

ARTICLE

AN ASSESSMENT OF HUMAN ATTITUDES TOWARDS OTTERS IN MBINGA DISTRICT, TANZANIA

William MGOMO¹ and Jan REED-SMITH²

¹ P.O. Box 65, Liparamba Game Reserve, Mbinga, Tanzania, Ranger: mgomowilliam@gmail.com

² African Otter Network, Director: africanotternetwork@gmail.com, jrsotter@gmail.com

(Received 25th May 2019, accepted 27th October 2019)

Abstract: A questionnaire survey was conducted among rural residents of the Mbinga district of southern Tanzania. Two hundred and fifty people, between ages 15 and 84 were interviewed, comprising farmers, farmer/fishermen, fishermen, and others. Information was collected on respondents' awareness of the two otter species (*Aonyx capensis* and *Hydrictis maculicollis*), their likes and dislikes of otters, damage to equipment, netted fish, fish in ponds, perceived impact on fish populations, traditional lore, and what uses are made of otters. Opinions on the future conservation and management of otters were elicited. All responses were correlated with the tribal affiliation, occupations, sex and ages of respondents. Findings will be used to better understand the local inhabitants' opinions and attitudes regarding otters and guide the creation of freshwater conservation outreach materials to address the needs of people and wildlife. The development of this future program will emphasize the need to empathize with human economic requirements and perceptions when creating an acceptable and workable plan to benefit the conservation of otters and their environment.

Citation: Mgomo, W and Reed-Smith, J. (2020). An Assessment of Human Attitudes towards Otters in Mbinga District, Tanzania. *IUCN Otter Spec. Group Bull.* 37 (2): 81 -97

Keywords: otter, traditional medicine, Tanzania, local opinion

INTRODUCTION

Information gathering on, and the conservation of small carnivores in Africa is beset with many issues; such as incomplete knowledge of behaviour, lack of community awareness or traditional bias against these species as well as frequent conflict with human neighbours. At this time, the spotted-necked otter (*Hydrictis maculicollis*) and African clawless otter (*Aonyx capensis*) are believed to occur throughout much of their former ranges but reliable status/presence information is dated for much of that area and, where populations are confirmed, the numbers are declining (Jacques et al., 2015; Reed-Smith et al., 2015).

In 2017 the African Otter Network (AON) began working with local citizen conservationists to develop a network of local otter champions. The first project was conducted in southern Tanzania where conflicts between fishermen, pond owners, and the otters had been reported. The purpose of this project was to: 1) Determine local communities' knowledge of and attitudes towards otters, 2) Establish presence of otters and identify which species, and 3) Train a local leader for future otter conservation work. Results from the formal survey (250 participants) have yielded information on the awareness and perception of otters as well as traditional uses of otters. The responses to the informal presentations conducted appear to indicate a positive impact as the result of having a local citizen activist involved.

STUDY AREA

Mbinga District (2002 population 404,799), Ruvuma Region of southern Tanzania. In the early 2000s there were 181 registered villages and an uncounted number of fishing centres or small camps. The district incorporates a large shoreline section of Lake Nyasa (Lake Malawi) which constitutes a majority of the area (~26% in total) covered by water. Another ~22% of the region is forest with the remaining ~52% considered arable land. Within these arable areas and forests are many small streams with wetland areas which combined with the lake shoreline offer suitable habitat for both otter species.

METHODS

Twenty-four questions (Appendix A) were asked of 250 respondents; as far as possible different age classes were included but owing to the nature of the targeted area, respondent occupations are dominated by farmers, fishermen/farmers (respondent identified as involved in both occupations), and fishermen (Fig. 2, 3). If a participant did not want to answer a question or had no answer it was left blank. All interviews were conducted in Swahili by the primary author between October 2017 and November 2018. For species identification purposes photographs of both species of otter and the marsh mongoose (*Atilax paludinosus*) were shown and individuals asked to identify the species they know and name them. Photographs were of wild individuals taken in Tanzania; none of the animals were shown eating and all were on land so the entire animal could be seen. Positive responses were scored when the individual correctly identified the animal and gave the local name known to the primary author. Additionally, several school presentations (Fig. 4) and informal meetings were conducted which presented basic information on otter behaviour and the role they play in healthy ecosystems. The project was focused on the area around Mbinga town, the shores of Lake Nyasa, and communities located near the northern edge of Liparamba Game Reserve. GPS locations of all presentations and interview sites were recorded.



Figure 1. Talking with fish pond owners (Photo: W. Mgomo)



Figure 2. Fisherman showing his net (Photo: W. Mgomo)

Responses were evaluated based on tribal affiliation, occupation, and age groups. The latter were arbitrarily grouped to reflect school age as well as early, middle, and later work careers and exposure to traditional stories or cultural influences. Occupation categories were collapsed into farmer, fisherman, fishermen/farmers, pond owners (Fig. 1), students, other, and fish sellers to evaluate the influence of profession on attitude towards otters and knowledge of traditional uses (Appendix B). Although only 54 respondents were female, their responses also were evaluated to determine if there were any significant differences in attitude towards, or knowledge of otters between males and females (Appendix C, Appendix D).



Figure 3. Meeting with Lake Nyasa fishermen (Photo: W. Mgomo)



Figure 4. Talking with school children (Photo: W. Mgomo)

Limitations of methods used

Efforts were made to focus on respondents who had not previously attended informal gatherings with the primary author. However, it is possible that attendance by some influenced answers to questions like; Do you like otter? Should they be conserved, etc. The sample size was not large enough to adequately evaluate any differences between men and women in their attitudes towards otters and questions were not asked of women to clearly sort out the influence of their husband's occupation on their attitudes.

RESULTS

Interviews were conducted in 37 towns or villages and four fishing areas on Lake Nyasa; all respondents reported as being from the Liparamba, Mbinga, or Lake Nyasa areas. School programs reached approximately 2,518 students plus their teachers at one secondary school and seven primary schools located throughout the area. These presentations included educational material developed by the researchers and African Otter Network Education Director on conservation, the value of freshwater ecosystems and the role otters play in these habitats.

Informal discussions and presentations were conducted in all communities visited, including the area around the Liparamba Game Reserve (~90 farmers and park staff), with fishermen along the Lake Nyasa shoreline, pond owners, and two community leader groups. A total of roughly 150 fishermen, 30 fish keepers (pond owners) and 700 farmers or villagers participated in discussions about conservation and the area's otters. These meetings included the use of photos (otters sunning themselves on land taken in Tanzania) to identify the otter species, a short talk about the biology of otters, and a discussion about the participants' familiarity with, and reaction to the otters they encounter. The 250 survey participants were selected from these communities. Most were interviewed prior to meetings but not all. A breakdown of responses based on sex is in Appendix C and along occupational lines for males

and female in Appendix D. No significant differences were found, perhaps due to the small female sample size.

Study participants (male = 196, female = 54) ranged in age from 15 to 84 years. They reported as being from ten tribal affiliations (Appendix B) and provided otter names in four local languages. Of the 26 people who mentioned the use of otter skin (most often from the tail specifically) to treat cerebral meningitis in children 16 were from the Matengo tribe and the other 10 were Ngoni; all 26 were farmers and all reported awareness only of the African clawless otter. There were no other correlations with tribe and attitude towards otters or knowledge of traditional uses.

Awareness of Otters

Awareness of otters and which species was correlated somewhat with occupation. Of the 98 farmers interviewed, 65% reported being familiar with the African clawless otter. Of the 41 fishermen interviewed, 78% were familiar only with the spotted-necked otter. Also, out of 62 farmers who also reported spending time fishing (fishermen/farmers) 74% were familiar only with the spotted-necked otter and 21% were familiar with both species. Somewhat interesting was of the 27 people who reported they had a fish pond of some kind 74% were familiar only with the spotted-necked otter and 33% were familiar with both species.

Table 1. Respondent awareness of otter species – based on identification of photos

Occupation of Respondent	African Clawless otter	Spotted- necked otter	Both Species	None
Students = 7	5	1	0	1
Farmers = 98	64 (65%)	14	8	12
Fisherman/farmer = 62	2	46 (74%)	13	1
Pond owners = 27	5	12 (44%)	9	1
Fishermen = 41	1	32 (78%)	8	0
Other = 11	2	7	2	0
Fish seller = 4	1	1	2	0

Do you like Otters?

Farmers – Seventy-two (81%) said they liked them and 21 said they do not like them; 80 said they caused no harm and 15 responded they did cause them harm with one additional citing of only some harm. Of the 21 who responded they did not like otters 11 responded the otters caused no harm to them and two of the respondents who did not know otters replied they caused harm.

Fishermen – Twenty-four (58%) reported they like otters, 16 that they did not like them and one did not know. Thirty-one (76%) reported otters cause significant harm (n = 19), only some damage (n = 12), and 10 replied the otters caused them no harm.

Table 2. Do you like otters?

Occupation of Respondent	Yes	No	Don't know
Students = 7	7	0	0
Farmers = 98	73	21	5
Fisherman/farmer = 62	43	16	3
Pond owners = 27	16	8	3
Fishermen = 41	24	16	1
Other = 11	7	1	3
Fish seller = 4	0	1	3

Table 3. Do they cause you harm (n=250)?

Occupation of Respondent	Yes	Some	No	Don't know
Students = 7	0	0	7	0
Farmers = 98	15	1	80 (82%)	2
Fisherman and farmer = 62	30*	21*	11	0
Pond owners = 27	10	9	8	0
Fishermen = 41	19**	12**	10	1
Other = 11	1	0	10	0
Fish seller = 4	0	1	3	0

* 82% of fishermen/farmers responded otters cause some degree of harm

** 76% of fishermen responded otters cause some degree of harm

Questions 12 – 17 regarding kind of harm, fishing equipment/practice and economic impact

Of the 250 respondents, 152 replied to one or more of the questions regarding the kind of harm caused, how often, fishing equipment used, how long nets are left in the water, how much does it cost, and how much do you earn from fishing or your pond. Of these, nine farmers responded they cause harm by polluting water with their scats, have heard they destroy nets, and/or eat fish. One respondent listed in other category (did not identify as fisherman or pond owner) replied they destroy nets, eat fish, and often cause harm. One farmer replied otters sometimes eat his chickens; one student and three fish sellers had heard of them destroying nets and eating fish. One pond owner knew of them killing a bird. This left 136 who responded to at least four of the six questions which form the basis for the following table (respondents may have mentioned more than one kind of harm).

Table 4. Interviewee Results Regarding Fishing Practices

What kind of harm do they cause you? Damage nets, eat fish, damage fish traps, damage pond?					
Net Damage	Eat fish in nets	Eat fish from ponds		None	
76	80	17		25	
How often do they cause harm?					
Never		Seldom		Frequently	
28		58		50	
What is the cost of the harm?					
None	New Fish trap	Buy new net	Repair net	Eat the fish	Buy new fish
40	1	38	72	15	14
What kind of net do you use?					
No answer	2 – 3.5cm	4 – 5 cm		6 -7cm	
30	75	45		7	
How long do you leave your net in the water?					
No answer	3 – 6 hours	7 – 11 hours	12 hours	24 hours	
30	3	31	53	19	
How much do you earn from fishing in a day?					

The majority (111) responded that the amount they earned varied and did not offer an estimate. Those that did ranged from nothing (pond owners primarily) to roughly \$5 - \$18 per day. This question did not provide the information we were looking for as it was poorly worded and, possibly the fishermen did not want to share what they earn.

Uses of Otters

Several traditional uses were mentioned. A few individuals reported only hearing of a particular use; however, the majority characterized it as “I/we believe...”, “We use otter for...” or in the case of eating otters all but one reported doing so themselves. As mentioned earlier, use of otters to treat cerebral meningitis in children was associated with respondents from two tribes.

The only tradition that appears to be associated with occupation is belief in the presence of a root in the otter’s mouth. Sixteen of the 37 respondents reporting this were fishermen and 16 were fishermen/farmers. Five were farmers who reported of hearing of this. The two mentions of use in treating constipation were from pond owners; one cited using boiled meat and the other using otter feces. Of the 176 responses from the 151 participants who knew of a traditional use 52 said they are eaten, 37 were of the legend of the otter’s mouth root, and 87 dealt with medicinal or a cultural traditional use.

Table 5. Otter Use by Occupation

Otter uses by occupation			
(Figure given in occupation is number reporting a use; several individuals reported more than one use. The <u>percentage in use category</u> is based on the total number of study participants (<i>n</i> %) in each occupation category. * Percentage of total participants in that occupation who reported a consumptive/traditional use of otters.)			
Occupation	Bush meat	Root legend	Traditional use
Farmer = 52 (<i>n</i> = 98) *53%	6	2	45 (46%)
Fisherman/farmer = 45 (<i>n</i> = 62) * 72%	24 (39%)	17	14
Fisherman = 24 (<i>n</i> = 41) *58%	5	16	7
Pond owner = 20 (<i>n</i> = 27) * 74%	13 (48%)		14 (52%)
Other = 4 (<i>n</i> = 11) * 36%	3		1
Student = 3 (<i>n</i> = 7) *43%			3
Fish seller = 3 (<i>n</i> = 4) *75%		1	2

Uses reported include (Table 5):

- Skin and claws – to cure cerebral meningitis in children; some specify the skin of tail is to be used. Both also used as unspecified charms. Skin specifically is used to make hats, drums, musical instruments, a charm to improve sexual function/attraction, and when boiled to treat constipation in children.
- Claws – three reports they are used by fishermen however, these reports were based on hearsay.
- Bones – used in traditional medicine but no specifics.
- Mouth root – fishermen believe the otter has a root in its mouth that helps them catch fish; if you get one of these it will improve your catch when tied to your fishing net.
- Oil from otter – used to treat ears.
- Scats – used to treat constipation in children; believed useful because otters spread their scat everywhere.
- Meat – both species are eaten and when eaten also used to improve sexual prowess.
- Traditional medicine – several respondents reported knowing, or having heard of otters use in traditional medicine but were not specific as to how.
- It was reported that the Wampoto believe the African clawless otter uses its tail to catch crabs. This process involves dangling their tail in the water and when the crab grabs on the otter pulls its tail from the water and eats the crab.

Why do you think otters are hard to see?

- Don't know – 25%
- Human presence/activities – 25%*
- Where they live – 31%**
- Not many otters – 6%
- People do not care about them so don't see – 5%
- Activity cycle – 2%
- Clever animals – 3%
- Destruction of their environment – 3%

* Human presence/activities included attempts to kill, general activities, and human density in area

** Where they live included identifying far from people and need to live in “cool” location.

What is your opinion about what should be done about otters? (Based on the wording of some responses it appears that some of the interviewees may have attended a presentation by the researcher prior to participating in the survey. In these cases [all scored under Protect or Conservation Education], their responses were comments like: “good indicators of healthy environment” or “should be protected for future generations”.)

- No opinion - 21%
- Protect them - 44%*
- Eliminate them - 16%**
- Provide more education to people about conservation – 18%
- Educate people how to avoid – 1%
- Do research of various kinds – 6%***

*Protect – reasons ranged from their value to healthy ecosystems, their value in traditional medicine, as a meat source, to tourism, and simple “protect them” statements which sometimes cited “we are supposed to protect for future generations” or so “we can benefit from them”.

** All of the individuals who want them eliminated are fishermen, farmers who also fish, or owners of ponds who raise fish for income/food.

***Of those who mentioned research the goals ranged from understanding how to avoid them (fishermen), if they actually do cure cerebral meningitis, how people can benefit from them, and to better understand their conservation.

DISCUSSION

Some information on the awareness of (Stevens 2011, Akpona et al. 2015) as well as the consumptive use of, and traditional lore about spotted-necked otters and African clawless otter has been collected in Benin (Djagoun et al. 2009, Akpona et al. 2015), Ethiopia (Ergete et al. 2017), South Africa (e.g. Simelane and Kerley 1998, Whiting et al. 2013 and Tanzania (Reed-Smith et al. 2010, DeLuca and Mpunga 2012, 2013). A review of this literature indicates that overall otters are unknown by the majority of people living in Africa (e.g. only 18% of local Lake Victoria students (N = 932) provided an acceptable name for otter in a survey by Stevens (2011). Where

they are known the immediate reaction is often to dislike them as in the Stevens (2011) survey in which 34% of those who knew of them disliked the otter and less than 50% of the students aware of otters wanted them nearby. Ergete et al. (2017) reported that 91% of 204 fishermen interviewed at Lake Tana, Ethiopia viewed otters (African clawless) as pests and of no economic value and 85% want them exterminated. Akpona et al. (2015) initially interviewed 165 fishermen in Benin to assess perceptions of spotted-necked otter predation and cost of this to them. Their final analysis determined that there was a demonstrable loss (~82% of which is a result of net damage) but this represented about a 9% documented loss versus the 30% estimated by the fishermen. These results and other reports indicate the negative attitudes towards the otter and damage caused by them to fishing equipment present serious hurdles to conservation of these species.

The results of this survey appear to contradict this literature in that 68% responded they liked otters and 44% stated they should be conserved. While hopeful, this positive outcome also could be influenced by consumptive use factors such as their use in traditional medicine and use as a food source. Alternatively, the high positive response rate could be attributed to a mentioned hope the otters could attract tourists to an area not often visited by international visitors, or indicative that respondents simply were aware of the researchers' interest and gave an answer that would please them. This study is in line with others in that of those who responded to "Do the otters cause you harm?" 76% of the fishermen and 82% of self-identified fishermen/farmers said they do cause harm. Eighteen percent of the survey respondents reported eating otters and 34% reported being familiar with traditional uses for otters. De Luca and Mpunga (2012, 2013) also reported on several traditional uses of otter and found that otters were eaten in southern Tanzania.

The responses to, "Why do you think otters are hard to see? are indicative of some familiarity with otters (active at night, general numbers are not high, and their behavior allows them to avoid or hide from people), and awareness of changes in the freshwater ecosystems that are harmful to all wildlife (destruction of environment).

Rural Africans, living a subsistence existence, regard any animal which has the potential to kill or consume anything belonging to them, or what they could consume themselves, as an enemy. At the same time, most wild animals are also regarded as a source of food and needed protein. A study of this type helps nature conservationists and wildlife biologists understand the people that they are dealing with and therefore develop ways of trying to impart accurate (and appropriate) knowledge. If cultural beliefs, perceptions towards wildlife, and the economic problems (real and perceived) associated with sharing their environment with animals are better understood we have a better chance of preserving Africa's otters and the freshwater ecosystems important to otters and people alike.

Acknowledgements - We thank the Columbus Zoo and Aquarium for funding the project and Idea Wild for providing equipment. Our gratitude also goes to the African Otter Network for funding and guidance. Many others assisted including Carol Bennetto and Margherita Bandini who helped develop and create the outreach materials; Hobokela Mwamjengwa who is AON Outreach Coordinator for Tanzania; John Ngoma who generously drove the team around; Dr. David Rowe-Rowe for advice and editing assistance, and Mr. Ramadhan Isomanga who as Project Manager of the Liparamba Game Reserve gave the primary researcher time to accomplish his goals.

REFERENCES

- Akpona, A.H., Djagoun, C.A.M.S., Barrington, L.A., Kabré, A.T., Mensah, G.A., Sinsin, B. (2015). Conflict between spotted-necked otters and fishermen in Hlan River, Benin. *Journal for Nature Conservation* 27:63-71.
- De Luca, D.W., Mpunga, N.E. (2012). Carnivores of the Mt. Rungwe-Kitulo landscape, Southwest Tanzania: presence, distributions and threats. *Wild. Cons. Soc.* pp 33.

- De Luca, D.W., Mpunga, N.E. (2013).** Small carnivores of the Mt. Rungwe-Kitulo landscape, southwest Tanzania: presence, distributions and threats. *Small Carn. Cons.* **48**:67-82.
- Djagoun, C.A.M.S., Kindomihow, V., Sinsin, B. (2009).** Diversity and ethnozoological study of small mammals in villages surrounding the Pendjari biosphere reserve in Benin. In: Traditional forest-related knowledge and sustainable forest management in Africa. Papers from the conference held in Accra, Ghana, 15-17 October 2008.
- Ergete, E.A., Hailermariam, T.W., Balakrishnan, M., Serfass, T.L. (2017).** Fishermen Knowledge and Conflict with African Clawless Otter in and around Lake Tana, Ethiopia. *African Journal of Ecology*, 56(2): 409– 413. <https://doi.org/10.1111/aje.12447>
- Jacques, H., Reed-Smith, J., Somers, M. (2015).** *Aonyx capensis*. The IUCN Red List of Threatened Species 2015. <http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T1793A21938767.en>
- Reed-Smith, J., Olouch, I., Ooriga, M., Kihedu, T.S., Muhabi, M.M., Yusuf, M.M., Ogada, M., Lobora, A., Serfass, T. (2010).** Consumptive uses of and lore pertaining to spotted-necked otters in East Africa – A preliminary report from the Lake Victoria area of Kenya, Tanzania, and Uganda. *IUCN Otter Spec. Group Bull.* **27**(2): 85-88.
- Reed-Smith, J., Jacques, H., Somers, M. (2015).** *Hydricotis maculicollis*. The IUCN Red List of Threatened Species 2015. <http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T12420A21936042.en>.
- Simelane, T.S., Kerley, G.I.H. (1998).** Conservation implications of the use of vertebrates by Xhosa traditional healers in South Africa. *South African Journal of Wildlife Research* **28**(4): 121-126.
- Stevens, S.S. (2011).** Flagship species, tourism, and support for Rubondo Island National Park, Tanzania. PhD. Thesis University of Massachusetts, Amherst, Massachusetts, USA.
- Whiting, M.J., Williams, V.L., Hibbitts, T.J. (2013).** Animals traded for traditional medicine at the Faraday market in South Africa: species diversity and conservation implications. In: Alves, R., Rosa, I. (eds) *Animals in Traditional Folk Medicine*. Springer, Berlin, Heidelberg

Appendix A: Information Gathered and Questions Asked.

All respondents were interviewed by the same person. Questions were asked and answered in Swahili then translated into English. Some individuals had been exposed to presentations by the primary researcher (e.g. students, some pond owners, and some fishermen). How this tainted their responses is unknown but suspected to have led to some responses that they liked otters even though they caused harm. However, in the majority of those cases, the individual did state the harm was minimal. All interviews were conducted between October 2017 and October 2018.

1. Date
2. Name
3. Sex
4. Age
5. Tribal affiliation
6. Where interviewed
7. Where from
8. Occupation
9. Do you know these animals (photos of otters and mongoose shown)?
10. Do you like this animal?
11. Do they cause you harm?
12. If yes, what kind of damage (e.g. eat/damage fish, economic, damage to nets, traps, ponds)?
13. What kind of net do you use?
14. How long is it left in the water?
15. How often do they cause harm?
16. What is the cost of this harm to you?
17. How much do you earn from fishing/your pond?
18. Are you familiar with any traditional uses of otter?
19. If yes, what?
20. Is clean water important for people and wildlife?
21. Is healthy vegetation important for people and wildlife?
22. Do you have any thoughts about the environment or what should be done to care for it?
23. How many otter species do you know? Asked to identify them from the photos.
24. Is it difficult to see otters? If yes, why do you think this is?
25. What is your opinion of otters? Should they be protected, left alone, eliminated?

Appendix B: Basic Study Information**Basic Study Information (page 1)****Study Locations:**

Base location Mbinga (10°57'45.10"S/ 34°57'11.36"E). The study focused on the area surrounding the town of Mbinga, Lake Nyasa shoreline, and Liparamba Game Reserve areas.

Interviews conducted in:

Burma, Changarawe, Chinura, Hongi, Jangwan, Kihagara, Kihangani, Kiliman, Lilongwe, Liparamba, Luanda, Luhununa, Lumeme, Maleta, Marungu, Matiri, Maumba, Mgangamao, Mbuyula, Miembeni, Mloweka, Mpepai, Mseto, Mtadazi, Mtua, Muhekela, Ndela, Ndilima, Ng'ombo, Njombe, Pacha sita, Pachani, Raha Leo, Ruvumua Chini, Songambe, Tugutu, Tumbi towns or villages. Also at, Mbuyula and Chinura beaches on Lake Nyasa and Kisangani Mwalo and Hongi fishing centers (36 L 0676612, UTM 8781908; 36L 0680461, UTM 8768924).

Respondents reported being from:

Liparamba, Mibinga, or Lake Nyasa areas.

School programs conducted at:

Limbo secondary (36 L 0700062, UTM 8748646) with 427 students; Linda Primary (36 L 0700298, UTM 8747003) with 293 pupils; Kilosa Primary (36 L 0698797, UTM 8749464) with 495 pupils; Lukwilu Primary (36 L 0700921, UTM 8748646) with 223 pupils; Kihagara Primary (36 L 0678192, UTM 8781941) with 284 pupils; Mbahi Primary (36 L 0679707, UTM 8782571) with 241 pupils; Mtomoni Primary (36L0765229, UTM 8722384) with 342 students, and Hongi Primary School (36 L 0680636, UTM 8769996) with 213 students equaling 2,518 students reached with educational material on conservation, the value of freshwater ecosystems and the role otters play in these habitats.

Community visits:

Informal discussions and presentations were conducted in all communities visited, including the area around the Liparamba Game Reserve (~90 farmers and park staff), Lake Nyasa fishermen, pond owners and two community leader groups. A total of roughly 150 fishermen along the shores of Lake Nyasa, 30 fish keepers (pond owners) and 700 farmers or villagers participated in discussions about conservation and the area's otters. These meetings included the use of photos to identify the otter species, a short talk about the biology of otters, and a discussion about the participants' familiarity with, and reaction to the otters they encounter. The 250 survey participants were selected from these communities. Most were interviewed prior to meetings but not all.

Otter fish pond depredation mitigation:

One pond in the Mbinga area (36 L 0723821, UTM 8795027) was used to test an exclusionary fence of chain link. This will slowly be replaced by a natural fence of pineapple plants.

Camera trap work:

The camera trap has been set up at the fenced fish pond for the last 8 months and to date has not produced any photos of otter incursions to the pond.

Local names for otter:

Swahili – fisi maji mkubwa (African clawless), fisi maji koo madoa (Spotted-necked); Kimatengo - likarangala likolongu likijivu (African clawless), likaranga gagabii na madoa (Spotted-necked); Kinyasa - chiucha nakolongwa wa Afrika (African clawless), chiucha ayina madoa (Spotted-necked); Wampoto – linkarankara (African clawless), huchwa (Spotted-necked).

Basic Study Information (page 2)**Tribal Affiliations**

Respondents reported as being from the following tribes: Matengo (104), Mkisi (3), Mmanda (5), Mindi (1), Mnyasa (64), Mpangwa (2), Mpoto (12), Ndendeule (2), Ngoni (56), Yao (1) ($N = 250$). There was no correlation with tribe and attitude towards otter or knowledge of traditional uses.

Gender and Age of Respondents:

Ages were arbitrarily grouped to reflect school age as well as early, middle, and later work careers and exposure to traditional stories or cultural influences.

Male	196
Female	54
Under 20 years of age	18 (range 15 – 19)
20 to 29 years of age	60 (range 20 – 29)
30 to 39 years of age	76 (range 30 – 39)
40 to 49 years of age	50 (range 40 – 49)
Over 50 years of age	49 (range 50 – 83)

Occupation of Respondents:

Fishermen/farmers may rely on one or the other of the occupations but indicate a greater likelihood of experiencing interactions with otters owing to fishing experience. Pond owners are most often also farmers; fish are kept for personal protein use and to sell. Of the four fish sellers three were farmer's wives and the fourth sold "dagaa" in the market. The "Other" category contains people working in professions not directly involved in fishing, fish keeping, or farming (i.e. teachers, drivers, business men, etc.) There is some correlation between occupation and attitude towards otter and traditional beliefs.

Farmers	Fishermen	Fishermen/farmers	Fish sellers	Pond owners	Students	Other
98	41	62	4	27	7	11

Appendix C: Respondent breakdown – Women versus Men

Respondent breakdown – Women versus Men					
Women = 54			Men = 196		
Tribe	Occupation*	Age Group	Tribe	Occupation*	Age Group
Matengo = 22	Farmer = 36	<20 = 8	Matengo = 82	Farmer = 61	<20 = 10
Mnyasa = 17	Student = 6	20-29 = 18	Mnyasa = 47	Fisherman/farmer = 62	20-29 = 40
Ngoni = 10	Other = 5	30-39 = 17	Ngoni = 46	Fisherman = 41	30-39 = 55
Mpoto = 4	Fish Seller = 4	40-49 = 6	Mpoto = 8	Pond owner = 25	40-49 = 47
Ndendeule = 1	Pond owner = 3	50+ = 5	Mmanda = 5	Other = 6	50+ = 44
			Mkisi = 3	Student = 1	
			Other tribes = 5 (1, 1, 1, 2)		
*Fishermen/farmers identified as engaged in both occupations. Pond owners are also farmers. Women May not have mentioned ownership of a pond and were not asked the occupation of their spouses which may have influenced the high awareness of spotted-necked otters if they are married to fishermen/farmers. Other category includes all engaged in other businesses except self-identified fish sellers.					
Know Otters (n = 54)	Identify Species (n = 50)	Like or Don't Like	Know Otters	Identify Species	Like or Don't Like
Yes = 49	Spotted = 32	Yes = 32	Yes = 190	Spotted = 81	Yes = 137
No = 1	Clawless = 15	No = 12	No = 4	Clawless = 66	No = 50
Heard of = 4	Did not ID = 2	Don't know = 10	Heard of = 2	Did not ID = 7	Don't know = 9
	ID both = 1			Both = 42	
Cause harm	Traditional Uses (some reported more than one)		Cause harm	Traditional Uses (some reported more than one)	
Yes = 10	None known = 27		Yes* = 109	None known = 70	
No = 44 (81%)	Cure cerebral meningitis = 6		No = 87	Cure cerebral meningitis = 21	
	Skin for hats, drums, traditional dress = 8		* 42 stated not much harm	Skin for hats, drums, traditional dress = 27	
	Skin/meat for erectile dysfunction = 2			Skin/meat for erectile dysfunction = 2	
	Claw/mouth root to improve fish catch = 3			Claw/mouth root to improve fish catch = 35	
	Eaten = 3			Eaten = 52	
	Heard of only = 6			Heard of only = 15	
				Cure constipation = 3	
				Oil to treat ears = 3	
Should otters be protected or destroyed?			Should otters be protected/conserved?		
Protected = 36			Protected = 121		
Destroyed = 7			Destroyed = 36		
No opinion = 11			No opinion = 39		

Appendix D: Women versus Men by Occupation

Women (n = 54) versus Men (n = 196) by occupation				
Photographs of both otter species and the marsh mongoose were shown to participants. They were asked if they knew the animals, if they liked them, and which species they see. Mongoose IDs were not kept. Respondents were interviewed separately. M = male, F = female; only categories with one or more respondents listed.				
Do you know this animal?				
Occupation	Know	Don't know	Heard of them	
M farmers (n = 61)	57 (93%)	2	2	
F farmers (n = 36) *	33 (92%)	1	2	
M fishermen/farmers (n = 62)	62 (100%)	0	0	
M fishermen (n = 41)	41 (100%)	0	0	
M pond owners (n = 25)	24 (96%)	1	0	
F pond owners (n = 3)	2 (66%)	0	1	
M Other (n = 6)	5 (83%)	1	0	
F Other (n = 5)	4 (80%)	0	1	
M Student (n = 1)	1 (100%)	0	0	
F Student (n = 6)	6 (100%)	0	0	
F Fish seller (n = 4)	4 (100%)	0	0	
* F farmers could be married to men who identified as fishermen/farmers.				
Do you like this animal?				
Occupation	Yes	No	Don't know	
M farmers (n = 61)	49 (80%)	10	2	
F farmers (n = 36)*	23 (64%)	10	3	
M fishermen/farmers (n = 62)	43 (69%)	16	3	
M fishermen (n = 41)	24 (50%)	16	1	
M pond owners (n = 25)	16 (64%)	7	2	
F pond owners (n = 3)	0	1	2	
M Other (n = 6)	4	1	1	
F Other (n = 5)	3	0	2	
M Student (n = 1)	1	0	0	
F Student	6	0	0	
F Fish seller (n = 4)	0	1	3	
What species identified?				
Occupation	Spotted	Clawless	Both	Neither
M farmers (n = 61)	2	49 (80%)	5	5
F farmers (n = 36)	18 (50%)	13	1	4
M fishermen/farmers (n = 62)	45 (66%)	4	13	0
M fishermen (n = 41)	31 (76%)	0	10	0
M pond owners (n = 25)	1	11	13 (52%)	0
F pond owners	0	2	0	1
M Other (n = 6)	1	2	1	2
F Other (n = 5)	4	0	0	1
M Student (n = 1)	1	0	0	0
F Student (n = 6)	6	0	0	0
F Fish seller (n = 4)	4	0	0	0
Do otters cause you harm?				
Occupation	Yes	No	Don't know	
M farmers (n = 61)	8	53 (87%)	0	
F farmers (n = 36)*	7	29 (81%)	0	
M fishermen/farmers (n = 62)	51 (82%)**	11	0	
M fishermen (n = 41)	31 (76%)*	10	0	
M pond owners (n = 25)	18 (72%)*	7	0	
F pond owners	2	1	0	
M Other (n = 6)	1	5	0	
F Other (n = 5)	0	5	0	
M Student (n = 1)	0	1	0	
F Student (n = 6)	0	6	0	
F Fish seller (n = 4)	1	3	0	

** Of the 51 male **fishermen/farmers** who answered otters cause them harm, 21 qualified it as “not much”. ***Of the 31 **fishermen** reporting harm, 10 qualified as “not much”. **** Of the 31 **pond owners** who answered otters cause them harm, 9 qualified as “not much”.

Do you know of traditional/consumptive uses of otter? (Some mention >1)

Occupation	M	Eaten	None	MR	Skin	ED	Heard
M farmers (n = 61)	20 (33%)	4	28	0	9	0	3
F farmers (n = 36)*	5	1	18	2	4	1	4
M fishermen/farmers (n = 62)	1	26	17	18 (29%)	7	0	5
M fishermen (n = 41)	0	8	16	17 (41%)	2	2	4
M pond owners (n = 25)	0	13(52%)	5	0	9	0	1
F pond owners	1	0	2	0	1	0	0
M Other (n = 6)	0	1	3	0	0	0	2
F Other (n = 5)	0	2	3	0	1	0	0
M Student (n = 1)	0	0	1	0	0	0	0
F Student (n = 6)	0	0	3	0	1	0	2
F Fish seller (n = 4)	0	0	1	1	1	1	1

M = cure for cerebral meningitis in children; **MR** = mouth root used to increase fish catch; **Skin** = used to make hats, for drums, ceremonial items; **ED** = meat and skin used to cure erectile dysfunction; **Heard** = heard of uses but not specified.

RESUME

EVALUATION DU COMPORTEMENT DE L'HOMME FACE AUX LOUTRES DANS LE DISTRICT DE MBINGA EN TANZANIE

Une enquête de type questionnaire a été réalisée auprès des résidents ruraux du district de Mbinga, dans le sud de la Tanzanie. Deux cent cinquante personnes, âgées de 15 à 84 ans, ont été interrogées, parmi celles-ci des agriculteurs, des agriculteurs/pêcheurs, des pêcheurs et d'autres personnes. Les informations recueillies chez les personnes interrogées concernaient leur connaissance des deux espèces de loutres (*Aonyx capensis* et *Hydrictis maculicollis*), leurs acceptations et rejets des loutres, les dégâts au matériel, aux poissons dans les filets et les étangs, la perception de l'impact sur les populations de poissons, les coutumes traditionnelles et leurs utilisations. Des avis sur la conservation et la gestion futures des loutres ont été obtenues. Toutes les réponses ont été corrélées avec l'appartenance tribale, les professions, le sexe et l'âge des personnes interrogées. Les résultats seront utilisés pour mieux comprendre les opinions et attitudes des habitants locaux concernant les loutres et orienter la conception de matériel de sensibilisation à la conservation des eaux douces afin de répondre aux besoins de la population et de la faune sauvage. L'élaboration de ce futur programme mettra l'accent sur la nécessité de faire preuve d'empathie quant aux exigences et perceptions économiques humaines lors de la conception d'un plan acceptable et réalisable au profit de la conservation des loutres et de leur environnement.

RESUMEN

EVALUACIÓN DE LAS ACTITUDES HUMANAS HACIA LAS NUTRIAS EN EL DISTRITO DE MBINGA, TANZANIA

Condujimos una encuesta con cuestionarios, entre los residentes rurales del distrito de Mbinga, sur de Tanzania. Entrevistamos a 250 personas, de edades entre 15 y 84 años, abarcando campesinos, campesinos/pescadores, pescadores, y otros. Recolectamos información sobre el conocimiento de los encuestados acerca de las dos especies de nutrias de la zona (*Aonyx capensis* e *Hydrictis maculicollis*), su gusto o disgusto para con las nutrias, daños a sus equipamientos, peces capturados en redes, peces en estanques, impactos percibidos sobre las poblaciones de peces, conocimientos tradicionales, y qué usos se hacen de las nutrias. Pedimos opiniones sobre la futura conservación y manejo de las nutrias. Todas las respuestas fueron correlacionadas con la pertenencia tribal, ocupaciones, sexo y edades de los que respondieron. Los resultados serán utilizados para entender mejor las opiniones y actitudes de los habitantes locales respecto de las nutrias, y guiar la creación de materiales de difusión sobre conservación en agua dulce, de manera que se tengan en cuenta las necesidades de la gente y de la fauna. El desarrollo de este programa futuro pondrá énfasis en la necesidad de empatizar con los requerimientos económicos y percepciones humanos al momento de crear un plan aceptable y viable, que beneficie la conservación de las nutrias y su ambiente.