Distribution and Conservation Status of Otters in Nepal

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Abstract

This article aims to provide overview of the conservation efforts of the government of Nepal within and outside the protected areas for the protection and long-term conservation of otters in the river basins of Nepal. The country is believed to harbor 3 species of otter, namely *Lutrogale perscipillata, Lutra lutra* and Aonyx *cinerea* which are under tremendous pressure from human disturbances such as overfishing, grazing, sand and boulder extraction, barrage construction etc. Due to these pertinent threats, the population of otters such as *Lutrogale perscipillata* in Narayani river of Chitwan National Park is being fragmented in a range of 20 km only. But this species is reportedly present in a good number in areas like Babai river of Bardia National Park and Bahunne creek of Suklaphanta Wildlife Reserve. This paper recommends to the implementation of conservation activities such as awareness to the locals and policy makers, appropriate habitats management and initiating scientific research to ensure a minimum viable population of the species in the country.

Key words

Eurasian otter smooth coated otter, human disturbances, Mahayana River, awareness, shallow channel, tracks

Introduction

The otter is a mammal of the Mustelidae family and are very elusive nocturnal animal that are rarely seen. They are semi-aquatic and favor a range of wetland habitats including rivers, marshes and lakes and are capable of travelling long distance in search of food. Majority of otter's food is amphibians, fish and crustaceans with seasonal variations. Representing the top of the food chain of the freshwater ecosystem, otters are often regarded as indicator species for intact healthy wildlife habitats in the South-east and South Asian regions (NEF, 1996). So far 13 species of otter are recorded in the world, out of which 3 species are recorded in Nepal: 1) Eurasian otter, *Lutra lutra;* 2) Smooth-coated otter, *Lutrogale perscipillata* and 3) Oriental small-clawed otter, *Aonyx cinerea*.

The common otter, *Lutra lutra* is included as Near threatened (Nt) species in the IUCN red list and in the Appendix I of CITES, Smooth coated otter, *Lutrogale perscipillata* in the IUCN Vulnerable (Vu) category and in the Appendix II of CITES and *Aonyx cinerea* in the IUCN Lower Risk / Near threatened (LR nt) categories (Hilton-Taylor 2000) and in the Appendix II of CITES. Nepal is also a contracting member of CITES, Ramsar Convention and Biodiversity

Convention, thus the provisions of these conventions will be helpful in strengthening the conservation efforts in protecting these mustelids. Although these species are not included in the protected list of the National Parks and Wildlife Conservation Act (1973), the Act restricts their killing, hunting and capturing as well as imposition of rules and regulations to curve illicit trade. The amendment (2002) of the Aquatic Life Protection Act (ALPA) 1961 of Nepal government has given legal protection to two species of otter (Lutra *lutra* and *Lutrogale perspicillata* which give an opportunity for their protection.

There has been no major investigation on the status and distribution of otter species in Nepal (Acharya 1998), Therefore more information is needed to develop conservation measures to the protection of these species. The aim of this paper is to document outcomes of major researches conducted so far on these species, conservation issues and ongoing conservation activities by protected areas and individual researches in the country. This will contribute in formulating appropriate policies for their conservation so that sound conservation measures by protected areas could be implemented.

Materials and Methods

This paper is the result of the outcomes of the research carried out in Rapti river in 1998 from the support of Otter Research Group, Japan and field studies conducted by the authors in 2008 and 2011 under financial support of Rufford Foundation Small Research Grant. Other occasional studies conducted time to time by the authors and others in different parts of the country are also being reviewed. Information on conservation issues of otters were collected from stakeholder's consultation meetings and interviewing key informants during these periods. Review of some published and unpublished papers on otters were also reviewed to account the challenges in otter conservation. The conservation modality prepared by the authors is based upon the field experiences and from Ando's awareness modality (2001). GIS map is s prepared by using Arc GIS 9.0 software.

Results and Discussion

Otter Distribution and Habitats

Eurasian otter *Lutra lutra*

It is distributed in mountain streams, rivers and lakes (Acharya 2006). There is very little information on its distribution in Nepal. The hill otter is essentially an otter of cold montane conditions and lives near streams and lakes (Prater, 1971). A preliminary review of Lutra lutra on the distribution and status off the Eurasian otter in Asia including Nepal is also available (Conroy J. *et al., 1998*). This species is reported from Annapurna Conservation Area, Makalu Braun National Park, Lake Rare National Park, Barcia National Park and districts of Saptari, Chitwan, Kapilvastu, Bardia, Kailali, Kanchanpur, Bajhang, Bajura, Ilam, Panchthar, Taplejung and Sankhuwasabha (BPP 1995). It is also recorded from Arun River, Seti River and its tributaries, Bhote Kosi and Tama Kosi (pers. comm. Karan Saha, 2011). The species has also been reported from Kanchenjunga region and West Seti River (Yonzon 1996; 1998) and from Lake Rara (Bolton 1976; DNPWC 2007) of Rara National Park. The authors (1991, 1994, and

1997) sighted the *Lutra lutra* species from Rupa and Begnas lakes of Pokhara valley in Central Nepal. They live in burrows and many are found near the banks of lakes which are covered with ferns (Acharya and Gurung, 1991; 1994). Otters require clean water with an abundant supply of food and plenty of bank side vegetation offering secluded sites for their holts. Marshes with a dense cover of reeds provide important habitats for resting and raising their cubs.

Smooth-coated otter *Lutrogale perscipillata*

The smooth-coated otter has been reported as present in the major river basins of Nepal: Koshi, Narayani, Karnali and Mahakali (Shrestha, 2003). The distribution of the smooth-coated otter is still poorly known. BPP (1995) reported this species from Annapurna Conservation Area, Makalu Barun National park, Bardia national park, Chitwan National Park, Koshi Tappu Wildlife reserve, Suklaphanta Wildlife reserve and districts of kailali and Kanchanpur (BPP1995). The species was also captured in the camera in Bahunne creek of Suklaphanta Wildlife reserve (Pers. Comm. Uba Raj Regmi, 2011). The smooth coated otters have been reported from Geruwa, Khaura, Batahani, Patkanua, Banjara ghat, Gaida Machan area, Lamak Tal, Bagaura Phant (Thapa, 2002; Bhandari 2007). It was also sighted in in Khaura River (Pers. Comm. N.B.M. Pradhan, 2008). The status of the smooth-coated otter in Narayani had been investigated by Evans *et al* (1985) in relation to fish distribution and their predation by the species. They estimated 8-10 family groups in the area. Otter signs have been also recorded from river Rapti near its confluence with the river Narayani (Acharya, 1998).

In Narayani river, the smooth-coated otters have been found to prefer along braided channels characterized by low current and depth separated from the main river course by high sandy bank. The banks and sandy islands were densely covered by *Saccharum sp*. (Acharya *et* al 2009; Acharya and Lamsal, 2010). The lower number of otter signs found with respect to January survey may have depended on the higher river discharge and consequent submersion of riparian areas. (Acharya *et a*l., 2010; Acharya and Lamsal, 2010).

The otter presence was not recorded in the downstream areas such as Kathona, Velloji and Kanah River, although the sites seemed to be suitable for the otters.

Oriental small-clawed otter *Aonyx cinerea*

Hodgson in (1839) mentioned the occurrence of small-clawed otter from Nepal, China, and India (Sikkim and Assam). However, Hodgson did not mention the species exact locality from Nepal. BPP (1995) mentions its distribution in the districts of kailali and Kanchanpur. The distribution of this species is still unknown in Nepal.as the available information is unsubstantial.

Threats

The main threats to smooth-coated otters are i) human disturbances through overfishing, grazing, sand and boulder extraction, illegal exploitation of natural resources, industrial pollution and barrage construction along Indo-Nepal border. The construction of dam such as one in Tribeni impedes fish migration (Holmquist *et al* 1998; Collares – Pereira *et al* 2000) that may reduce fish availability to otters (MacDonald and Mason 1985; Foster-Turley et al 1990).

The major threats to common otter in the Mountain Rivers are from hunting and loss of habitat from dam construction. Illegal hunting for pelts is also a serious problem (NEF, 1991) in Rupa and Begnas lakes. Otters are killed by i) trapping the animal using several nets ii) chasing the animal to exhaustion and iii) guns (Agenda Survival 1991). Yonzon (1998) reports that about 5 otters were killed in Dhung Gad in West Seti River with pelt price of US$ 150.00.

On the other hand, optimal habitat is also created such as by the management of the proposed hydroelectric reservoir in the Seti river basin. This gives feeding ground as well as lessens the illegal hunting (Yonzon, 1998).

Considering the overall threats to the species, implementation of the following actions (Table 1) could be appropriate to the long-term conservation of otters:

Table 1: Challenges and actions in otter conservation

Challenges	Actions
Inadequate awareness	Implement conservation education programs in buffer zone communities and schools
Overfishing	Strict implementation of fishing regulations.
Poisoning for high harvesting of fish	Strict patrolling in river/wetland areas.
Industrial pollution	Proper treatment process of industrial wastes should be maintained. The national parks should also conduct periodic assessment of water quality.
High human disturbances (fishing, grazing, sand and boulder extracting, exploitation of natural resources)	The movements of people and other biotic pressures should be discouraged.
Increasing use of fertilizer and pesticides deteriorates the water quality.	Promote bio-pesticides.
Inadequate Patrolling and enforcement of the laws.	Mobilize park posts and buffer zone communities in patrolling and in enforcing strict implementation of existing wildlife laws.
Increasing unemployment in the area	Promote income generating activities and provide job opportunities in business outlets within and outside the protected areas.

Survey results

Very few surveys have been conducted to assess the status and distribution of otters in Nepal. A preliminary survey by Acharya in Rupa and Begnas lakes (1991; 1996) and Rapti river (1998) were conducted. Acharya (2006) indicates impact of anthropogenic pressure as evident by field research, the absence of tracks, scats, holts, resting and grooming sites on both sides of riverbanks from the Sauraha – Bhimleghat. Such activities mainly attributed to overfishing and degrading good cover for otters, especially their habitat conditions. Owing to the increasing trend of excessive human pressure along with natural hazards like sedimentation, river dynamics, natural balance of aquatic system and floodplain dynamics has altered and posed a significant threat to otters thereby shrinking their habitat resulting into their reduced population. The observation of large number of signs of otters present around the Rapti and Narayani river confluence within a 6 km stretch would reflect the better protection of their population where habitat features act as a shield or barrier itself making it more attractive for otter to dwell where its access to food especially fish is available and the habitat is well protected. It was found that the population of otters was confined within the small range near the confluence of Rapti and Narayani rivers due to high human disturbances. Thapa (2002) and Bhandari (2008) conducted a preliminary otter survey in Karnali river. Recent study includes the status and distribution of smooth-coated otters in Narayani river (Achaya *et al.,* 2008; Acharya and Lamsal 2010). The study on Narayani river showed that the population of *Lutrogale perscipillata* has been reduced within a range of 15 km along Gidha - Bhosarghat (Acharya *et a*l., 2010). This is attributed due to increasing human disturbances along most parts of the river and the construction of Gandak barrage.

Otter survey in Narayani river

Survey of January 2009 recorded a large number of otter signs i.e. tracks, resting, grooming and marking sites in Zones 2 and 3 of the shallow channels of western channel of Narayani along Nawalparasi district (Fig. 1). The otter signs were found mostly on sandy island, muddy sand and elevated sandy banks. Otter signs were also recorded in Zone 3 of the eastern main channel of Narayani.

The June 2009 survey had recorded otter signs mainly track in shallow braided channels in Zone II. The tracks were mainly found on the bank by the confluence of shallow channel with main channel, muddy and sandy islands in between the shallow channels with good escape cover of *Saccharum spontaneum*. Occurrence of low otter signs during this period could be due to submergence of key otter habitats.

The otter signs were not observed in lower reaches of Narayani River (Kathona, Vellogi and Kanha River) although the areas have suitable otter habitats.

The riverine stretch from Baluwa ghat to Bhosarghat was identified as key otter bearing habitats of Narayani River as indicated by field study and information from stakeholder meetings.

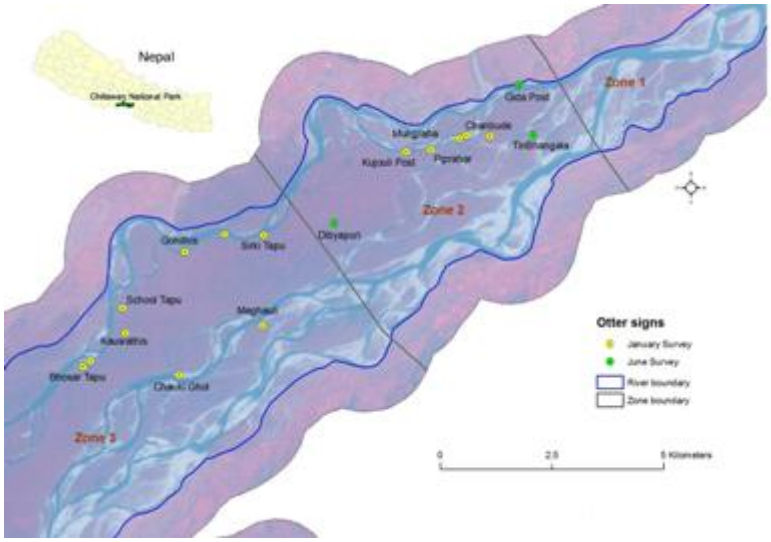

Figure 1: Distribution of otter signs in Narayani river

Awareness modality

Conservation awareness among the local communities was low particularly with regards to importance and values of otters. The interaction meetings led to their willingness to participate in otter and other aquatic fauna conservation. They even showed desire to form otter protection groups. In context to the different protected areas having different physiographic variations, the following regional approach of awareness modalities by the authors (Table 2) which has already been implemented during Rufford Foundation Small Research Projects in 2008 and 2011 among fishermen, buffer zone communities and park staff would be useful in promoting otter conservation awareness in Nepal:

Table 2: Proposed Modalities of Awareness/Education for Otter Conservation in Nepal

Target Groups	**Objectives**
Wetland dependent people	Awareness and Capacity Building Activities: Enabling them on otter conservation, and Education for their children, providing incentives in the form capital or cash for fish farming Methodology: Involvement in surveying and Monitoring otter Population
Policy making agencies	Advocacy and lobbying Activities: Training seminars Methodology: incorporation of otter issues in national plans and strategies
Government agencies	Awareness, Information Dissemination Activities: Arranging seminars, trainings, training on surveying and monitoring, Involvement in

	otter conservation projects Methodologies: Familiarization of otter action plan
Non-government agencies	Awareness, Building networks, Capacity Building Activities: Seminars/Trainings, Field trip to water bearing areas Methodology: Active involvement in otter networking
Media	Training and Awareness Program, Science Knowledge Activities: Talk programs, presentation on otter conservation issues, arranging field trips to the sites Methodology: providing case studies, Video films
Educational institution	Seminars, Field trips, Trainings, Curriculum development Activities: Training in surveying and monitoring Methodology: Encouraging them to carry out research on otter son otters for their dissertation works
Private sectors	Awareness in the issues Activities: Arranging meetings and trainings, providing brochures and leaflets Methodology: Site visits to familiarize the pertinent otter conservation issues, Recreation program

Conservation measures

The government of Nepal has established protected areas covering over 20% of the total area of the country under National Parks and Wildlife Conservation Act 1973. The Act provides protection to the otters within the protected areas. The amendment to this act has approved the Buffer Zone Guidelines and Rules and Regulations which provides for the inclusion of buffer zones around the protected areas. Under this, the protected area also provides 30-50% of its earned revenue to the buffer zone to implement appropriate habitat and conservation activities to the protection of otters and other biodiversity elements.

The amendments of ALPA, 1961 in 2002 by the government give provisions for protecting two species of otter *Lutra lutra* and *Lutrogale perscipillata* and emphasizes on the wetland conservation (Acharya, 2000, 2006; Acharya and Rimal 2007). Section 3 of the ALPA punishes any party introducing poisonous, or explosive materials into a water source, or destroying any dam, bridge, fish ladder or water system with a intent of catching or killing aquatic life. Although both noxious and explosive materials are increasingly used, there is no reported case of a person being prosecuted for a breach of the ALPA (Belbase, 1999). A recent amendment to the act has listed species (Nepal gazette, 2002), and prohibits the capture, killing or harming a 3

species of *Shizothorax* fish, 12 species of turtles, 2 species of crocodile, dolphin and 2 species of otter. These amendments could be crucial in protecting the biodiversity of aquatic ecosystem through inter-agency cooperation. Other relevant acts such as Soil and Water Conservation Act 1982, Water Resources Act 1992 and Electricity Act 1992 are also effective legal provisions to the conservation of otters.

The National Biodiversity Strategy 2002 of the government of Nepal prioritized the wetland ecosystem as an important habitat for the conservation of biodiversity and in maintaining environmental integrity. This can pave way to formulate the otter action plan of Nepal. The wetland conservation programs outline by the National Biodiversity Strategy 2002 will lead to the long-term protection of the otter population and its habitats.

The wetland policy 2003 of the government of Nepal emphasizes on the involvement of local people in the management of wetlands for its wide use and conservation of biodiversity that prevail in the wetland ecosystem. The major programs for the improvement of wetland habitats and awareness enhancement programs could play a significant role in strengthening the otter conservation in Nepal.

Recommendations

A. Research Priorities

1. Assessment of status

There are very few studies on status of otters in different physiographic zones of Nepal. Identification of otter species and their co-existence with other otter species should be determined. Therefore, detailed surveys should be conducted in the river basins and lakes in order to determine the current distribution, status and factors affecting survival of species.

2. Investigation of habitats and population status

Information on habitats and population status is poorly known which is very crucial to ensure long-term conservation of the species. Thus, protected areas of Terai and mountain regions should initiate studies on ecology of otters focusing on habitats and populations. The activities of otters such as foraging, feeding, seasonal movement of its prey species, reproduction and genetic configuration in Narayani and Karnali rivers which are considered as prime habitats should be investigated.

3. Impacts of hydro-electric projects

The construction of major hydro-electric dams and barrages such as West Seti, Karnali, Gandak and Girijapur barrage in Kailashpuri, India have negatively impacted the otter populations. The infrastructure had isolated the otter population's thereby resulting decrease in habitat, genetic exchange among wider populations (Smith 1993; Smith et al, 1996).The extent of impact by these dams should be investigated. In some areas such as West Seti, optimal habitats by construction of reservoir are created. Such artificial habitats should be protected by the concerned agencies to maintain their population.

4. Effects of industrial pollution
The effluents of industries are being directly discharged into the Narayani and other rivers which is causing bioaccumulation of pollutants in prey-base and also causing loss of the habitats. The protected area needs to initiate research on the level of water pollution and its effects on the aquatic life including the otters.

5. Study of fish migration
Studies should be carried out during the seasonal fish migration and its effects in the dispersal of the otters within the home range.

6. Study of climate change
A study focusing on the effects of the climate change in the river basins and its likely threats to the otters should be initiated timely to address the otter conservation issues.

B. Proposed conservation actions

1. Public awareness programs
A consistent and active conservation education program is required. It is strongly agreed that conservation education plays an important role in enhancing awareness and appreciation of the natural resources and must be implemented at all levels (primary to secondary schools). National school curricula on conservation should be developed by teachers' associations, other non-governmental organizations and national education and environment ministry. But it must be supplemented by locally developed curricula that bring conservation issues close to have. In addition, it is necessary to improve the quality of the personnel who work directly with conservation education programs. Mass public awareness campaign should be undertaken to educate people, specifically fishermen inhabiting close to wetland habitats about the ecological role of otters and their habitats. Training programs are required for local park authorities such as rangers, game scouts etc. to train well on otter identification, field survey and their conservation. The trainings should be conducted once a year in all protected areas of the country.

2. Conservation of prey-base
At present, the wetlands and rivers are under tremendous pressure due to overfishing which is leading to scarcity of food to otters. The use of small mesh-sized nets is widespread in Nepal and these are used on a variety of net types such as gill nets, cast nets, drag nets and variety of local types. These nets are indiscriminate in their catches resulting in the removal of both adult breeding stock and young fingerlings from the population, thereby reducing the possibilities of future breeding and recruitment from the areas. Such activities need to be discouraged by the concerned authorities for the sake of providing large biomass to support otters.

3. Conservation outside the protected areas
Some of the wetlands and river basins outside the protected areas such as flood plains of Narayani, Rapti, Babai, Karnali and Bahunne Nala are also prime habitats for the otters which are under continuous threat from human disturbances. Such suitable habitats should be given priority for the protection of the otters by the parks and buffer zone institutions.

4. Monitoring of the habitats
The main otter habitats in all the river basins of the country should be identified.

5. Environmental Impact Assessment of major development projects
The barrages constructed along the rivers in many parts of the country have caused the loss of prime otter habitats and led to fragmentation of small isolated population as well as reducing of food availability. Therefore, all river-based development projects including dam constructions while undergoing environmental impact assessment should also focus on likely effects on otters and other species. On the other hand, studies should also be conducted to see whether reservoirs constructed by hydroelectric projects can support otters and its prey base.

6. Otter conservation action plan
An otter conservation action plan should be developed. The goal of conservation action plan will not be sustained without the active support and cooperation of the local people. Strong and active partnership with local communities is important in the habitat conservation of otters. Collaboration between government authorities and local communities in the process of long-term conservation of otters in and outside the protected areas is equally important.

Conclusion

The otters being one of the key species of the river basins in Nepal are largely threatened by human disturbances, inadequate conservation measures and lack of awareness among local communities and park staff. The proposed awareness modality and habitat restoration activities could be extremely beneficial to policy makers, particularly in formulating effective management strategies to the successful conservation of otters in Nepal. Thus, the concerned authorities must adopt such conservation measures to maintain minimum viable population.

Acknowledgement

This article was possible due to support of Rufford Foundation in conducting the research on otters in Narayani river of Chitwan National Park. The field-based staff deserve our thanks for their help in logistics and otter survey. The authors heartily thank Professor Karan B. Shah for reviewing and improving the article.

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