which the local community benefits by sale of souvenirs, curios, camping supplies, and operation of guesthouses and restaurants. The impact of tourism on the socio-economics of the local community has been considerable and it is likely to increase on completion of the proposed Makuyuni-Ngorongoro tarmac road (IRA, 1994). Collection of wild animals especially birds and reptiles for the export trade is also conducted in the area, mostly illegal (Kabigumila, 1998).

The National Park contributes to several social and income-generating projects in the ward within the framework of the Community Conservation Services. These include tree-planting, expansion of a secondary school, and conservation education (V.A. Mgina, pers. comm.).

II. Survey of Community Attitudes

A questionnaire survey was used to study community attitudes to tortoises and tortoise conservation, with each respondent representing his/her household. A household was defined as one comprising a husband, wife, children and dependants, or a widow/divorcee, children and dependants (Kabigumila, 1991). The respondents were interviewed about the status of the leopard tortoise in their area, whether they collected tortoises for local use or trade, and if they would like to participate in conservation of tortoises and biological diversity in their area. Where possible, the questions asked were of the "free response" type to encourage individual expression (Appendix 1.1). It was not possible to obtain a truly random sample because at the time of the survey some villagers were busy tending their farms. The questionnaires were translated into Swahili (Appendix 1.2) and administered by primary school teachers recruited from respective village schools. Experience has shown that most respondents would talk to local teachers more easily than to a stranger (Kabigumila, 1991).

A total of 308 households (154 in each area) were surveyed between October 1994 and March 1995. The sample comprised more than 80% of the households in the respective sample villages.

Data Analysis

In summarising the results, the data from Mto wa Mbu ward were pooled to provide comparisons between Robanda and Mto wa Mbu areas.

Statistical tests used include the Goodness of Fit test (G-test), and the d-test for proportions. Where appropriate, the 95% confidence limits for means and percentages are given (Zar, 1996). The confidence limits for proportions were read or calculated by interpolation from Table P of Rohlf & Sokal (1995). All probabilities are two-tailed and the results are recorded as significant at $p \leq 0.05$.

TORTOISE SIGHTINGS AND POPULATIONAL TREND

Nearly half (51.3%, N=154) the respondents in Robanda village claimed they could see more than two leopard tortoises per day, compared to only 19.4% (N=154) of the respondents in Mto wa Mbu villages (Fig. 2). The difference in the number of tortoise sightings likely to be made per day was significant between the two areas ($G=45.411$, $DF=3$, $P<0.001$). Most respondents from both areas said there had been noticeable changes in tortoise numbers over the past ten years (Fig. 3). However, the proportion of respondents claiming so differed significantly between the two areas (d test, $d=6.648$, $P<0.001$), with Mto wa Mbu showing a higher proportion (92.9%, N=154). Also, there was a significant difference in respondents' views between the two areas on the trend in tortoise numbers ($G=37.028$, $DF=1$,

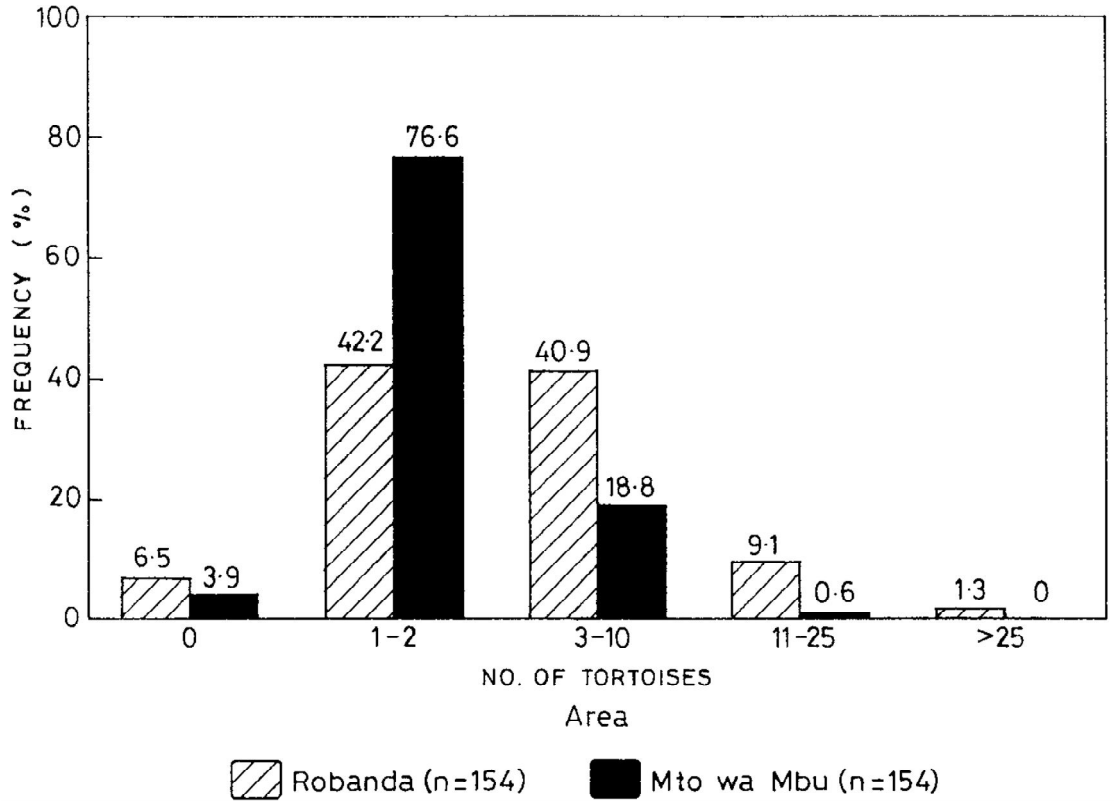


Fig. 2. Respondents' views on the number of tortoises likely to be sighted per day in their area. n=number of respondents.

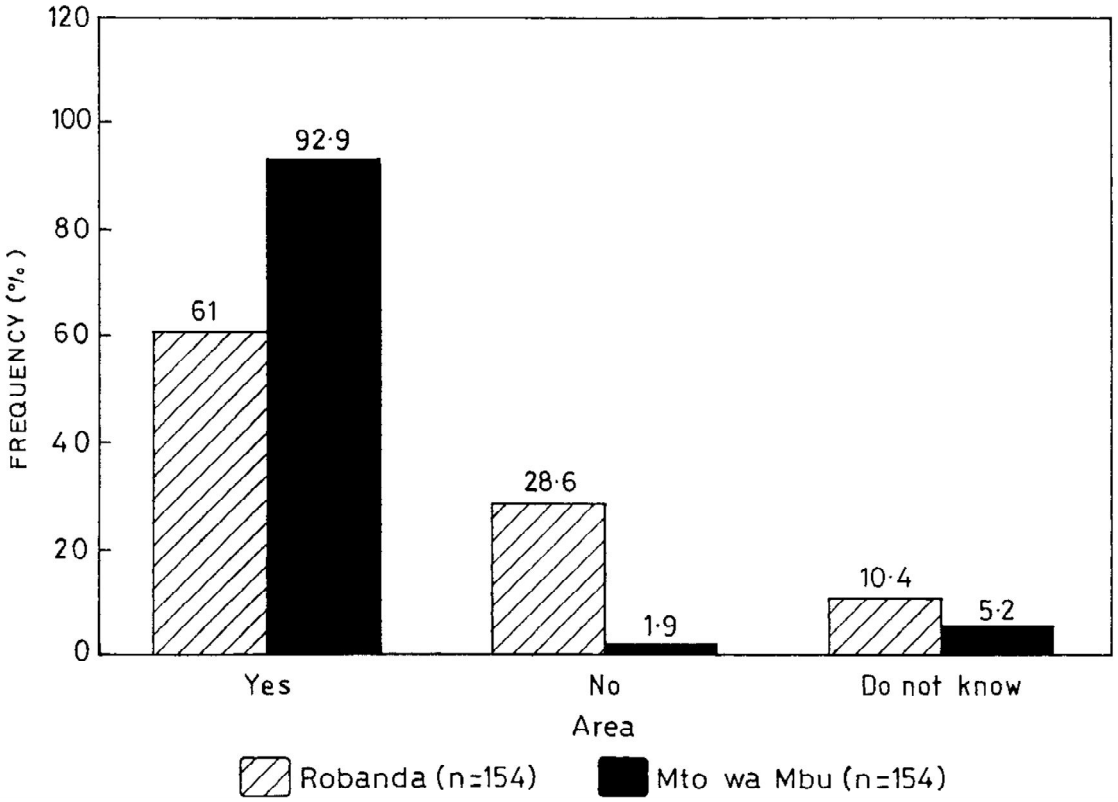


Fig. 3. Respondents' views on whether there had been noticeable changes in tortoise number over the past ten years in their area. n=number of respondents.

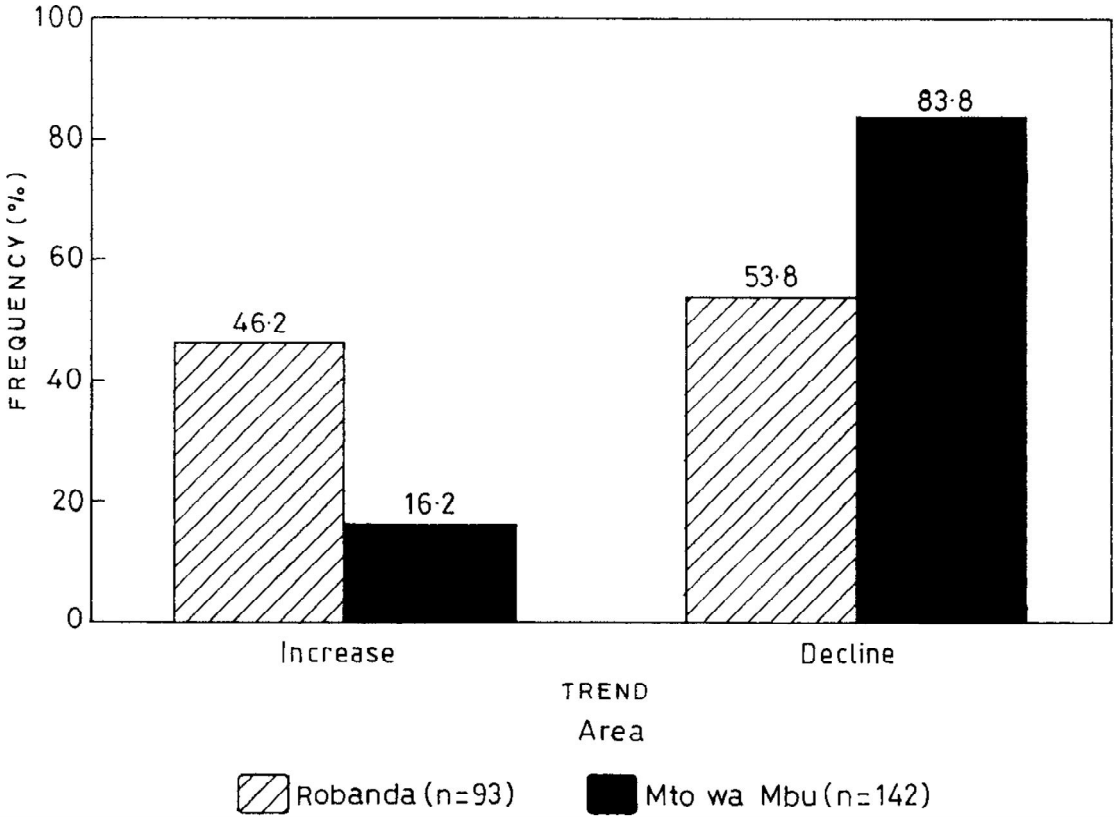


Fig. 4. Respondents' views on the trend in tortoise number over the past ten years. n= number of respondents.

Table 1. Reasons given by villagers for the decline in tortoise numbers compared between Robanda and Mto wa Mbu areas. Only factors with >5.0% frequency in either area are shown. N=Number of responses.

Reason	Frequency (%)	
	Robanda (N=43)	Mto wa Mbu (N=135)
Predation	46.5	0.0
Drought	11.6	49.6
Low reproduction output	4.7	31.1
Fire	7.0	0.0
Human disturbance	2.3	10.4

$P<0.001$). While there were mixed views about the trend in the Robanda area, most respondents from Mto wa Mbu (83.8%, N=142) claimed there had been a decline in tortoise numbers (Fig. 4). The reasons cited for the decline differed significantly between the two areas ($G=52.072$, $DF=2$, $P<0.001$). Predation by baboon and spotted hyena was cited in Robanda (46.5%, N=43), while prolonged drought (49.6%, N=135) and slow reproduction (31.7%) were cited in Mto wa Mbu (Table 1). Other causes of decline given included human disturbance and fire.

TORTOISE DAMAGE TO PROPERTY

Most respondents (89.6%, N=154) in Robanda village claimed significant damage to vegetables such as pumpkins (*Cucurbita maxima*), beans (*Phaseolus vulgaris*) and cowpeas (*Vigna unguiculata*). However, only a few respondents (12.3%, N=154) from Mto wa Mbu did so ($G=220.2$, $DF=2$, $P<<0.001$) (Fig. 5)

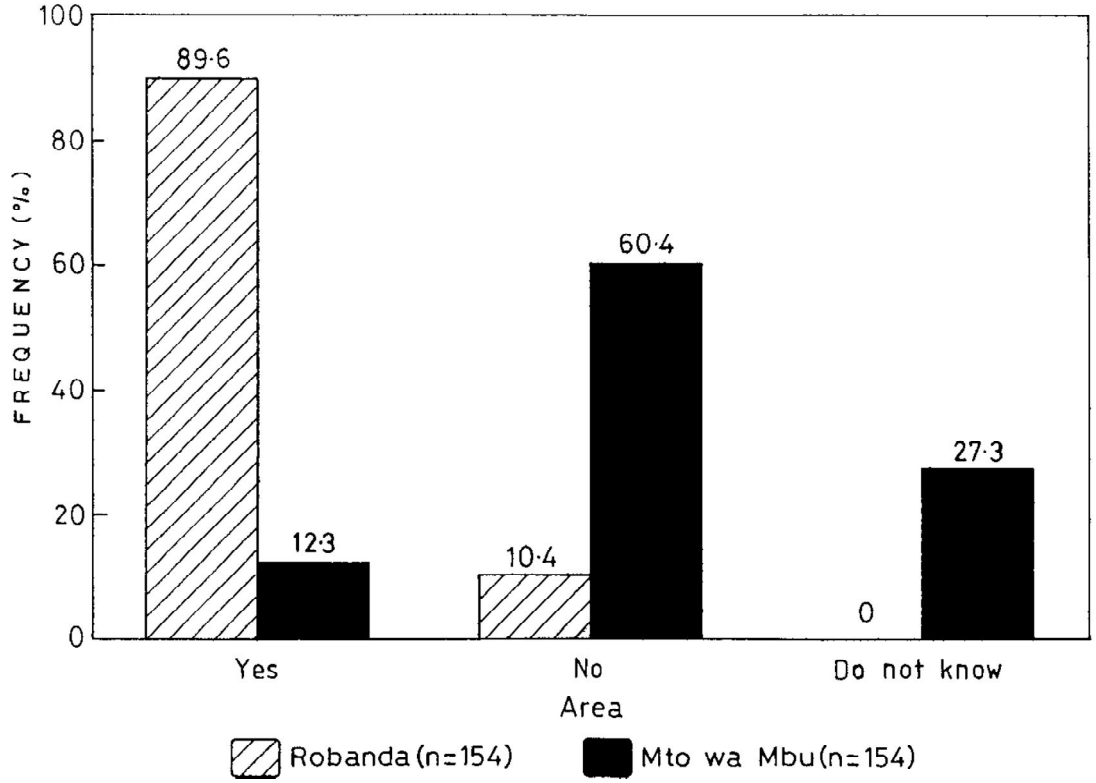


Fig. 5. Respondents' views on whether tortoises cause damage to property. n=number of respondents.

The most frequent action taken to contain damage was translocation of the animal further away from the *shamba* (92.0%, N = 138) (Table 2). Other steps taken included fencing with *Acacia* scrub (1.4%), and turning the tortoise on its back or side (2.2%).

TORTOISE UTILISATION

Most respondents from Robanda village (88.3%, N = 145) and Mto wa Mbu (70.1%, N = 154) claimed they did not utilise leopard tortoises in their area (Table 3). However, there was a significant difference in the uses cited between the two areas ($G = 68.312$, $DF = 2$, $P < 0.001$). Utilisation for trade (27.3%), food (1.9%) and pets (0.6%) were mentioned in Mto wa Mbu, while traditional healing was the only use cited in Robanda (Table 4).

Most respondents from Robanda (89.5%, N = 152) admitted that the leopard tortoise featured prominently in their tradition and customs (Fig. 6) as a totem animal (98.5%). The scutes were used for treating various ailments such as muscular pains,

Table 2. Steps taken to control tortoise damage to crops in Robanda village. N = 138 responses.

Action	Frequency (%)
Translocating the animal	92.0
Turning the animal on its back	2.2
Fencing with *Acacia* scrub	1.4
No action taken	2.9

Table 3. Respondents' views on how leopard tortoises are utilised in their area.

Use	Frequency (%)	
	Robanda	Mto wa Mbu
None	88.3	70.1
Trade	0.0	27.1
Medicinal	11.7	0.0
Food	0.0	1.9
Pets	0.0	0.6
No. of responses	145	154

Table 4. Medicinal uses of tortoise scutes cited by respondents in Robanda village. Only factors with > 5.0% frequency in either area are shown. N = 49 responses.

Use	Frequency (%)
Treatment	
Muscular pains	30.6
Dental caries	18.4
Boils	12.2
Cardiac diseases	6.1
Splenic diseases	6.1
Other	
Witchcraft	6.1
Preventing rain	6.1

boils, snake bites, fever, and for witchcraft (Table 5). The scutes were also used for preventing rains when someone wants a dry day to travel or work in the *shamba*. In addition, the appearance of the animal in one's courtyard was regarded as an omen of success or a sign of something good to happen especially for expectant mothers. No such beliefs were reported in Mto wa Mbu.

Utilisation for trade was reported only in Mto wa Mbu. However, most respondents were very reluctant to state the number of animals caught for trade. The little information obtained showed that the number of tortoises caught per month ranged from 1-10 (mode=2). Virtually all the animals caught were sold to dealers from Arusha, and only occasionally to local middlemen. The price asked per tortoise varied depending on the size of animal but ranged from TShs.100-4,000 (US$ 0.17-6.78).

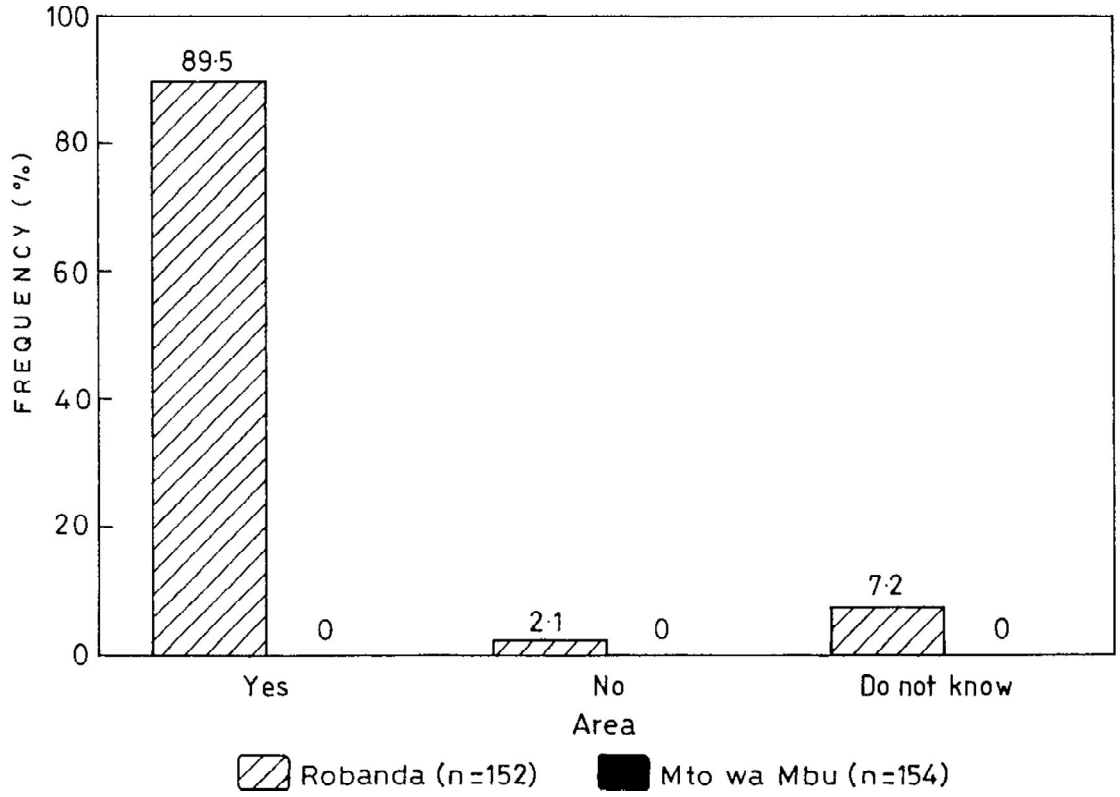


Fig. 6. Respondents' views on whether there are traditional beliefs with regard to tortoises in their area. n=number of respondents.

Table 5. Reasons cited by respondents for supporting tortoise conservation in their area. Only factors with >5.0% frequency are shown.

Reason	Frequency (%)	
	Robanda	Mto wa Mbu
Biological resource for the benefit of future generations	33.9	44.3
Foreign exchange earnings from tourism and pet trade	0.0	54.2
Totem animal	43.5	0.0
Docile animal	22.6	1.5
No. of responses	124	131

PERCEPTION OF TORTOISES AND CONSERVATION

There was no significant difference in community perception to tortoises and conservation between the two areas (Fig. 7) (G=5.145, DF=2, P=NS), and the data were pooled. Most respondents (87.0%, N=308) favoured the idea of conserving tortoises in their area. However, the reasons given for supporting conservation differed significantly between the two areas (G=207.2, DF=3, P<< 0.001). While respondents from Mto wa Mbu emphasised foreign exchange earned from tourism and the pet trade (54.2%, N=131), those from Robanda stressed the importance of the species as a totem animal to their tribe (43.5%, N=124) (Table 6). It is encouraging to note that some respondents cited the need to conserve tortoises for the benefit of future generations. There was no significant difference in respondents' views between the two areas on whether they were willing to participate in conserving bio-

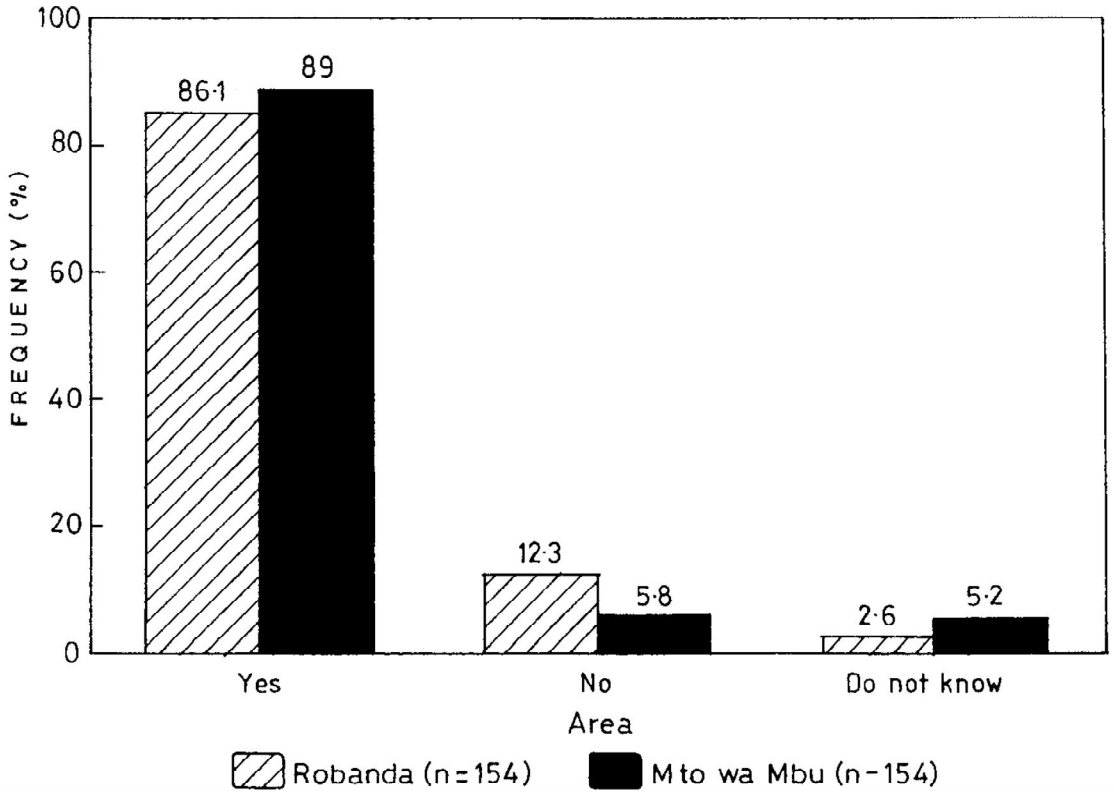


Fig. 7. Respondents' views on whether they would like to conserve tortoises in their area. n=number of respondents.

Table 6. Reproductive output of *Geochelone pardalis babcocki* compared with that of other species at the various farms

Species	Reproductive output (%) at each farm			
	Buibui Investments	A.F. Supplies	Mbale Traders	Mtn. Birds and Trophies
G.p. babcocki	1.33	10.14	27.30	1.62
K.b. zombensis	0	Not stocked	0	Not stocked
M. tornieri	100	27.7	33.3	1.8
K. spekii	0	Not stocked	71.61	0
A. elephantina	Not stocked	11.03	26.42	Juveniles

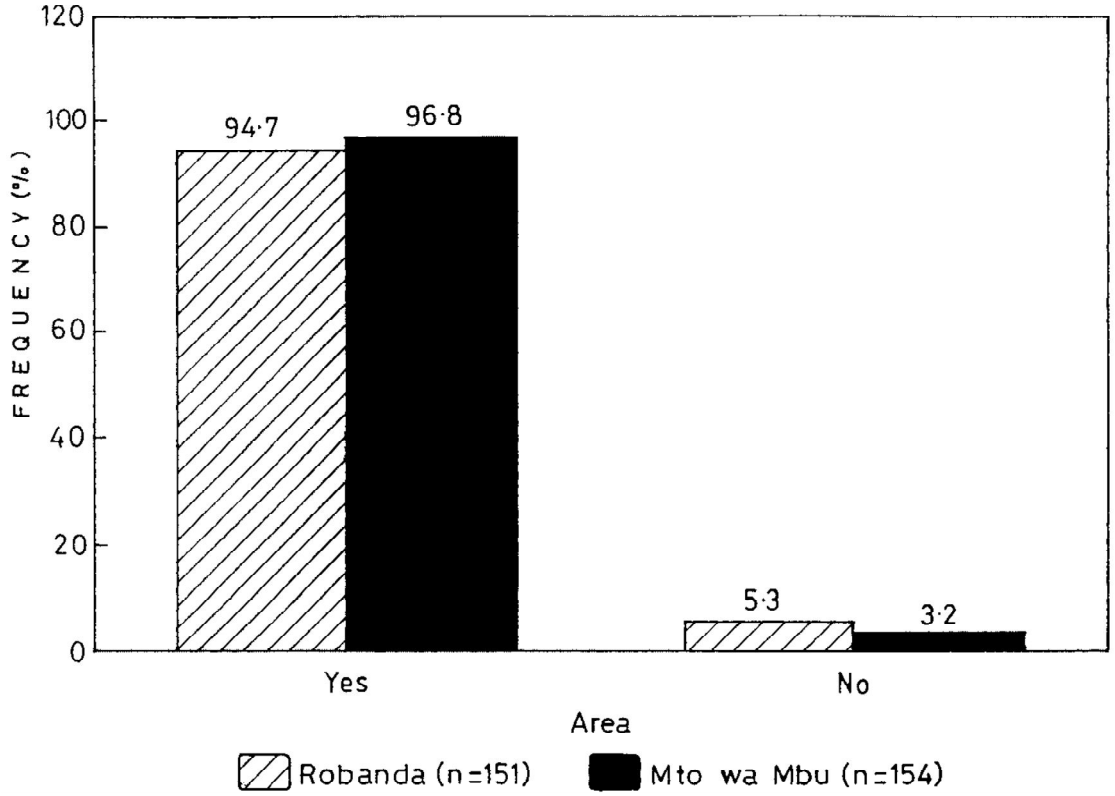


Fig. 8. Respondents' views on whether they would like to participate in conservation of biological diversity in their area. n=number of respondents.

logical diversity (including tortoises) in their area (Fig. 8) (G=4.981, DF=2, P= NS), and the data were pooled. Most respondents supported the idea (95.7%, N= 308). However, those not wishing to support conservation claimed that animals could take care of themselves if left alone, and after all they caused damage to life and property.

DISCUSSION

I. Tortoise Sightings and Populational Trend

This survey suggests that the local people were perceptive of the decline in tortoise numbers and the underlying factors. Observations on the general decline in tortoise numbers are consistent with the results of the census conducted in the two areas by Kabigumila (1998). He showed that leopard tortoises were more common at Robanda (0.74 per mhr) than Mto wa Mbu (0.6 per mhr).

II. Tortoise Damage to Property

Tortoise damage was more frequent in Robanda village, presumably due to leopard tortoises being more abundant there than at Mto wa Mbu. The common practice of translocating tortoises away from *shambas* in order to contain damage is similar to that reported by Highfield & Bayley (1995) in the Souss Valley, Morocco. These

workers have also reported frequent tortoise damage by spur-thighed tortoise *Testudo graeca graeca* to agricultural produce, thus making tortoises unpopular with farmers. However, as in the study area, tortoises were rarely harmed in the Souss Valley. In parts of South Africa leopard tortoises are killed on sight by some farmers and landowners, and their carcasses destroyed immediately for fear of infecting livestock with botulism and other diseases (Boycott & Bourquin, 1988). However, this allegation may be unfounded, considering that diseases are rather uncommon in wild tortoise populations (Berry, 1993).

III. Utilisation of Leopard Tortoises

The medicinal value and totem beliefs associated with leopard tortoises recorded in the present study have not been reported elsewhere. Such values, as well as proximity to protected areas (Serengeti National Park, Grumeti and Ikorongo Game Reserves), and remoteness from major collecting centres in Arusha have served to protect leopard tortoises in Serengeti District from exploitation.

Although trade was reported in Mto wa Mbu, most respondents were very reluctant to state the number of animals caught for the trade presumably for fear of being prosecuted. Although no interviews with collectors were made, tortoise collection is said to be well organised and efficient (Klemens & Moll, 1995). Usually, the dealers place their orders with the middlemen, who in turn employ local people, usually teenagers and youths to collect the animals. The low retail price of tortoises suggests that tortoise collection provides limited financial benefits for most local collectors. Given the difficulty of finding tortoises (Fritts & Jennings, 1994; Kabigumila, 1998), limited benefits and the erratic nature of orders, most of the local people who collect tortoises do it as an alternative source to supplement their income (Klemens & Moll, 1995).

IV. Perception of Tortoises and Conservation

Most of the respondents favoured the idea of conserving tortoises and biological diversity in their area. This is partly because the local communities benefit from conservation through community conservation schemes. Furthermore, frequent interactions between wildlife personnel and the local communities in the study area may have helped to break down mistrust, promoting positive attitudes towards wildlife conservation (Newmark *et al.*, 1993). However, the reasons cited for supporting conservation varied between Robanda and Mto wa Mbu, presumably due to differences in culture and socio-economic background. In Mto wa Mbu, where it is close to the road and Arusha, more emphasis is placed on cash values of the wildlife trade and tourism. In contrast, in Robanda, culture values may favour conservation. The low income *per capita* in Robanda (Kauzeni & Kiwasila, 1994) and the decline in culture norms among the young generation might change the people's attitudes to tortoises. If tortoise exports from the wild were to be allowed, some youths might resort to tortoise collection to supplement their income. It has been shown that local economics, customs and the proximity of tortoises to settlements (Fritts & Jennings, 1994) influence use of tortoises.

V. Conclusion

The survey of community attitudes to leopard tortoises and conservation of biological diversity suggested that the local people were perceptive of the decline in tortoise numbers and the underlying factors and were willing to participate in conservation. Therefore, public awareness campaigns aimed at the youths should be promoted to elicit community support in conserving biological diversity in the area.

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Appendix 1.1

Questions asked of local communities living adjacent to leopard tortoise sites in northern Tanzania to examine trend in tortoise numbers, damage to crops, conservation attitudes and willingness to participate in conservation.

Utilisation of tortoises

1 How many leopard tortoises would you see if you went out on a day during the wet season? a) Probably none, b) Up to 2, c) Between 3-10, d) Between 11-25, e) More than 25
2.1 Have there been noticeable changes in tortoise numbers over the past ten years? a) Yes, b) No, d) Do not know
2.2 If yes, have the numbers a) Declined, b) Increased?
2.3 If there has been a decline in numbers, what do you think are the causes?
3.1 Do tortoises cause damage to property in this area? a) Yes, b) No, c) Do not know
3.2 If yes, describe this damage?
3.3 What measures do you take to prevent the damage?
4.1 What are the uses of tortoises in this area? a) None, b) Food, c) Trade, d) Pets, e) Traditional healing
4.2 If for food, how many tortoises do you kill for meat per month?
4.3 If for healing, which part of the tortoise do you use and for what cure?
4.4 How many tortoises are killed for traditional healing per month?
4.5 If for trade, how many tortoises do you collect per month?
4.6 To whom do you sell your catch? a) Local middlemen, b) Tortoise dealers from towns
4.7 What is the price per tortoise?

Attitudes to tortoise conservation

5.1 Are there traditional beliefs regarding leopard tortoises in your area? a) Yes, b) No, c) Do not know
5.2 If yes, explain.
6.1 Do you think tortoises should be conserved in this area? a) Yes, b) No, c) Do not know
6.2 If yes, explain why?
7.1 It is now years since the Government introduced "Community Conservation Services" in this area. Would you like to participate in conserving biological diversity (including tortoises) in this area? a) Yes, b) No, c) Do not know
7.2 If no, explain why?

Appendix 1.2

Kiswahili version of the questionnaire shown in Appendix 1.1.

Matumizi ya kobe-chui

1 Je, unaweza kuona kobe wangapi kwa siku wakati wa majira ya mvua? a) Hata mmoja, b) Kama wawili, c) Kati ya 3-10, d) Kati ya 11-25, e) Zaidi ya 25
2.1 Je, kumekuwa na mabadiliko katika idadi ya kobe kwa miaka kumi iliyopita? a) Ndiyo, b) Hapana, d) Sijui
2.2 Kama ndiyo, je idadi ya kobe a) Imepungua, b) Imeongezeka?
2.3 Kama kobe wamepungua, unafikiri ni kwa sababu gani?
3.1 Je, kuna uharibifu wowote kutokana na kobe katika kijiji hiki? a) Ndiyo, b) Hapana, c)

Sijui
3.2 Kama ndiyo, eleza kobe wanaharibu nini?
3.3 Je, unachukua hatua gani kuzuia uharibifu huu?
4.1 Kuna matumizi gani ya kobe katika kijiji hiki? a) Hakuna, b) Chakula, c) Biashara, d) Wanafugwa, e) Dawa za kienyeji
4.2 Kama kwa chakula, eleza unaua kobe wangapi kwa ajili ya nyama kwa mwezi?
4.3 Kama kwa dawa, je ni sehemu gani ya mwili wa kobe inatumika, na maradhi unayoyatibu?
4.4 Unafikiri ni idadi gani ya kobe wanauawa kwa ajili ya tiba hizo kwa mwezi?
4.5 Kama kwa biashara, je ni idadi gani ya kobe unakamata kwa mwezi?
4.6 Ni nani unamuuzia kobe hao? a) Wafanya biashara wa hapa kijijini, b) Wafanya biashara kutoka mijini
4.7 Je, bei ya kobe ni kiasi gani?

Maoni kuhusu uhifadhi wa kobe

5.1 Je, kuna imani yoyote kuhusu kobe katika mila na desturi za kabila lako? a) Ndiyo, b) Hapana, c) Sijui
5.2 Kama ndiyo, eleza ni imani gani?
6.1 Je, unafikiri ni vizuri kuhifadhi kobe katika kijiji hiki? a) Ndiyo, b) Hapana, c) Sijui
6.2 Kama ndiyo, eleza kwa nini?
7.1 Kijiji hiki kinayo "Kamati ya Uhifadhi ya Kijiji kwa ajili kuhifadhi wanyamapori na mazingira yao. Je, ungependa kushirikiana na kamati hii katika kuhifadhi viumbe wote hai pamoja na kobe katika kijiji hiki? a) Ndiyo, b) Hapana, c) Sijui
7.2 Kama hapana, eleza kwa nini?