

PEOPLE'S PERCEPTIONS OF THE EURASIAN OTTER (*Lutra lutra*) CONSERVATION IN MUGU DISTRICT, NEPAL

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Abstract

This study aims to evaluate the perceptions and attitudes of people towards Eurasian otter conservation in Mugu District, Nepal. The social survey was carried out by interviewing local people in the river corridors of Mugu Karnali, Karnali and Khatyad rivers. Interviews were carried out through semi-structured questionnaires consisting of five categories: socio-demography of the respondent, fishing information, knowledge on otters, threats to otters, and perception towards the conservation of otters. A total of 90 people were interviewed – 92.22% male and 7.88% female with occupations of farmer, labourer, businessperson, student, and fisherman. The data obtained were analysed using Microsoft Excel. A total of 72.2% respondents go to the river frequently while 13.3% of respondents visit the river occasionally and 14.4% do not go to the river. The majority of fishermen have carried out fishing for 5–8 generations (47.54%) followed by 4–5 generations (31.14%), and 2–4 generations (21.31%). Different methods (gillnet, set net, hook, current net, etc.) of fishing were used during the day and night by 56.67% of respondents. 53.34% of respondents knew the morphological characteristics of an otter. 64.44% of respondents reported a drastic change in river dynamics. 34.44% of respondents had seen or heard about the killing of otters thereby threatening the survival of otters. 35.56% of respondents believed that otters still exist in these rivers. There have only been rare programmes regarding wildlife conservation carried out in the past years, and so they were unaware about the importance of otters and laws for their conservation.

Keywords: *Otters; perception; social survey; fishing; conservation*

INTRODUCTION

Nepal holds three of the 13 otter species found in the world: Eurasian otter (*Lutra lutra*), smooth-coated otter (*Lutrogale perspicillata*) and Asian small-clawed otter (*Aonyx cinereus* Hodgson 1839). The Eurasian otter is an apex predator that occurs in various aquatic habitats (Mason and Macdonald, 1986; Kruuk et al., 1994). It primarily feeds on fish and secondarily on amphibians, crustaceans, and rodents, with

seasonal variation (**Kruuk et al., 1994; Lekagul and McNeely, 1977**). Otters are sensitive to pollution (**Mason, 1996; Yamaguchi et al., 2003**) and act as a key species of the wetland ecosystem (**Mason and Macdonald, 1986**). They usually exploit a linear home range of 5–20km of riverbanks and the surrounding wetlands in Europe (**Green et al., 1984; Chanin, 1985**).

In Nepal, there has been confirmed evidence of Eurasian otter (**Shrestha et al., 2021**) and smooth-coated otter (**Acharya and Rajbhandari, 2011; Mishra et al., 2022; Thapa et al., 2021**), whereas there is only anecdotal records of the Asian small-clawed otter's presence. Eurasian otters have disappeared from several areas of its historical range due to anthropogenic activities such as competition for fish, fur trade, deliberate killing, habitat loss and fragmentation. Otters were being killed using several trap nets or chasing the animal to exhaustion and shooting (**Acharya and Gurung, 1994; Fitchett, 2013**). Eurasian otters are a native species which is rarely observed in Nepal. It was recorded in 1993 (**Acharya and Gurung, 1994**) and recently recorded in Roshi, Tubang, and Barekot rivers (**Shrestha et al., 2021**). It has been listed as Near Threatened in the IUCN Red List and Largely Depleted in the IUCN Green List assessment (**Loy et al., 2022**).

For human survival, rivers have been the hub for settlement of civilisations from ancient times by providing basic and essential resources (**Clayton and Dent, 1973**). As a result, the versatile wildlife habitat along the rivers has been subjected to anthropogenic pressure since the very outset of human civilisation (**Khan and Abbasi, 2015**). The relationship between human and animal is more intense where both of them use resources from common sources and they play an important part of people's livelihood and their income (**Treves et al., 2006, Eniang et al., 2011**). For wildlife protection, and to evaluate the success of conservation projects, it is vital to know local people's attitude, knowledge, and perceptions of wildlife conservation (**Soto et al., 2001; Sundaresan et al., 2012**). Attitudes can be defined as an individual's disposition to respond with some degree of favour, or not, to an object, person, event, or any other discriminable aspect of the individual's world (**Ajzen and Fishbein, 1980**).

Information regarding perceptions and attitudes of local people living near and around protected areas is important to identify management programme and strategies that best fit to protect biodiversity alongside the development of local public livelihoods (**Allendorf, 2007; Heinen, 1993; Infield and Namara, 2001; Kideghesho et al., 2007; Manfreda, 2008; Rands et al., 2010**). Thus, understanding the attitude and perception of locals towards wildlife conservation, is a fundamental need in order to balance conservation goals with the needs of local human populations (**Terborgh and Peres, 2002; Shahabuddin and Rangarajan, 2007; Brett et al., 2009; Karanth and De Fries, 2010**). The relationship between local residents and wildlife may be additionally strained when there is conflict between them (**Lee and Priston, 2005**). We need to understand human–wildlife relations and

incorporate local stakeholders in the decision-making process through evidence-based management for conservation initiatives to succeed (**Nepal Gazette, 2002**).

The attitude of individuals leads to a complex psychological determinant system with diverse variables involved such as intangible and tangible cost and benefit perceptions, knowledge of wildlife, exposure and experience with wildlife, species characteristics and socio-demographic variables (**Kansky and Knight, 2014**). The perceived costs and benefits of wildlife have generally been considered the primary determinants of attitudes towards wildlife (**Chan et al., 2007; Linnell et al., 2010; Treves and Bruskotter, 2014**). However, tangible benefits may be very important, especially if the species contributes positively towards people's livelihoods (**Sekhar, 2003**). Infrastructure development programmes to support sustainable wildlife use in critical habitats may contribute tangible benefits for local people. If these efforts are linked with conservation initiatives, they can create positive conservation attitudes (**Agrawal and Gupta, 2005; Xiang et al., 2011; Ellwanger et al., 2015; Lamichhane et al., 2019; Shahi et al., 2022**). Different factors like age, gender, education, and family size demographics (**Yosef, 2015; Mekonen, 2020; Merkebu and Yazezew, 2021; Penjor et al., 2021**), influence people's perceptions and attitudes toward wildlife and conservation (**Biru et al., 2017; Mitchell et al., 2019**).

The aim of this study was to evaluate the perceptions and attitudes of people towards Eurasian otter conservation. In addition, it will help in obtaining reliable information that can attract the attention of researchers in carrying out scientific surveys of otters, conservation awareness campaigns, coexistence between people and otters, and effective management of otter habitat for its best survival. Through the face-to-face interviews, we provide an insight into the attitudes of Karnali people on otters and related factors.

STUDY AREA

This study was carried out along the river corridors of Mugu district that includes major rivers - Mugu Karnali, Karnali and Khatyad (Figure 1). The biggest lake, Rara Lake is located in this district. According to the National Population and Housing Census (**CBS, 2012**), the total population is 64,549 comprising 32,168 female (49.8%) and 32,381 male (50.2%) with a household of 12,430. Mugu District has an average population density of around 18.26 people per square km. The average family size is 6.1. The average literacy rate of females is 49.9% and of males 50.1%. It has a multi ethnic composition with Chhetri, Thakuri, Brahman, Tamang Sherpa Bhot Lama, Damai, Kami, Kumal, Sunar, Bitalu and Yogi. The common language is Nepali followed by Bhot (**CBS, 2012**).



Figure 1. Map of study area showing rivers surveyed in Mugu District.

METHODS

A questionnaire survey was carried out from 3 April to 2 May 2022, in Karnali, Mugu Karnali, and Khatyad River corridors. Local people from different communities (fishermen, herders, farmers, businessmen) were interviewed through a semi-structured questionnaire that asked both open and close-ended questions. The questionnaire consisted of five categories: socio-demography of the respondent, fishing information, knowledge of otters, threats to otters, and perceptions about the conservation of otters. The questionnaire was conducted with 90 respondents from the study site by involving participatory techniques.

The survey began with a structured questionnaire form but when the locals panicked and would have provided altered responses, we switched to informal, oral interviews based on the same format, and the questionnaire form was filled in immediately after each interview to reduce errors (**Khan and Abbasi, 2015**). Informal group discussions and poster presentations were conducted in the area. These discussion 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 numerical or quantitative data was then put into a more comprehensive form using a graphical approach using Microsoft Excel. Analysis of the data was done through descriptive analysis using pivot tables and pivot charts.

RESULTS

1. Socio-demography

Altogether 90 respondents (92.22% male and 7.88% female) were interviewed during the field survey. The majority of the respondents were between 18 and 60 years of age (86.67%) followed by over 60 years (8.89%), and below 18 years (4.44%). For occupation/profession, farmers were highest (61.11%) followed by businessmen (13.33%), students (7.78%), social service (5.56%), labourers (4.44%), other job (4.44%), fishermen (2.22%), and household (1.11%)

2. Fishing activities

A total of 72.2% respondents go to the river frequently while 13.3% of respondents go to the river occasionally and 14.4% do not go to the river. The purpose of going to the river was for grazing their cattle (45.56%), fishing (42.22%), firewood collection (40%), washing and bathing (11.11%), sand and boulder extraction (7.78%), irrigation (1.11%), and dumping waste (1.11%).

The purpose of fishing was mainly for personal household purposes (70%), selling (20%), both household and selling purposes (10%). 46.67% of respondents buy fish either for household or business purposes. The average fishing per day was 1.275 kg while 0.5 kg fish were bought in one day.

The majority of fishermen carried out fishing from generation to generation: 2–4 generations (21.31%), 4–5 generations (31.14%), and 5–8 generations (47.54%). Among the fishermen, the fishing experience of more than 25 years (44.44%) were higher followed by less than 5 years (26.67%), 5–10 years of experience (13.33%), 20–25 years of experience (11.11%), and 10–15 years of experience (4.44%) thus resembling the history of more than the 2nd to 8th generation (Table 1).

Table 1. Fishing methods along with years of fishing experience by respondents

Years of experience with methods of fishing with fishing time	Generation of fishing (%)			TOTAL
	2–4 Generation	4–5 Generation	5–8 Generation	
<2 Years	11.36			11.36
Hookline	4.55			4.55
Whenever needed	4.55			4.55
Hookline, Hand/Set net	6.82			6.82
9am–2pm	2.27			2.27
All time	2.27			2.27
Whenever needed	2.27			2.27
2–5 Years	2.27	6.82	4.55	13.64
Hookline	2.27	2.27	2.27	6.82

2pm–7pm	2.27		2.27
9am–2pm		2.27	2.27
Whenever needed		2.27	2.27
Hand/Set net		2.27	4.55
Whenever needed		2.27	4.55
Drag net		2.27	2.27
Whenever needed		2.27	2.27
5–10 Years	6.82	6.82	13.64
Hookline		4.55	4.55
7pm onwards		2.27	2.27
9am–2pm		2.27	2.27
Hand/Set net	2.27		2.27
7pm onwards		2.27	2.27
Hookline, Hand/Set net	2.27	2.27	4.55
2pm–7pm		2.27	2.27
7pm onwards		2.27	2.27
Drag net	2.27		2.27
Whenever needed		2.27	2.27
10–15 Years	2.27	2.27	4.55
Gill Net		2.27	2.27
2pm–7pm		2.27	2.27
Hookline, Gill Net, Hand/Set net	2.27		2.27
Whenever needed		2.27	2.27
20–25 Years		4.55	6.82
Hand/ Set net		2.27	2.27
7pm onwards		2.27	2.27
Hookline, Hand/Set net		4.55	4.55
2pm–7pm		2.27	2.27
9am–2pm, 4am–9am		2.27	2.27
Drag net, Hookline		2.27	2.27
7pm onwards		2.27	2.27
Hookline, Gill Net		2.27	2.27

7pm onwards		2.27		2.27
>25 Years	6.82	15.91	22.73	45.45
Hookline	4.55	6.82	4.55	15.91
2pm–7pm			2.27	2.27
7pm onwards	4.55	6.82		11.36
9am–2pm, 4am–9am, 7pm onwards			2.27	2.27
Hand/Set net		2.27	2.27	4.55
7pm onwards		2.27	2.27	4.55
Hookline, Hand/Set net		2.27	6.82	9.09
7pm onwards			2.27	2.27
9am–2pm, 7pm onwards			2.27	2.27
All time			2.27	2.27
Whenever needed		2.27		2.27
Drag net, Hookline, Hand/Set net			2.27	2.27
7pm onwards			2.27	2.27
Drag net, Gill Net, Hookline			2.27	2.27
7pm onwards			2.27	2.27
Hookline, Gill Net, Hand/Set net			2.27	2.27
7pm onwards			2.27	2.27
Hookline, Hand/Set net, Supo Soli	2.27	2.27	2.27	6.82
2pm–7pm	2.27			2.27
7pm onwards			2.27	2.27
Whenever needed		2.27		2.27
Hookline, Supo Soli		2.27		2.27
7pm onwards		2.27		2.27
TOTAL	29.55	36.36	34.09	10

Different methods of fishing were used during day and night by 56.67% of respondents: 96.08% used gill net during both day and night time. 70.59% used hooks or current net followed by hand/set net (5.88%) and hook and hand/set (1.96%) and divert the water flow (1.96%). Combined for day and night, 70.59% used a hook or current net and the gill net (Table 2).

Table 2. Number of respondents using different methods of fishing during day and night

Day Fishing Method	Night Fishing Method (%)		Day Total (%)
	Gill Net	others	
Divert the water flow	0.00	1.96	1.96
Hand/set net	3.92	1.96	5.88
Hook/current net	70.59	0.00	70.59
Hook and hand/set net	1.96	0.00	1.96
NA	19.61	0.00	19.61
Night Total	96.08	3.92	100.00

A decline in fish was noticed by 38.89% respondents while 43.33% respondents were unaware of the trend of fish populations, 15.56% of respondents express no decline while 2.22% expressed stable fish population in rivers.

3. Knowledge of otters

A total of 80% of respondents knew about fish-eating animals. Among them, 58.02% recognised otters as a fish-eating animal while 41.98% recognised mongoose and yellow-throated marten as fish-eating animals. Only 53.34% of respondents knew the morphological characteristics of an otter while 3.33% described it as a mongoose and 43.33% did not know the otter's morphological characteristics.

76.83% of respondents were aware of the food of otters while 23.17% did not know about their diet. 53.33% of respondents could identify the scat of otters consisting of scales and bones of fish and amphibians.

Most of the respondents (70%) did not know where the otters lived. Though 30% of respondents knew where otters live, there was a variety of answers in the location of a den/holt (29.63): river bank (25.93%), in the water (18.52%), under a big boulder (11.11%), followed by under logs, cave in the water, burrow and den, while 7.2% do not know where otters live.

Likewise, 71.11% of respondents did not know the time of the active period of otters while 28.89% had observed otter activities at 10.00–15.00 (26.92%) followed by 20.00–24.00 (26.92%), 1.00–5.00 (11.54%), 20.00–5.00 (11.54%), 15.00–20.00 (15.38%), and 15.00–5.00 (7.69%).

4. Threats to otters

Only 28.99% of respondents responded regarding the threat to survival of otters. Among respondents, only 65% strongly stated that sand mining was being done during the past five years and 31% stated that sand mining was taking place 5 to 10 years ago. Therefore, 96% of sand mining was started within the last 10 years.

Altogether, 64.44% of respondents had responded about a drastic change in river dynamics. 14.4% of respondents noticed an increase in water level while 12.2% said it was because of seasonal change and a decrease in depth (10%). There were human causes such as infrastructure construction (4.4%), road construction (4.4%), sand mining (1.1%), and landslides due to deforestation (2.2%). While natural causes like drought (low and no rainfall (4.4%)), seasonal change, and change in water level (4.4%) were also noticed by respondents (Figure 2).

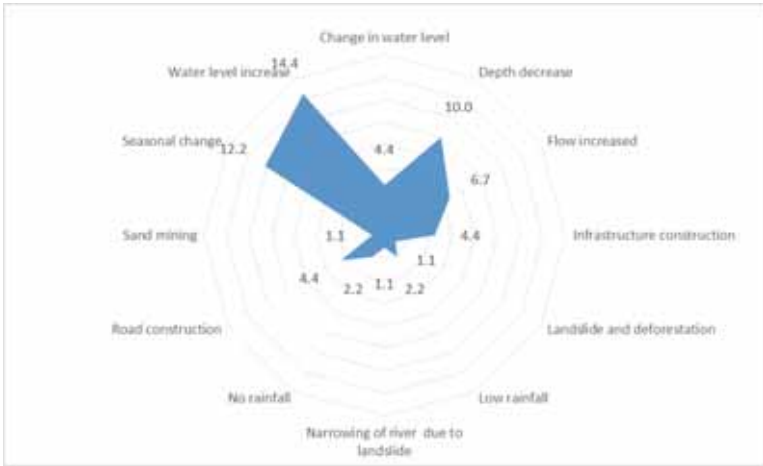


Figure 2. Filled radar chart of the reasons for the change in river dynamics given by respondents in percentage (%)

Similarly, 34.44% of respondents have seen or heard about the killing of otters but among them 76.67% had no idea about the location.

5. Attitudes of local people to the conservation of otters

35.56% of respondents believed in the existence of otters in these rivers to date. Regarding the concern for conservation of otters, respondents prefer awareness programmes (78.89%) and habitat improvement (14.44%) rather than other activities. Among respondents, 37.78% noticed a decline in the otter population, out of which 13.33% gave the reason to be hunting followed by a decline in fish numbers (10%), infrastructure development (8.89%), hydropower (3.33%), and mining (2.22%).

DISCUSSION

Available land for wildlife has decreased remarkably due to extensive needs for agriculture and urbanisation as a result of population increases (Green et al., 2005). Thus developed animal conservation strategies are necessary regarding how wild animals can coexist with people outside of protected areas (Anand et al., 2010). In

order to develop these strategies, conservation awareness, custom, activity, and socioeconomic cultures are important (**Athreya et al., 2013**).

In our study, the majority of respondents were males and farmers above 30 years of age because agriculture is the major occupation in these areas. Due to less available land, people take up other jobs like fishing and labouring during lean periods. There were eight highly valued respondents i.e., respondents above 60 years of age, who were not only information centres but also possessed a higher position in society. Similarly, four in the age group below 18 years represent the ideology of the new generation. Female respondents were not enthusiastic to answer the questions because of shyness and they worked mostly for household purposes. According to **Kaltenborn et al., 2006**, gender exerts a good significant influence on affinity levels towards animals. Women have higher levels of support for species protection than men (**Kellert, 1989; Williams et al., 2002; Zinn and Pierce, 2002**).

The majority of the local people were unaware of the decline in the fish population in the study area over the past five years. The fishing methods and density is also responsible for fish decline. We noticed more than 25–62 gill nets were installed in one km length for fishing each day. So, fishing is carried out densely as compared to the past.

The local people's attitude varies depending upon the time and situation. Most of the respondents were well aware of fish-eating animals, including the otter, except for a few respondents. The highly experienced respondents, above 60 years old, knew the morphological features of otters, behaviour, habitat, and scats of otters (**Green et al., 1984**) and that their behaviour allows them to avoid or hide from people. Beside these people, when they had gone to the river to collect fish from the set/gill net, some people had seen otters roaming late at night near the river for food and playing early in the morning. This behaviour shows that otters and sympatric animals were mostly nocturnal although some might be diurnal.

Mining was found to have the most impact on embryonic stages of fish, with juvenile and adult fish more likely to avoid or survive passage through a suction dredge (**Harvey and Lisle, 1998**). **Rempel and Church (2009)** stated that this indirectly impacts on fish-eating predators like otters. This change in habitat for otters played a vital role in their disappearance as seen in the study area. Hunting and poaching was intense mainly by males and due to the fear of being caught, respondents hesitated to respond. Otters were mostly killed for fur and pelts used for cultural dress and medicine, respectively, in Tibet and China (**Savage and Shrestha, 2018**). Traditional hunters from Humla and Jumla districts, who sell wildlife pelts, also kill a number of otters (**Yonzon, 1998**). Karnali River corridor is one of the major routes for the trafficking of pelts and fur to China and Tibet where their price was known by the majority of the local people and some children as well. Illegal hunting of otters for the pelt trade was a serious problem in Nepal (**Savage and Shrestha, 2018**).

It is important to evaluate and understand public attitudes toward species, so that their loss can be prevented. It is necessary to know not only about the biology of wildlife species, but also about people's attitudes and behaviours that affect the wildlife species (Manfredo, 2008; Saunders, 2003; Smith et al., 2010). The otter feeds on fish entangled in fishing nets set by fishermen, thereby damaging the fishing equipment while foraging. The human–otter conflict results in economic loss of fishing nets. Despite this, local people showed a degree of positive attitudes toward otters although most of them had not encountered otters before. There might be only a few wildlife friendly programmes conducted in a number of rural areas and this is why the majority of the respondents do not participate in any form of event on otter conservation yet. However, some people from the buffer zone of the Rara National Park had participated in an awareness campaign. As the construction of infrastructure was rapidly proceeding in the corridors of Karnali River, it had somehow affected the water quality, fish population, and habitat of otters. These changes directly influence the population status of otters and provide a feasible route for trafficking.

CONCLUSIONS

It is hard to confirm the presence of the Eurasian otter as the majority of the respondents had not encountered otters. They are not sure whether otters need to be conserved or not since they are not aware of any law protecting wildlife, including otters. It is difficult to conserve any species without the involvement of local community participation. A series of community approach wildlife friendly activities is needed to change people's attitudes towards animals. The awareness should include both (a) the animal's biology such as its behaviour, habitat, and its foraging activities, and (b) community participation through livelihood enhancement. Wildlife tourism is one of the major income generating activities for the enhancement of the livelihood of people living near the aquatic ecosystem in the study area. There is an urgent need for a number of programmes for the conservation of wildlife species, including otters, and these areas are prone to hunting and poaching.

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Disclosure Statement

No potential conflict of interest was reported by the authors.

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