NOTE FROM THE EDITOR

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Dear Friends, Colleagues and Otter Enthusiasts!

Most of you will have realized that last year we had 5 full regular issues and 4 special issues which means we never have received so many manuscripts in the history of the IUCN OSG Bulletin. We are a bit delayed as it is February and Lesley has just closed issue 38/5 and now, we finally start into the new year and at this moment we have one complete issue already filled and finished and the manuscript for a complete issue 2 are almost finished while it is just the second month of the year.

I want to thank all the reviewers from last year of which some have done more than one review. My sincere thanks to Daniel Allen, Juan Pablo Gallo-Reynoso, Galo Zapata-Rios, Syed A. Hussain, Melissa Savage, Will Duckworth, Hannah Kruppa, Divya Mudapa, Rosemary Green, Max Khoo, Janice Reed-Smith, Atul Borker, Tom Serfass, Padma de Silva, Sina Mohtasebi, Aadrean, Leona Wai, Miriam Marmontel, Fernanda Michalski, Nicole Duplaix, Heike Weber Heike, Annabel Pianzin, Gandhiv Kafle, Naveen Namboodiri, Paras Acharya, Aarati Basnet and Oldemar Carvalho Junior. You all did a great job to evaluate the manuscripts but also to help the authors that their manuscripts reach the necessary maturity for acceptance.

The large number of manuscripts received also considerably increased the workload for Claudio Chehebar and Gerard Schmidt, who provide us with the standard French and Spanish abstracts. You will have realized that some articles do have additional abstracts in various languages and if you provide me such translations, I am more than happy to include them.

I allow myself today to include a note that authors should not forget that this is a completely voluntary activity performed in free time by Lesley and me. So before sending harsh comments I kindly ask you to think twice how to formulate your questions, concerns or critics to which we are always open.

While it is very nice to see so many manuscripts arriving in one year which shows the appreciation our community has, we all should not forget that this also seriously increases the workload for Lesley. She uses a lot of time for the language editing and to double check missing references etc. I would kindly ask all authors to ensure that the references in the text and the list of references to be complete and congruent. Without the efforts of Lesley, our journal would not be what it is, and I want to thank you Lesley, once more for all your efforts on behalf of all of us!

R E P O R T

FIRST PHOTOGRAPHIC RECORDS OF THE SMALL-CLAWED OTTER *Aonyx cinereus* (ILLIGER, 1815) IN EASTERN JAVA, INDONESIA

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Abstract: The knowledge about the distribution of the Small-clawed Otter *Aonyx cinereus* on the Indonesian island of Java largely dates to the 20th century. We present the easternmost photographic evidence for its presence on Java. A camera trapping survey in 2018 yielded 28 notionally independent events of the Small-clawed Otter in a mangrove ecotourism site located east of the city of Surabaya. Most of these events show solitary individuals at night. Two duos were recorded in fishponds, and family groups between mid-November and end of December. The mangrove habitat along the coastline of this site is polluted by plastic waste, and microplastic entered the food chain through molluscs and fish, the main prey of the Small-clawed Otter. Further surveys are warranted to determine the distribution and conservation needs of the Small-clawed Otter in coastal wetlands of eastern Java.
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INTRODUCTION

The Small-clawed Otter *Aonyx cinereus* has an extensive geographic range in subtropical and tropical Asian wetlands (Wright et al., 2015). Since the early 20th century, wetlands have been imperilled by large-scale conversions for agriculture and aquaculture, as well as construction of industrial and hydropower plants (Gopal, 2013; Davidson, 2014; Dixon et al., 2016). This habitat loss coupled with unsustainable over-hunting led to the decline of the global Small-clawed Otter population, and it is therefore listed as Vulnerable on the IUCN Red List of Threatened Species (Wright et al., 2015). Repeated records of Small-clawed Otter pups offered alive in Thailand, Vietnam, Malaysia and Indonesia indicate that the illegal pet trade is a major driver for unsustainable hunting (Shepherd and Tansom, 2013; Gomez and Bouhuys, 2017; Gomez and Bouhuys, 2018; Siriwat and Nijman, 2018).

The Small-clawed Otter has been known to occur on Java since the early 19th century (Illiger, 1815). It was commonly encountered in agricultural, urban and semi-urban environments on Java until at least the early 20th century but was intensively hunted and considered a pest to commercial fisheries (Meijaard, 2014). In western Java, it inhabits aquaculture sites along the coast, in creeks, irrigation channels and rice fields (Melisch et al., 1994). It was also sighted near the drainage system in southern Jakarta (Meijaard, 2014). As it is threatened by pollution and conversion of natural wetlands,

it was proposed to be protected under Indonesian law in 1994 (Melisch et al., 1994). Since then, several authors reported live Small-clawed Otters offered for sale in Indonesian wildlife markets and social media platforms (Aadrean, 2013; Gomez et al., 2016; Gomez and Bouhuys, 2017; Gomez and Bouhuys, 2018; Gomez et al., 2019). Despite these reports, the Small-clawed Otter had still not received formal protection in the country by 2018 (Gomez and Shepherd, 2018). The IUCN Otter Specialist Group called for a long-term program to evaluate the status and dynamics of the Small-clawed Otter in human-altered wetland habitats in Indonesia (Duplaix and Savage, 2018).

From July 2018 to January 2019, we conducted a camera trapping survey in a coastal wetland located east of Surabaya. This survey yielded the first photographic evidence for the presence of the Small-clawed Otter along the northern coast of eastern Java.

STUDY AREA

The Wonorejo Mangroves are located at the eastern outskirts of Surabaya in the province Jawa Timur (Prasita, 2015). They are bounded by the estuaries of the rivers Wonorejo in the north and Avuur in the south, both emptying into the Madura Strait at 7.304°S, 112.845°E and 7.322°S, 112.838°E, respectively (Fig. 1). They comprise about 300 ha of mangrove swamps and brackish aquaculture ponds (Fig. 2), latter varying in size from 0.3 ha to 8.5 ha. This area was designated as an ecotourism site in 2010 (Murtini et al., 2018) and forms part of a Mangrove Conservation Area (Prasita, 2015). The city government of Surabaya initiated a mangrove rehabilitation program (Hakim et al., 2017) and bought five abandoned fishponds in the Wonorejo Mangroves of about 13 ha in total, which are being renaturalised (Management team of the Mangrove Information Center in Gunung Anyar Mangroves, personal communication 24 July 2018). The other ponds are owned and managed by small cooperatives and families who cultivate Milkfish *Chanos chanos*, Catfish *Clarias batrachus*, Tilapia *Oreochromis mossambicus*, Asian Sea Bass *Lates calcarifer* and mud crabs *Scylla*. There is no permanent house in this area. Pond workers use small shacks by day, if and when they need to carry out maintenance work such as regulating inflow of water, harvesting and restocking ponds.

Contiguous mangroves cum aquaculture ponds straddle along the coast over at least 225 km^2 up to the city of Pasuruan (Prasita, 2015; Maryantika and Lin, 2017). A part of 56 km^2 was designated as the Important Bird Area (IBA) Pantai Timur Surabaya, a resting and breeding site for migratory waterbirds (BirdLife International, 2018). A part of the mangrove swamps to the west of this IBA were converted between 1995 and 2015 to make way for the extension of the nearby airport (Maryantika and Lin, 2017).

The climate in the entire region is dominated by the Southeast Asian monsoon that brings high humidity during the wet season from November to April (Aldrian and Djamil, 2008). Monthly rainfall ranges from 105 mm in November to 327 mm in January and decreases to 101 mm in June (WWIS, 2020). Dry southerly winds prevail during July to October (Aldrian and Djamil, 2008). This dry season exhibits a total of 19 rainy days on average with a total mean rainfall of 81 mm (WWIS, 2020). Temperatures range from a daily minimum of 22.5 °C in August to a daily maximum of 33.4 °C in October (WWIS, 2020).

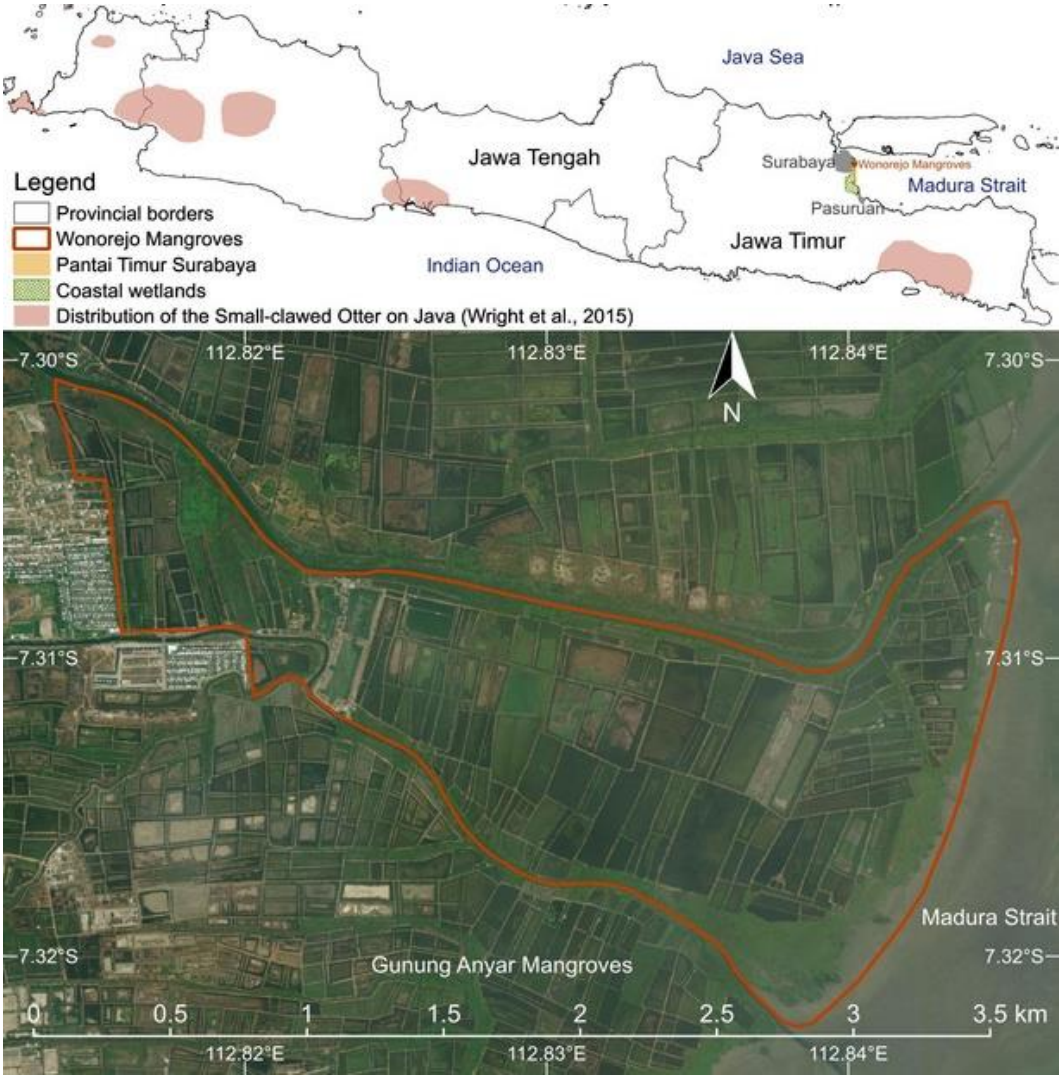

Figure 1. Map showing Java and the study area in the Wonorejo Mangroves

Figure 2. Fishpond in the Wonorejo Mangroves

MATERIALS AND METHODS

We used six Enkeeo PH730 camera traps and set them to be active for 24 hours per day taking three photographs within an interval of one second followed by a video of 20 seconds. We mounted one camera trap per station 30–45 cm above ground without attractant and deployed the stations opportunistically on dykes between ponds. Where accessible, we also deployed camera traps in mangrove patches along Avuur River and in silted-up areas inside ponds. We kept the stations for 6–117 days and determined their coordinates using the GPS function of a mobile phone, model Xiaomi Redmi 4X, which was set to WGS84 datum. Camera traps were deployed, checked and moved in the mornings, so that we define a camera trap day as a full 24-hour day.

We consider consecutive photographs of the same species within 30 minutes to be a notionally independent event. We relied on the data provided by TDAS (2021) to determine the times of night, dawn, day and dusk of these notionally independent events. To analyse and visualize the activity pattern of the Small-clawed Otter in our study area we used the package 'activity' in the statistical software R (Rowcliffe et al., 2014; R Development Core Team, 2021).

RESULTS

The camera trapping survey was carried out from 18 July 2018 to 6 January 2019 in 14 stations. The total sampling effort of 519 camera trap days yielded 28 notionally independent events (NIE) of the Small-clawed Otter between 12 September and 29 December in six stations. It was photographed on dykes between ponds in four stations, on the muddy bank of a pond in one and swimming in another station (Fig. 3). Solitary individuals were recorded in 21 NIE, groups of three to five individuals in five NIE (Fig. 4), and duos in two NIE. Three NIE were taken in early mornings shortly after sunrise between 5:30 and 6:11 h, and the remaining after dark between 18:08 and 03:00 h (Fig. 5).

Figure 3: Two Small-Clawed Otters swimming in a pond in the early morning of 12 September 2018

Figure 4. A Small-clawed Otter followed by its family in the early morning of 29 December 2018.

Other wildlife photographed in the study area comprises Small Indian Civet *Viverricula indica*, Common Palm Civet *Paradoxurus hermaphroditus*, Javan Mongoose *Urva javanicus*, Sunda Leopard Cat *Prionailurus javanensis*, Long-tailed Macaque *Macaca fascicularis*, Asian Water Monitor *Varanus salvator*, rodents, birds and mud crabs.

DISCUSSION

Our survey yielded the first photographic evidence for the presence of the Small-clawed Otter in eastern Java. To date, its distribution in Java has been thought to be discontinuous, limited to widely spaced areas in western Java and in the south of the provinces Jawa Tengah and Jawa Timur (Wright et al., 2015; Fig. 1). Previous records on the island were based on reports by local people (Yossa et al., 1991; Husodo et al., 2019), tracks and spraints found in the vicinity of slow-flowing rivers, narrow mountain creeks, irrigation channels and rice fields, all in western Java (Melisch et al., 1996; Megantara et al., 2019). Live individuals were sighted near drainage channels in southern Jakarta (Meijaard, 2014) and photographed by camera traps in Cisokan (Husodo et al. 2019), both also in western Java. Tracks, faeces and empty nests found along six rivers in Batang Regency of Jawa Tengah were attributed to the Small-Clawed Otter (Dwijayanti et al. 2021).

Elsewhere in Southeast Asia, it inhabits rice fields (Foster-Turley, 1992; Aadrean et al., 2011; Aadrean and Usio, 2020; Andreska et al., 2021) and peat swamp forest (Cheyne et al., 2010; Kanchanasaka and Duplaix, 2011). We did not find any evidence for the Small-clawed Otter using rice fields outside Peninsular Malaysia, Sumatra and Java. The lack of such records in India may be due to the dearth of surveys in this habitat type (Arjun Srivathsa, in litt. 4 March 2021; Katrina Fernandez, in litt. 5 March 2021). It has been recorded widely across its range in the vicinity of freshwater lowland and montane streams (Kruuk et al., 1994; Castro and Dolorosa, 2008; Hon et al., 2010; Perinchery et al., 2011; Prakash et al., 2012; Naniwadekar et al., 2013; Mohapatra et al., 2014; Punjabi et al., 2014; Raha and Hussain, 2016; Krupa et al., 2017; Nikhil and Nameer, 2017; McCann and Pawlowski, 2017; Mudappa et al., 2018; Sreekumar and Nameer, 2018; Sanghamithra and Nameer 2018; Li et al., 2019; Tantipisanuh et al., 2019; Marler et al., 2019; Menzies and Rao, 2021). Published sightings in mangrove habitat are limited to Similajau National Park in Sabah, Malaysian Borneo (Duckworth, 1997) and the Sundarbans Mangroves in Bangladesh (Aziz, 2018). In southwestern Thailand, it was also photographed in mangrove swamps (Tantipisanuh et al., 2019).

In view of the small size of our study area, all 28 NIE of the Small-clawed Otter presumably show the same individuals, comprising two adults between 12 September and 9 November and a family group between 13 November and 29 December 2018.

Camera trap photographs showing one to three individuals were often reported (Naniwadekar et al., 2013; Punjabi et al., 2014; Krupa et al., 2017; Nikhil and Nameer, 2017; Mudappa et al., 2018; Sanghamithra and Nameer, 2018; Li et al., 2019). Groups of four to five individuals were photographed in three protected areas (McCann and Pawlowski, 2017; Allen et al., 2019; Marler et al., 2019). Willcox et al. (2017) reported a maximum group size of eight individuals in U Minh Ha National Park, Vietnam. A group of about nine individuals was documented in a coastal wetland in western Java (Erwin Wilianto in litt., 17 November 2016), and also near the Andaman coast in southern Thailand (Tantipisanuh et al., 2019). In contrast, Aziz (2018) observed groups of up to 12 members apart from solitary individuals and duos between November and March.

The activity pattern of the Small-Clawed Otter observed in our study area is only a first indication and may not be representative for its general behaviour. However, this pattern fits with its nocturnal and crepuscular activity in habitats that are frequented by people (Foster-Turley, 1992; Prakash et al., 2012; Krupa et al., 2017; Nikhil and Nameer, 2017; Sreekumar and Nameer, 2018; Li et al., 2019). In undisturbed protected areas, it was also photographed by day (Mohapatra et al., 2014; McCann and Pawlowski, 2017; Willcox et al., 2017; Aziz, 2018; Sanghamithra and Nameer, 2018; Allen et al., 2019; Marler et al., 2019; Tantipisanuh et al., 2019; Menzies and Rao, 2021).

Low and dense vegetation is considered important as shelter for the Small-clawed Otter (Foster-Turley, 1992; Melisch et al., 1996; Prakash et al., 2012). In the Wonorejo Mangroves, dense vegetation is present off trails and in silted-up areas inside abandoned ponds. Potential prey of the Small-clawed Otter includes crustaceans, mudskippers *Periophthalmus* and fish, which elsewhere have been found to constitute its staple diet (Foster-Turley, 1992; Kruuk et al., 1994; Melisch et al., 1996; Hon et al., 2010; Kanchanasaka and Duplaix, 2011; Aziz, 2018). On the other hand, the concentration of heavy metals in flesh of mud crabs in the Wonorejo River is slightly below the threshold recommended for human consumption (Ardianto et al., 2019). The coastline of the Wonorejo Mangroves is polluted by plastic waste, both macro- and microplastic (Kurniawan et al., 2019; Firdaus et al., 2020). Marine organisms ingest microplastic, which possibly acts as a vector for the chemical transfer of pollutants within the food chain (Teuten et al., 2007). Microplastic was found in molluscs and fish in other parts of the Javan coastline (Lestari and Trihadiningrum, 2019). Both heavy metals and microplastic are likely to be detrimental to the health of wildlife in the Wonorejo Mangroves. A strategy to clean up remnant mangrove patches from plastic waste is urgently required, and frequent manual cleanups are imperative. We consider it vital to monitor the water quality in estuaries and in ponds as a prerequisite for intervention in case the water quality deteriorates.

On Java, the Small-clawed Otter is primarily threatened by poaching for the pet trade (Aadrean, 2013; Gomez et al., 2019). Between November 2018 and January 2019, Gomez et al. (2019) traced 42 advertisements offering pups in the province of Jawa Timur alone that were posted on a social media platform, including 19 offers in Surabaya. The legal protection of the Small-clawed Otter in Indonesia is long overdue (Melisch et al., 1994; Gomez and Shepherd, 2018; Duplaix and Savage, 2018; Gomez et al., 2019). Tough penalties must be adopted and enforced to deter catching and trading of otters in the country. We also recommend monitoring of social media platforms and wildlife markets in Surabaya and neighbouring cities. As already stipulated by Duplaix and Savage (2018), it is equally essential to raise public awareness for the challenges to safeguard the Small-clawed Otter.

Given the extent of the coastal wetland between the cities of Surabaya and Pasuruan, this broader area may constitute an important refuge for the Small-clawed Otter on Java. Systematic surveys are urgently needed in this area and adjacent agricultural fields to the southwest to acquire baseline data on its population size, threats and conservation needs. We also recommend to explore river valleys farther south that might constitute corridors to the population along the southern coast of Jawa Timur.

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ABSTRAK

CATATAN FOTOGRAFI PERTAMA BERANG-BERANG CAKAR KECIL *Aonyx cinereus* (ILLIGER, 1815) DI JAWA TIMUR, INDONESIA

Informasi mengenai distribusi Berang-berang Cakar Kecil *Aonyx cinereus* di pulau Jawa, Indonesia sebagian besar berasal dari abad ke-20. Kami menyajikan bukti fotografi kehadiran Berang-berang Cakar Kecil di sisi paling timur Pulau Jawa. Dari hasil survei kamera trap di tahun 2018, diperoleh 28 kejadian independen dari Berang-berang Cakar Kecil di wilayah ekowisata mangrove yang berlokasi di sisi timur kota Surabaya. Kebanyakan dari kejadian yang tertangkap oleh kamera trap menunjukkan

individu soliter pada malam hari. Dua pasangan terekam di tambak ikan, dan grup keluarga terekam di pertengahan November dan akhir Desember. Habitat mangrove di sepanjang garis pantai pada lokasi ini tercemar oleh sampah plastic, dan mikroplastik memasuki rantai makanan melalui moluska dan ikan, makanan utama dari Berang-berang Cakar Kecil. Survei lebih lanjut diperlukan untuk menentukan distribusi dan kebutuhan konservasi spesies Berang-berang Cakar Kecil di pesisir lahan basah Jawa bagian timur.

RÉSUMÉ

PREMIERS PREUVES PHOTOGRAPHIQUES DE LA LOUTRE CENDRÉE *Aonyx cinereus* (ILLIGER, 1815) DANS L'EST DE JAVA, INDONÉSIE

La connaissance sur la distribution de la Loutre Cendrée *Aonyx cinereus* sur l'île indonésienne de Java remonte en grande partie au 20ième siècle. Nous présentons les preuves photographiques les plus orientales de sa présence à Java. Une enquête par piéges photographiques en 2018 a révélé 28 événements théoriquement indépendants de la Loutre Cendrée dans un site écotouristique de mangrove situé à l'est de la ville de Surabaya. La plupart de ces événements montrent des individus solitaires durant la nuit. Deux duos ont été enregistrés dans des étangs piscicoles et des groupes familiaux entre la mi-Novembre et la fin Décembre. L'habitat de mangrove le long du littoral de ce site est pollué par les déchets plastiques, et le microplastique est entré dans la chaîne alimentaire par des mollusques et des poissons, lesquelles sont les principales proies de la Loutre Cendrée. D'autres études sont nécessaires pour déterminer la distribution et les besoins de conservation de la Loutre Cendrée dans les zones humides littorales de l'est de Java.

RESUMEN

PRIMEROS REGISTROS FOTOGRÁFICOS DE LA NUTRIA DE UÑAS PEQUEÑAS ASIÁTICA *Aonyx cinereus* (ILLIGER, 1815) EN JAVA ORIENTAL, INDONESIA

El conocimiento sobre la distribución de la Nutria de Uñas Pequeñas Asiática *Aonyx cinereus* en la isla indonesia de Java, mayormente data del siglo 20. Presentamos la evidencia fotográfica más oriental de su presencia en Java. Un relevamiento con cámaras-trampa en 2018 produjo 28 eventos independientes de Nutria de Uñas Pequeñas en un sitio de ecoturismo ubicado al este de la ciudad de Surabaya. La mayoría de estos eventos muestran individuos solitarios, por la noche. Dos dúos fueron registrados en estanques para peces, y grupos familiares entre mediados de Noviembre y final de Diciembre. El hábitat de manglares que bordea la costa de éste sitio está contaminado por desechos plásticos, y los microplásticos ingresaron a la cadena alimentaria a través de moluscos y peces, la presa principal de la Nutria de Uñas Pequeñas. Se justifica realizar relevamientos adicionales para determinar la distribución y necesidades de conservación de la Nutria de Uñas Pequeñas en los humedales costeros de Java oriental.

ZUSAMMENFASSUNG

ERSTE AUFNAHMEN DES ZWERGSOTTERS *Aonyx cinereus* (ILLIGER, 1815) IM OSTEN VON JAVA, INDONESIEN

Das Wissen über die Verbreitung des Zwergotters *Aonyx cinereus* auf der indonesischen Insel Java datiert zum größten Teil aus dem 20. Jahrhundert. Wir stellen die östlichsten fotografischen Belege für seine Anwesenheit auf Java vor. Eine Untersuchung mithilfe von Kamerafallen in 2018 erbrachte 28 vermutlich unabhängige

Nachweise des Zwergotters in einem ökotouristischen Mangrovengebiet östlich der Stadt Surabaya. Die meisten dieser Nachweise zeigen einzelne Individuen bei Nacht. Zwei Duos wurden in Fischteichen fotografiert, und Familiengruppen zwischen Mitte November und Ende Dezember. Das Mangrovengebiet entlang der Küste ist mit Plastikmüll verschmutzt, und in die Nahrungskette drang Mikroplastik durch Weichtiere und Fisch ein, die Hauptbeute des Zwergotters. Weitere Untersuchungen sind nötig um die Verbreitung des Zwergotters in küstennahen Feuchtgebieten im Osten Javas zu ermitteln und erforderliche Naturschutzmaßnahmen zu bestimmen.

S H O R T C O M M U N I C A T I O N

FIRST PHOTOGRAPHIC RECORD OF SMOOTH-COATED OTTERS (*Lutra Perspicillata* GEOFFROY 1826) IN VELLAR ESTUARY, NORTHEAST COAST OF TAMIL NADU, INDIA

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Abstract: The presence of the smooth-coated otter (*L. perspicillata)* in the estuary of River Vellar has been confirmed by sighting and interview surveys. A family of smooth-coated otters was observed in a stream, hunting and eating fish from fishermen's nets, resting and swimming around during the end of morning low tide. This is the first study that confirms the presence of otters here. The next closest known record is from Pichavaram which is about 6km south of the Vellar estuary. The family in the Vellar estuary consisted of ten otters; they were social, showing parental care. The report suggests the available rich biodiversity of the river which should come under conservation criteria.

Key words: Smooth-coated otters, Vellar estuary, Tamil Nadu, Pichavaram

INTRODUCTION

The Tamil Nadu coastline comprises of 15% of the 1076km of Indian coastal stretch consisting 13 districts. A wide range of ecosystems including mangroves, wetlands, estuaries, lagoons and related biomes (Ramesh et al., 2008) are found along this coastal stretch of Tamil Nadu. Occurrence of Smooth-coated otters could be an indicator of abundance of prey, but they also known to adapt to the changes in land use patterns and anthropogenic led changes in habitat. Interview surveys around the regions of wetlands of Tamil Nadu, has suggested the presence of otters but this is the first study that confirms their presence in the Vellar estuary by means of direct observation.

Three species of otter have been reported in India (Smooth-coated otter, Eurasian otter and Small-clawed otter) (Reuther, 1999). Among these, smooth-coated otters have been reported nationwide while other two species are restricted to some specific locations and they are not reported in central and south India (Hussain and Choudhary, 1995; Forster-Turley and Santiapalli, 1990). The distribution of suitable habitat for smooth-coated otters is quite high but these areas are also nearshore or in estuaries that are prone to unmanaged development and infrastructure growth, making this species

exposed to a range of threats. Smooth-coated otters remain one of the least studied species in Asia and are classified as insufficiently studied by the IUCN Red list and are in schedule II in the Indian Wildlife Protection Act, 1972. The lack of knowledge of smooth-coated otters throughout their range, limits the conservation strategy required to conserve the species (Hussain and Choudhary, 1995).

STUDY AREA

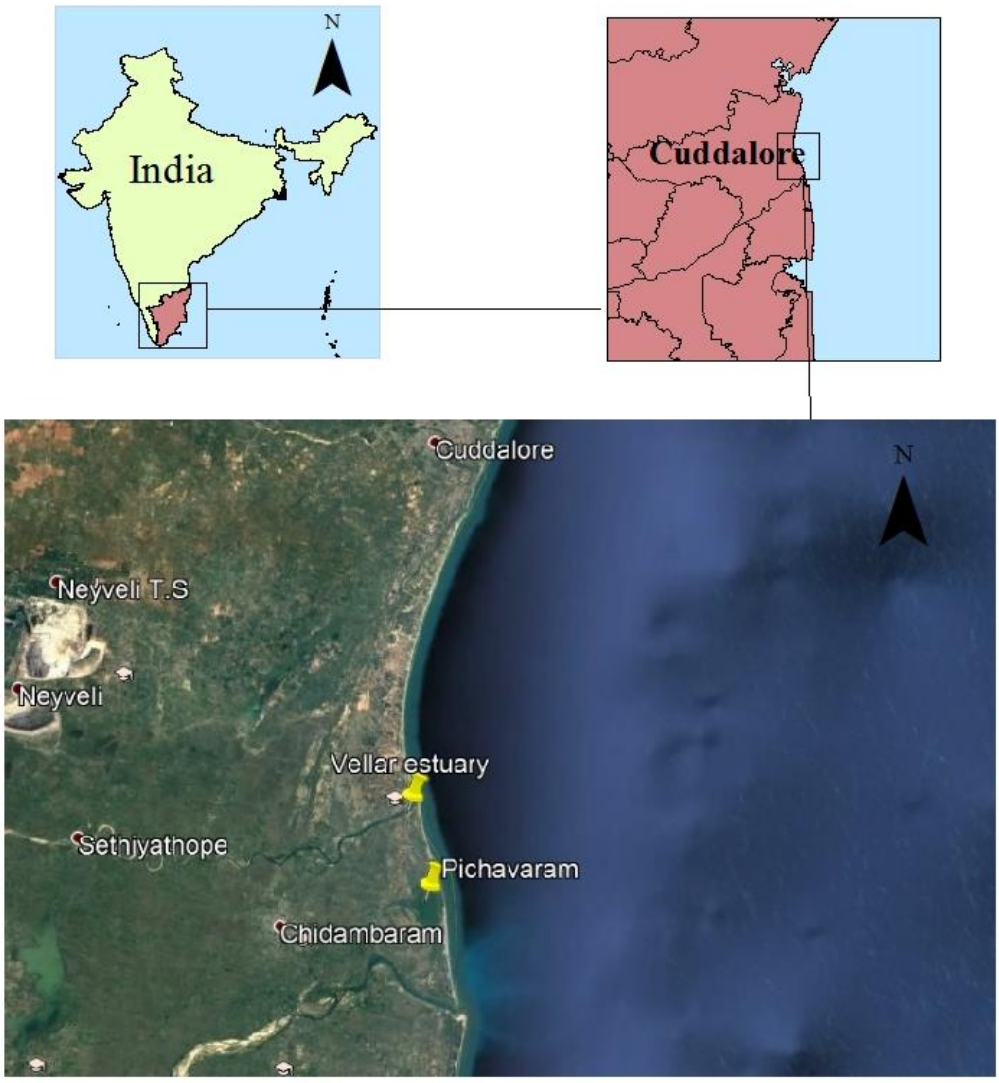

Figure 1. Location of the Vellar estuary

Cuddalore district of Tamil Nadu possesses some remarkable wetlands and coastal ecosystems of Tamil Nadu (Fig.1). The coastal regions such as Cuddalore port, Parangipettai, Samiyarettai, Periyakuppam are remote fish catching sites. The wetlands and backwater ecosystems include Pichavaram, Killai R.F., Thiruchchopuram are locations that possess suitable environments for a range of megafauna.

Figure 2. Location of otter sighting

DETAILS OF THE SIGHTING

A group of otters were seen during the early morning hours (5.30 AM to 7 AM) on 15th April, 2021, under the parangipettai railway bridge which is across the Vellar estuary and is one of the locations of the river which is utilized the most by fishermen (Fig. 2). During the morning hours, otters were seen, catching fish from the gill nets of the fishermen. There were ten otters in the area of which eight otters remained in the southern bank of the river after catching the fish from the nets while two pups were seen swimming and catching fish below the bridge which was half a kilometer away from the rest of the pack (Fig. 3). At 7 am the two pups swam back towards the pack (Fig. 4) and they moved into the stream that runs into the dense mangrove forest. After the pack had moved upstream into the forest, pugmarks were observed along the bank of the river closer to the mangroves (Fig. 5).

Figure 3. Two pups swimming below the railway bridge

Figure 4. The pack swimming towards the river bank

Figure 5. Footprints of otters observed along the bank

RESULTS

The place where the sighting occurred is an active fishing ground most of the year using gill nets and cast nets. The fishery resource in the location is abundant with catch of *Etroplus suratensis*, *Mugil cephalus*, *Lates calcarifer* and mud crabs and oysters. The interview surveys were carried from local fishermen following the survey questionnaire. It revealed that the otters' adaptation in the region which catch fish from the gill nets leading to conflict with fishermen due to the cost of net damage and loss of fish catch.

CONCLUSION

We are not yet sure if this pack of otters is resident in this stretch or uses it seasonally. Our future study will look into these questions of distribution, space use and habitat mapping. We will also be working with local communities to collect sighting information and also to study the interactions between fishermen and otters – in relation to the type of fishing carried out. The next closest sighting of otters has been confirmed from Pichavaram and Kille reserved forests approximately 6km from here.

The construction of hydropower plants, ports and other infrastructure projects in coastal stretches of India, remains the key threat to the presence and distribution of otters throughout its range, along with the other threats including declining prey abundance and water contamination (Hussain et al., 2008). Vellar estuary is still free from a host of these anthropogenic threats and offers a suitable site for community inclusive conservation of otters. Fishing in this estuary is still small scale and the fishery is mainly for sustenance and small local markets giving us the chance to reduce conflicts between fishers and otters.

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RÉSUMÉ

PREMIER ENREGISTREMENT PHOTOGRAPHIQUE DE LOUTRES À COUCHE LISSE (*Lutra perspicillata* GEOFFROY 1826) DANS L'ESTUAIRE VELLAR, CÔTE NORD-EST DU TAMIL NADU, INDE

La présence de la loutre à pelage lisse (L. perspicillata) dans l'estuaire de la rivière Vellar a été confirmée par des observations et des enquêtes par entretien. Une famille de loutres à pelage lisse a été observée dans un ruisseau, chassant et mangeant du poisson dans les filets des pêcheurs, se reposant et nageant à la fin de la marée basse du matin. C'est la première étude qui confirme la présence de loutres ici. Le prochain signalement connu le plus proche est celui de Pichavaram, situé au-dessus de 6 km parallèlement au sud de l'estuaire de Vellar. La famille de l'estuaire de Vellar se composait de dix loutres ; ils étaient sociaux, montrant des soins parentaux. Le rapport suggère la riche biodiversité disponible de la rivière qui devrait relever de critères de conservation.

RESUMEN

PRIMER REGISTRO FOTOGRÁFICO DE NUTRIAS LISAS (*Lutra perspicillata* GEOFFROY 1826) EN EL ESTUARIO VELLAR, COSTA NORESTE DE TAMIL NADU, INDIA

La presencia de la nutria lisa (*L. perspicillata*) en el estuario del río Vellar ha sido confirmada por avistamientos y encuestas. Se observó una familia de nutrias lisas en un arroyo, cazando y comiendo peces de las redes de los pescadores, descansando y nadando durante el final de la marea baja de la mañana. Este es el primer estudio que confirma la presencia de nutrias aquí. El registro conocido más cercano es de Pichavaram, que se encuentra a más de 6 km, ubicado paralelo al sur del estuario de Vellar. La familia de la ría de Vellar estaba formada por diez nutrias; eran sociales, desplegando cuidado parental. Este informe sugiere la rica biodiversidad disponible del río que debería estar bajo criterios de conservación.

S H O R T C O M M U N I C A T I O N

SMOOTH-COATED OTTER *Lutrogale perspicillata* (GEOFFROY, 1826) IN THE URBAN LANDSCAPE OF VISAKHAPATNAM, ANDHRA PRADESH, INDIA

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Abstract: The Smooth-coated otter, for the first time, is photographed in the Kondakarla Ava (Ava means lake) located within the urban landscape of Visakhapatnam district, Andhra Pradesh, India. In the Ava, otter-human relations, especially with the local fishing community, are strained with conflicts. Otters feed on commercially farmed and valuable wild fish in the Ava, such as snakehead fish, carp, catfish, and damage fish traps. The perceived financial loss of fish and the damage to equipment anger the fishermen, and they retaliate by opportunistically killing otters and the pups. Despite human retaliation, otters continue to survive in the human-dominated wetland ecosystem of Vizag. Their resilience and survival ability posts a solid case to support the conservation prospects of the species within this rapidly developing and proposed metropolitan region of Visakhapatnam.
Future investigations to support effective otter conservation planning in the Visakhapatnam district should include 1) Inter-connectivity of the various local streams and water bodies and if otter movement across the larger landscape is supported. 2) Investigate the human-dimension aspect, such as local practices of local communities using the streams and water bodies and their impact on wetlands and local fauna, and understanding wildlife conflicts.
Citation: **Tamarapalli, S.C.P., and Kolipaka, S. (2022).** Smooth-Coated Otter *Lutrogale perspicillata* (Geoffroy, 1826) in the Urban Landscape of Visakhapatnam, Andhra Pradesh, India. *IUCN Otter Spec. Group Bull*. **39** (1): 22 - 28
Keywords: Kondakarla Ava, human-dominated, Visakhapatnam, urban wildlife, Vizag

INTRODUCTION

The Smooth-coated otter (*Lutrogale perspicillata*) inhabits wetlands such as rivers, lakes, estuaries and mangroves of south and south-east Asia (de Silva et al, 2015).

In the Indian subcontinent, the Smooth Coated Otter has a wide distribution within India, Pakistan, along the Terai of Nepal, along the Indus River, in the lower parts of Bhutan, Bangladesh and Myanmar. In Andhra Pradesh state on India's east coast, the smooth-coated otter is found in the Krishna and Godavari river basins and several wetlands (Nagulu et al., 1998).

The Smooth-Coated Otter is a vulnerable species in the IUCN red list (de Silva et al., 2015). Primarily, the vulnerability to the otter across their range is from retaliatory killing by local fishermen because it competes for fish or steals fish from nets. Further, otter pelts are highly valued, and they are trafficked. Their wetland habitat is also critical for human survival and is always at risk of degradation.

Several streams, lakes, and marshes abound in the coastal city Visakhapatnam (Vizag from here onward) of Andhra Pradesh. There is evidence that the local wetlands supported several habitat specialists such as the otter, fishing cat, and tens of wetland birds and reptiles from historical times. While there are records of the otter in Vizag, over the last 3 decades, the city has expanded and changed into a vast and heavily urbanized human-dominated landscape. To understand the survival status of local wildlife in the urban wetlands, we started surveying Kondakarla Ava, the biggest freshwater lake in the city, in January 2021.

STUDY AREA AND METHODS

A group of four people walked human and animal trails in the Kondakarla Ava area (Fig. 1). The goal was to find evidence of otter tracks and signs. At promising locations, Cuddeback digital camera traps were installed to capture otter presence.

In addition, to understand the local perception of the otter, we engaged local fishers in informal chats over 2 months. We used semi-structured questions, ensured that the information generated was incorporated into subsequent queries, and adapted our interviews. This method allowed us to cross-check the reliability of the responses, consistency of answers and developed deeper insights into human-otter interactions.

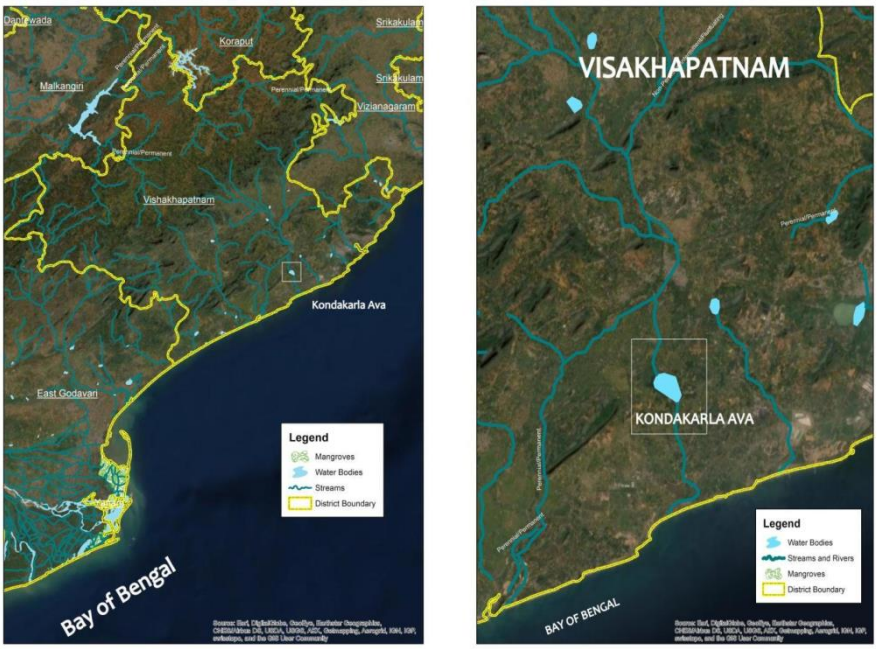

Figure 1. Map of the study area: left: Visakhapatnam district map with several rivers and streams (lines in blue) and water bodies (blue features). Kondakarla Ava is marked with a box. Right: Kondakarla Ava lake and the Saradha river that drains into the lake. Note the interconnected nature of the streams and the water bodies.

RESULTS AND DISCUSSION

Camera Trap Survey Findings

A small group of four smooth-coated otters were photographed for the first time (Fig2). Otters avoided areas where cameras with white flash functioned and could only be photographed in black flash camera traps. They may have seen the camera flash go on and possibly avoided using those trails.

Figure 2. A group of smooth-coated otters in Kondakarla Ava, Vizag, Andhra Pradesh

Besides otters, domestic cats, village dogs and palm civets, and people were also photographed. The spoor of fishing cat, jungle cat, palm civet, small Indian civet, grey mongoose, small Indian mongoose was also found on the trails around Kondakarla Ava. A recently abandoned otter holt with fresh spraint was observed on 28th January 2021. The waters recede in the lake area at this time of the year, and human activity increases. Grass harvesting, fishers wading through shallow water, dog movement all could have contributed to the disturbance.

Comprehensive identification of birds revealed the presence of wetland specialists like coot, moorhen, jacanas, lesser whistling duck, oriental darter, Asian openbill stork, and several seasonal migrants. Woodland and shrubland species such as grey hornbills, painted spurfowl, barred button quails are found around the lake.

Fishermen's Views about Otter-Human Interactions

In the Telugu speaking areas of Andhra, including Visakhapatnam, the otter is locally referred to as Yeti kukka (water dog) and neeti pilli (water cat). Local communities living around Kondakarla Ava do not eat otter flesh. However, in other parts of Andhra Pradesh, otters are opportunistically eaten.

Local communities admire the otter for its swimming adeptness, mastery at outsmarting the fishers and stealing from their traps. Fishers believe that the otter cannot be killed and does not die in a story bound way. We did not find any evidence of people worshipping the otter in the local area during our interactions. The Kondakarla Ava itself is seen as a sacred lake. A water goddess representing the lake is worshipped during March and other local spirit deities Yellaramma and Nukambika.

Knowledge

Local fishers did not have very accurate knowledge of otter behaviour or their ecology. Many myths and beliefs surround their descriptions of the otter. According to interviewed local fishermen, otters are residents. This response was consistent. According to the interviewees, otter activity is more at night and in the crepuscular hours (dawn and dusk). All the otter pictures we captured are night-time and corroborates with local information. With dogs and human activity high in the area during the day, otter activity in Kondakarla Ava is primarily nocturnal and consistent with the activity of wildlife reported in other similar human-dominated sites worldwide, for example, Gaynor et al., 2018.

Fish Losses

Fishers release high-value fish seed in Kondakarla Ava, and fishing is their primary source of income (Fig. 3. 4 and 5). Birds, snakes, reptiles and mammals, preyed on fish at different fish-life stages and reduced stocks. To protect personal financial interests, fishers are vigilant against all these threats.

Figure 3. *Labeo rohita*

Figure 4. *Ctenopharyngodon idella*

Figure 5. *Channa striata*

Fishers revealed that otters damage their fishing gear and steal fish. Local fishers use handmade bamboo traps to catch fishes like Snakehead murrel (*Channa striata*), Rohu (*Labeo rohita*), grass carp (*Ctenopharyngodon idella*), Catla (Labeo catla) and other freshwater fishes. It took them several man-days to build their intricate bamboo, coconut leaf and nylon traps (Figure 6). When wildlife damaged traps, it aroused tempers and upset fishers retaliated antagonistically on potentially threatening wildlife, including otters.

Figure 6. Front view of fish trap used for fishing (left) and Top view of the trap (right)

The scale and exact extent of losses and the actual species responsible is not clear in this assessment. Otters were readily blamed for fish losses, and people tried to kill them occasionally. These existing conflicts need more detailed qualitative and quantitative investigation. We plan to investigate these aspects before any conservation interventions. Fishers future expectations of Kondakarla Ava and coexistence prospects also need further understanding.

Potential landscape-level connectivity

The Sarada river is connected to the lake through a canal. Tracks and spraints are observed at several locations along the canal, suggesting that the otters may be moving beyond the Ava and using other water bodies in the district (Fig. 1). If the otters in Visakhapatnam could also be moving far and interacting with populations in East Godavari and those in Vizianagaram and Srikakulam districts needs understanding too. As a next step, focused surveys on the otter's habitat connectivity and threats to otters along the water networks will be crucial to conservation planning purposes.

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RÉSUMÉ

LOUTRE À PELAGE LISSE, Lutrogale perspicillata (GEOFFROY, 1826) DANS LE PAYSAGE URBAIN DE VISAKHAPATNAM, ANDHRA PRADESH, INDIA

Pour la première fois, une loutre à pelage lisse a été photographiée autour de Kondakarla Ava (Ava voulant dire lac), dans la zone urbaine du district de Visakhapatnam situé dans l'État d'Andhra Pradesh en Inde. Les relations entre les loutres et les humains autour de cet Ava sont conflictuelles, en particulier avec la communauté locale de pêcheurs. En effet, les loutres se nourrissent du précieux poisson d'élevage comme le poisson à tête de serpent et ont aussi tendance à abîmer les pièges. La perte financière engendrée met les pêcheurs en colère, qui se vengent à l'occasion en tuant les loutrons ou en essayant de capturer les individus qu'ils aperçoivent. Un solide argumentaire sur l'importance de la conservation des espèces résilientes et spécialisées des zones humides, comme la loutre, à l'intérieur de la limite urbaine de la ville de Vizag est actuellement rassemblé. Les futures recherches visant à soutenir une planification efficace de la conservation des loutres dans le district de Visakhapatnam devraient inclure 1) l'interconnectivité des divers cours d'eau et plans d'eau de la zone

et si les loutres se déplacent à travers l'ensemble du paysage 2) Enquêter sur la dimension humaine, comme l'utilisation des cours d'eau et points d'eau par les communautés locales, leur impact sur les zones humides et la biodiversité ou encore les conflits liés à la faune.

RESUMEN

LA NUTRIA LISA Lutrogale perspicillata (GEOFFROY, 1826) EN EL PAISAJE URBANO DE VISAKHAPATNAM, ANDHRA PRADESH, INDIA

Por primera vez, la nutria lisa es fotografiada en Kondakarla Ava (Ava significa lago) ubicado dentro del paisaje urbano del distrito de Visakhapatnam, Andhra Pradesh, India. En el Ava, las relaciones entre nutrias y humanos, especialmente con la comunidad pesquera local, están en tensión debido a los conflictos. Las nutrias se alimentan de peces criados comercialmente y con gran valor en el Aa, como el pez cabeza de serpiente, la carpa, bagres, y también dañan las trampas para peces. La pérdida financiera percibida y los daños al equipo enojan a los pescadores, que toman represalias matando de manera oportunista a las nutrias y sus cachorros. A pesar de estas represalias humanas, las nutrias continúan sobreviviendo en el ecosistema de humedales dominado por actividades antrópicas de Vizag. Ésta resiliencia y capacidad de supervivencia dá fundamento sólido a las perspectivas de poder conservar la especie en ésta región metropolitana de Visakhapatnam -que atraviesa un acelerado desarrollo. Las investigaciones futuras para apoyar la planificación eficaz de la conservación de las nutrias en el distrito de Visakhapatnam deberían incluir 1) La interconexión de los diversos arroyos y cuerpos de agua locales, y si se facilita el movimiento de las nutrias a través del paisaje más amplio. 2) Investigar el aspecto de la dimensión humana, como las prácticas locales de las comunidades locales que utilizan los arroyos y cuerpos de agua y su impacto en los humedales y la fauna local, y comprender los conflictos con la vida silvestre.

R E P O R T

OTTER SURVEY IN PAKKE TIGER RESERVE, ARUNACHAL PRADESH, EASTERN HIMALAYAS OF INDIA

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Abstract: Otter species are declining across their distribution in South Asia. There is an urgent need to understand the distribution of otters in the region, as well as to direct conservation efforts and protect their habitat. In India, there are very few data on otters in the Northeast region of the country. In this study, we report the presence of two species, Eurasian and Small-clawed otters, in the Pakke Tiger Reserve and Wildlife Sanctuary (Pakke Tiger Reserve) in Arunachal Pradesh, a large Indian state in the Eastern Himalayas. The Eurasian otter and the Small-clawed otter species are listed on Appendix I of CITES and are protected by Wildlife (Protection) Act 1972 in India. We conducted the first survey for otters in the Indian North-east, along the Kameng River, and recorded 43 otter signs, 23 of the Eurasian otter, and 20 of the Small-clawed otter, and retrieved photographic records of both species. There is an urgent need for further research and the development of conservation strategies to protect otters in the region.

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Keywords: Eurasian otter**,** *Lutra lutra*, Small-clawed otter, *Aonyx cinereus*, Pakke Tiger Reserve, Eastern Himalayas

INTRODUCTION

The Indian subcontinent is home to three species of otter, the Small-clawed otter *Aonyx cinereus*, the Eurasian otter *Lutra lutra*, and the Smooth-coated otter *Lutrogale perspicillata* (Hussain, 1999). Almost nothing is known about their distribution or status in the Arunachal Pradesh, a remote state of India in the Eastern Himalayas. Among the three species, recent records of the Eurasian otter in the region are the sparsest. Only recently have there been confirmed reports of Eurasian otters in other parts of India (e.g., Conroy et al., 1998; Joshi et al., 2016; Jamwal et al., 2016). In this study, we report evidence of two otter species, the Eurasian otter and Small-clawed otter along the Kameng River in Arunachal Pradesh, based on a field survey and photographic records.

The terrain of Arunachal Pradesh is highly rugged, with steep mountains, deep gorges and an elevational gradient of 100 to 5500 m. It lies in the eastern ranges of the Himalayas, and is bordered by Bhutan to the east, China to the north, and Myanmar to the east. The main rivers, fed by high elevation glaciers, flow on a precipitous gradient from north to south, and include the Kameng, Lohiti, Siang and Subansari Rivers. The state receives 2000-5000 mm of rainfall annually in a seasonal monsoon (Dhar and Nadrangi, 2004). The elevational gradient also fosters a high degree of stratified biodiversity, from tropical rainforests in the lowlands, then sub-tropical forests, pine forests, temperate forests and alpine forests at the highest elevation (Government of Arunachal Pradesh, 2019). This region is one of India's most biodiverse, harboring rare species such as the rufous-necked hornbill (Naniwadekar and Datta, 2013), leopard cat (Selvan et al., 2014), and Bengal slow loris (Das et al., 2016).

The three otter species of India may overlap in their distribution, but generally prefer different habitat types. The Eurasian otter in general prefers cold mountain streams at higher elevations. Nevertheless, the species has been reported from scattered locations in India, for example, on the upper Gangetic plains of the Corbett Tiger Reserve in Uttarakhand, and the Dudhwa Tiger Reserve and Katerniaghat Wildlife Sanctuary in Uttar Pradesh (Hussain, 2002). In the Himalayan range, Eurasian otters have been reported from the Trans-Himalayan region of Ladakh (Jamwal et al., 2016), from the Rangeet and Teesta Rivers in Sikkim (Khatiwara and Bhutia, 2020), and in central Bhutan (Chettri and Savage, 2014), and the species is believed to be widely distributed across the Himalayas, although in low numbers.

Small-clawed otters are found across much of South and Southeast Asia (Hussain, 2013). They are present in the Anamalai Tiger Reserve and Kotagarh Wildlife Sanctuary in India (e.g., Hussain, 1999; Prakash et al., 2012; Sharma et al., 2014) and in the low foothills of the Himalayas, (e.g., Gupta et al., 2020). Smooth-coated otters are perhaps the most widely distributed otter species in India (Hussain, 2013). All three otter species are reported to occur sympatrically in the Western Ghats (Raha and Hussain, 2016; Krupa et al., 2017).

Little is known about otter distribution in the North-east Indian states (Conroy et al., 1998; Choudhury, 2013, Datta et al., 2008). To our knowledge, only three studies in Arunachal Pradesh have reported the existence of otters with reliable evidence. Naniwadekar et al. (2013) photographed a Small-clawed otter in Namdapha Tiger Reserve in 2010. Medhi et al. (2014) photographed a Smooth-coated otter at 2100 metres above sea level (masl) on the Nyamjang Chu (Chu = river) in northern Arunachal Pradesh, and Bhattacharya et al. (2019) photographed Eurasian otters from Nyamjang Chu in 2018.

To shed some light onto the status of the otters in North-east India, a single season survey was conducted in Pakke Tiger Reserve and Wildlife Sanctuary (Pakke Tiger Reserve) to provide baseline information about otters in that region. Two or three species of otter had been anecdotally believed to occur in Pakke Tiger Reserve (Datta et al., 2008), although the identity of the species remained unconfirmed.

STUDY AREA

The study was conducted in Pakke Tiger Reserve (27°05′N 92°51.5′E), situated in the East Kameng District of Arunachal Pradesh at the foothills of Lesser Himalayas (Fig. 1). The Pakke River and Kameng River flow through the reserve. With over 862 km^2, and undulating foothills ranging in elevation from 100 to 2000 masl, the reserve has great biological significance due to its rich diversity of flora and fauna. About 60 species of mammals are known to occur in the Reserve (Datta et al., 2008). The

vegetation of the reserve is classified as Assam Valley tropical semi-evergreen forest (Champion and Seth, 1968). The area has a subtropical climate, with cool weather from November to March. It receives rainfall from both southwest (May-September) and northeast monsoons (November-April). Temperature on average rises to 30 °C in summer and falls to 2 °C in winter.

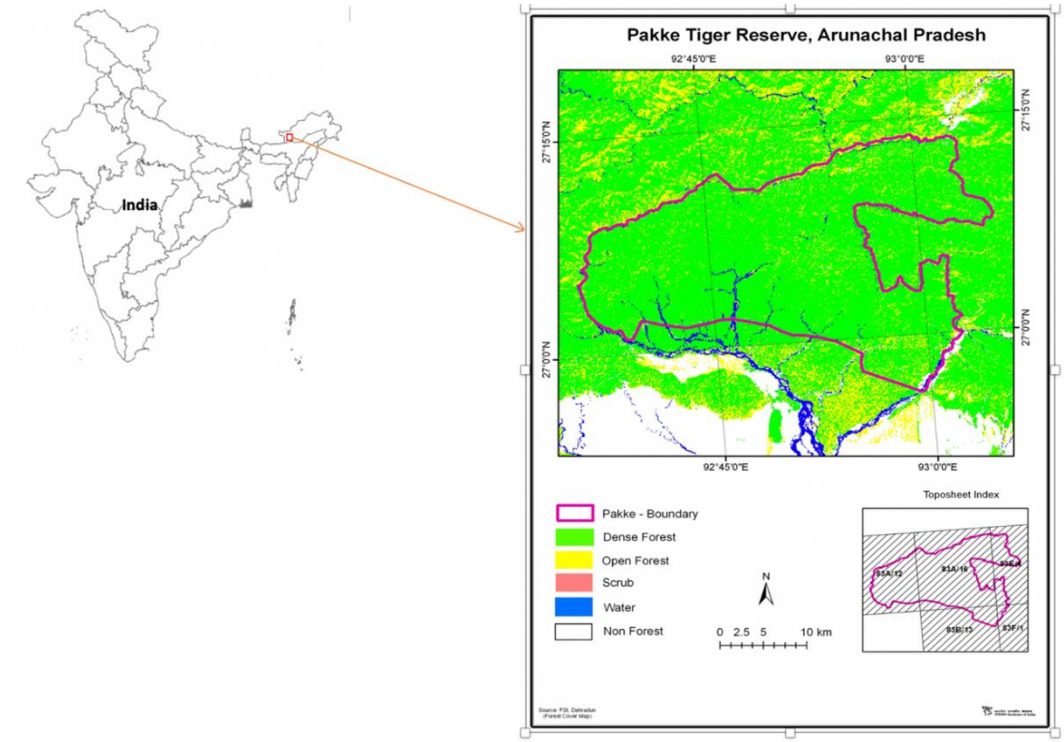

Figure 1. Map of Pakke Tiger Reserve (Adapted from ENVIS Centre on Wildlife and Protected Areas http://wiienvis.nic.in/Database/trd_8222.aspx).

The survey was conducted along the Kameng River (Jia Bhoreli in Assam), a northern bank tributary of the Brahmaputra River. The total length of the river is approximately 264 km (Khound and Bhattacharyya, 2017).

METHODS

The survey was conducted in March 2019. A total length of 6430 m of riverbank was surveyed, of which 2400 m were along the main river (Fig. 2) and 4030 m were along first order streams (Fig. 3), tributaries of the main river. We searched for otter sign (scat, latrine sites, tracks, dens). A combination of sign features, habitat preference, and behavior patterns were used to identify species. Scats and tracks were identified following characteristics described by Kruuk et al. (1993). The GPS location of each otter sign was recorded using Garmin eTrex 10. Each scat/latrine/track was examined carefully, and otter species identified based on size, shape, contents, and location of the sign. We also queried Forest Department staff and local inhabitants to collect more information about otters in Arunachal Pradesh.

Figure 2. The main stretch of the Kameng River, along which Eurasian otter sign was found.

Figure 3. The smaller first order streams that joined the Kameng River, along which Small-clawed otter sign was found (right).

RESULTS

Based on size and composition of the scat and latrine sites, and their habitat type, elevation, and location, as well as interviews with the Forest Department staff, the presence in Pakke Tiger Reserve of two species of otter was confirmed, the Eurasian

otter and the Small-clawed otter. A total of 43 signs were recorded over 6 days of the survey (Fig. 4). Scat and latrine sites were often found on large rocks or boulders along the water's edge.

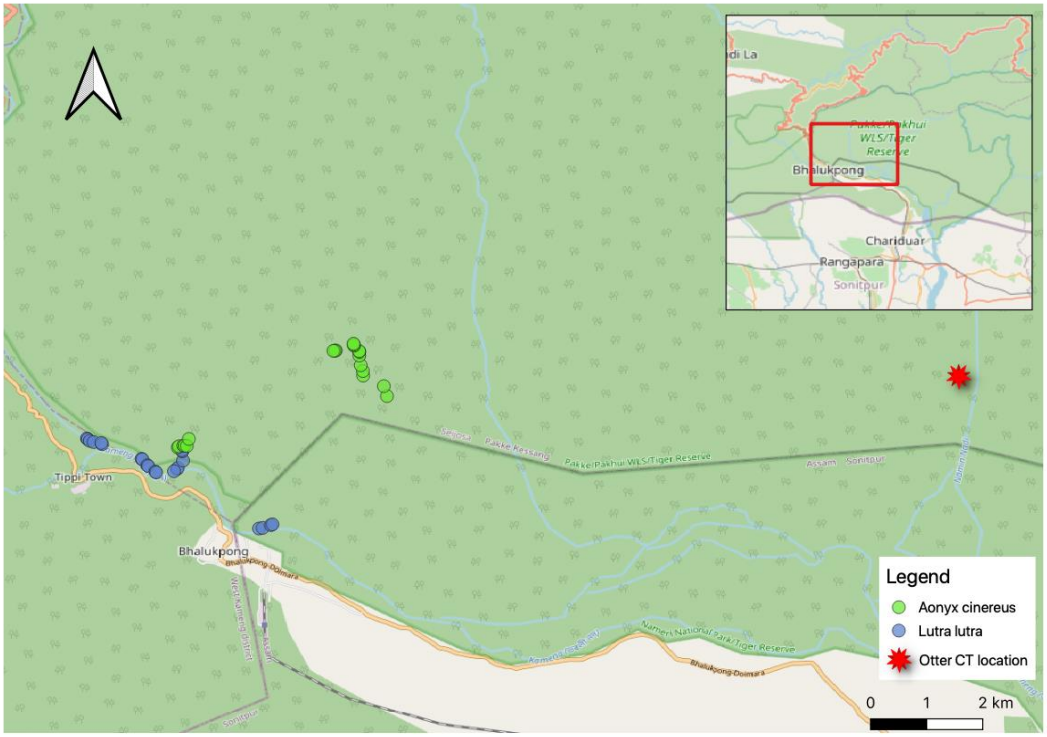

Figure 4. The locations where otter sign was recorded in Pakke Tiger Reserve and Wildlife Sanctuary, and the location of the camera trap (CT) that captured the image of Small-clawed otters. Green circles show the location of *Aonyx cinereus* sign, while blue circles show the location of *Lutra lutra* sign.

Among the signs recorded, we observed tracks of Eurasian otter, displaying distinct claw marks. In contrast, tracks of the Small-clawed otter are small with longer toes and lack distinct claw marks. The tracks of Smooth-coated otter are generally larger than those of either of these two species. The substrate on which the tracks were recorded could not conclusively rule out Smooth-coated otters, but further investigation would be needed to confirm the presence of this third otter species in the area.

We recorded scat from both of these otter species. Eurasian otter scat had a distinctly fishy odor and were larger in size than that of the Small-clawed otter (see Fig. 5). Scat of the Small-clawed otters consisted mostly of crustacean remains and were comparatively narrower. Based on these differences, 23 of the 43 signs recorded were identified as those of the Eurasian otter, and 20 as those of the Small-clawed otter.

The Forest Department staff stated that they were aware of the presence of two different types of otters in Pakke Tiger Reserve, although they were unable to identify the species. They observed that one species was noticeably larger in size than the other. We retrieved a camera trap photo from 2015 that recorded a Small-clawed otter in the reserve in the Forest Department archive (Fig. 6). We also obtained a photo of a Eurasian otter from a local resident in nearby Shergaon, West Kameng (Fig. 7).

Figure 5. Latrine site of Eurasian otter (note larger-sized scat) (upper picture), **b.** Latrine site of Small- clawed otter (smaller scat size) (lower picture).

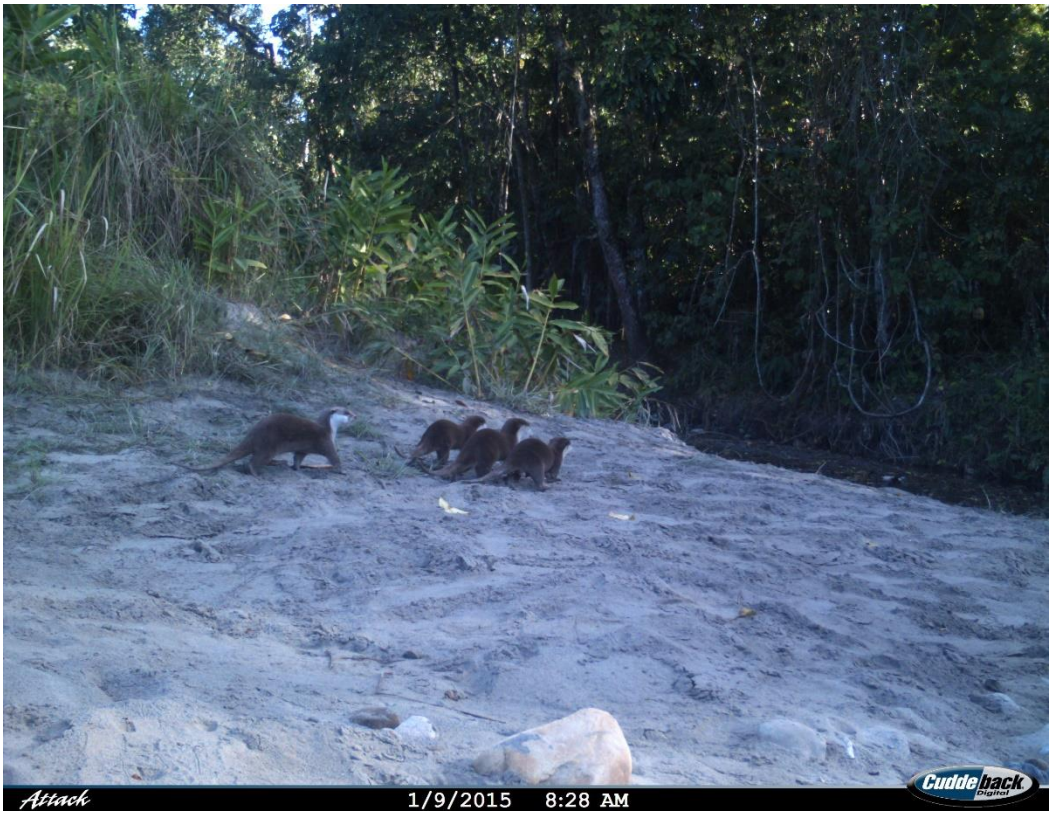

Figure 6. Camera trap image of Small-clawed otters from Pakke Tiger Reserve, photographed in 2015.

Figure 7. Photograph of a Eurasian otter from Shergaon, West Kameng.

DISCUSSION

Although Arunachal Pradesh and Pakke Tiger Reserve have extensive suitable habitat for otters, this is the first field survey focused on otters in the region. We found survey-based and photographic evidence of two otter species present in the Reserve, the Eurasian otter and the Small-clawed otter. The different food and habitat preferences of each species likely facilitates co-existence. Although the two species of otter have been observed to overlap to some extent in their use of habitat, Small-clawed otters have been observed to prefer smaller rivers and streams in proximity to larger species of otter such as the Smooth-coated otter or the Hairy-nosed otter (Larivière, 2003). Similarly, we observed Eurasian otter scat and latrines along the main stretch of the river, while those of Small-clawed otters were primarily found along the smaller first and second order streams.

Otter populations are decreasing throughout the Himalayan region due to habitat fragmentation, poaching, contamination of waterways, reclamation of wetlands and construction of hydro power plants (Kafle, 2009; de Silva et al., 2015; Duplaix and Savage, 2018). Otters in Pakke Tiger Reserve and elsewhere in Arunachal Pradesh are highly threatened by commercial poaching for their valuable pelts, both by local tribal people and traders from Myanmar, and likely trafficked across international borders to Myanmar (Datta et al., 2008).

It is imperative that we understand the distribution and status of otters in Arunachal Pradesh so that informed conservation decisions can be made. Lack of such information will hinder suitable conservation efforts and lead to further declines in their populations. Presence/absence data is crucial for developing a species protection strategy. This study has laid a foundation for further long-term research on otter species in North-east India, to better understand otter distribution, status, and threats in this biodiverse region of India and to plan for their conservation.

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RÉSUMÉ

SUIVI DES LOUTRES DANS LA RÉSERVE DE PAKKE TIGER, ETAT D'ARUNACHAL PRADESH, DANS L'EST DE L'HIMALAYA EN INDE

Les espèces de loutres sont en déclin dans leur distribution en Asie du Sud. Il y a un besoin urgent de comprendre la répartition des loutres dans la région, ainsi que d'orienter les efforts de conservation et de protéger leur habitat. En Inde, il existe très peu de données sur les loutres dans la région Nord-Est du pays. Dans cette étude, nous indiquons la présence de deux espèces : la loutre eurasienne (Lutra lutra) et la loutre cendrée (Aonyx cinereus), dans la réserve de Pakke Tiger et sanctuaire de faune situé dans l'Arunachal Pradesh, un grand État indien de l'Himalaya oriental. La loutre eurasienne et la loutre cendrée sont deux espèces inscrites à l'Annexe I de la CITES et sont protégées par le Wildlife (Protection) Act de 1972 en Inde. Nous avons mené un premier inventaire sur les loutres dans le Nord-Est de l'Inde, le long de la rivière Kameng, et avons enregistré 43 indices de présence de loutre, dont 23 de loutre eurasienne et 20 de loutre cendrée, et récupéré des enregistrements photographiques des deux espèces. Il est urgent de poursuivre les recherches et de développer des stratégies de conservation pour protéger les loutres dans cette région.

RESUMEN

RELEVAMIENTO DE NUTRIAS EN LA RESERVA DE TIGRES PAKKE, ARUNACHAL PRADESH, HIMALAYAS ORIENTALES DE INDIA

Las especies de nutria están declinando en toda su distribución en el Sur de Asia. Hay una necesidad urgente de comprender la distribución de las nutrias en esta región, así como de dirigir esfuerzos de conservación y proteger su hábitat. En India, hay muy pocos datos sobre nutrias en la región Noreste del país. En este estudio, reportamos la presencia de dos especies, la Nutria Eurasiática y la Nutria de Uñas Pequeñas Asiática, en la Reserva de Tigres y Santuario de Vida Silvestre Pakke (referidos como Reserva de Tigres Pakke) en Arunachal Pradesh, un gran estadio de India en los Himalayas orientales. La Nutria Eurasiática y la Nutria de Uñas Pequeñas Asiática están listadas en el Apéndice I del CITES y están protegidas por la Ley de (Protección de la) Fauna de 1972, en India. Condujimos el primer relevamiento que se hace de nutrias en el Noreste de India, a lo largo del Río Kameng, y registramos 43 signos de nutria, 23 de la Nutria Eurasiática y 20 de la de Uñas Pequeñas, y obtuvimos registros fotográficos de ambas especies. Hay una urgente necesidad de realizar más investigaciones, y desarrollar las estrategias de conservación para proteger las nutrias de esta región.

S H O R T C O M M U N I C A T I O N

PREDATION EVENT ON *Iguana iguana* BY *Pteronura brasiliensis* IN THE MID TILLAVÁ RIVER BASIN, COLOMBIA

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Abstract: The Giant otter (*Pteronura brasiliensis*) is a semi-aquatic mammal listed as Endangered (EN) at national and international levels. On 20th April 2021, a *P. brasiliensis* was sighted and a video recorded the killing a Common green iguana (*Iguana iguana*). In this short note we report the first record of attack and consumption of iguana by giant otter and includ the Giant otter in the list of the occasional predators of these widespread lizards in a tributary of Tillavá River, tributary of the Vichada River, department of Meta, Colombia.

Keyworks: Occasional attack, prey, interspecific interaction, large lizard, Orinoco region.

INTRODUCTION

The Giant otter (*Pteronura brasiliensis* Zimmermann, 1780) is the largest freshwater otter in the world. In Colombia this monotypic and semi-aquatic carnivore inhabits the Orinoco and Amazon basins (Noonan et al., 2017; Duplaix et al., 2015; Trujillo et al., 2015). The giant otter is classified as Endangered (EN) at national and international levels (Groenendijk et al., 2015; Rodríguez-Mahecha et al., 2006; Trujillo et al., 2016). At national level threats include the retaliation of the fishermen by fishing resource, because the local people consider that the presence of this mammals decreases fish availability, or that they can remove fish from fishing nets, illegal traffic as pets, fishing overexploitation, and the mercury bioaccumulation in dam fishes by the illegal minery in the basin (Rodríguez-Mahecha et al., 2006; Trujillo et al., 2015). In particular, the Orinoco giant otter populations suffer additional pressures such as accelerated transformation of habitats, depletion of fish stocks and contamination of freshwater (Trujillo and Mosquera-Guerra, 2018).

The common Green Iguana, *Iguana iguana* (Linnaeus, 1758), is a widespread arboreal reptile that occurs from North of Mexico to Paraguay, including numerous islands (Bock, 2013; Bock et al., 2018). In tropical humid forest the iguanas appear to select the branches of trees where they can thermoregulate or rest near rivers, lakes and open areas into which they can escape when threatened (Bock, 2013; Oliveira and Castro, 2017).

METHODS

This record was obtained opportunistically as part of a study on river dolphins (*Inia geoffrensis*) and giant otter (*P. brasiliensis*) and their interrelations with other hydrobiological resources and wetlands of Tillavá River (Orinoco basin), department of Meta, Colombia. During 14 to 23 of April 2021 we surveyed the Tillavá River and

tributaries (Rubiales and El Puente) for approximately 277 km in a boat at a velocity of 15 km per hour. This clear water river is located in a vast area known as Altillanura (part of the Colombian Shield), a landscape that extends from the east of the department of Meta to the department of Vichada, with an area of 86,211 km^2, equivalent to 7.5% of the area of Colombia (Serrato, 2018).

RESULTS

On April 20, 2021, two subadult giant otters were recorded in the Caño El Puente, a tributary of Tillavá River (N 3º45'3.146"N latitude and -71º20'52.263"W longitude), Vereda Rubiales, department of Meta. At around 11h40, one of these animals hunted an iguana (approximately 70 cm length including the tail) that was in the water; this lizard threw himself from a tree branch. The attack consisted of biting the head and immersing it in the water by turning on its body. Once the iguana was dead, the giant otter swam upstream (Figure 1). We hypothesized that the iguana would shortly be eaten.

Additional video is available at the following link: https://www.youtube.com/watch?v=SmILJbYV-z4

DISCUSSION

P. brasiliensis is primarily piscivorous (orders Characiformes, Perciformes and Siluriformes) especially when fish concentrate in small areas under dry conditions, but it will opportunistically add crustaceans, mollusks, birds, amphibians, reptiles and small mammals to its diet (Duplaix et al., 2015; Noonan et al., 2017). Giant otters have been documented consuming some lizards, snakes, turtles, and small caimans (Duplaix et al., 2015; Trujillo and Mosquera-Guerra, 2018). Surprisingly, drought conditions may have resulted in *P. brasiliensis* feeding on caimans in the Pantanal wetland (Ribas et al., 2012). The giant otter prefers fish ranging from 7-30 cm in length, although the the species has been seen catching prey up to 100 cm (Duplaix et al., 2015). For this reason, the attack to the iguana is not surprising; according to Falcón et al. (2013) the head-body length of an adult of iguana can reach up 50 cm and approximately 200 cm head to tail length; the tail represents almost two thirds of their body length.

The present study includes *Iguana iguana* in the list of diet item of *Pteronura brasiliensis*. Juvenile iguanas are preyed upon by crocodiles, caiman, and fish while swimming during their dispersal away from the nesting sites, and by other large lizards for example, *Basiliscus* sp. (Bock et al., 2018). Previously, two predators of the Mustelidae family (*E. barbara* and *L. longicaudis*) hav been reported attacking or consuming iguana. Nevertheless, the attempt by *L. longicaudis* does not configure a predation event because the iguana managed to escape (de Lima et al., 2020). Other studies documented ten predatory carnivorous mammals of iguana (eight wild and two domestic) and presumably *L. longicaudis* (de Lima et al., 2020). On the other hand, and not less important, humans are regarded as their main enemy (Falcón et al., 2012); the consumption of iguana by humans is a common issue and in some places the rate of overexploitation is not sustainable (Bock, 2013).

Figure1. Attack and consumption of iguana by giant otter (*Pteronura brasiliensis*). a and b: The otter bites the iguana's head. c: Swimming with the dead iguana. d: Unique markings of white or cream fur on the throat and under the chin on the otter.

In summary, here we report the first known case of predation by *P. brasiliensis* on a large lizard (*I. guana*). This opportunistic feeding behavior can be associated with the high-water season, as documented by Duplaix et al. (2015), when fish are dispersed throughout large areas in the flooded forest. In the Orinoco region, this month (April) of the year usually corresponds with the dry season (January-April; Trujillo and Mosquera-Guerra., 2018). Nevertheless, the increase in water level is notable, and our observation confirms the activity of the giant otters in tributaries when the main rivers have high water levels.

A fundamental aspect to consider in this type of predation event is the relatively high availability of iguanas in the area. In a 20 km stretch of the Rubiales River, a tributary of the Tillavá River, researchers reported 93 iguanas throwing themselves from the trees into the water every time they sensed the boat (4.6 iguanas per km. pers. com). This evasive behavior of the iguanas seems to be induced by the active hunting of these reptiles by indigenous communities in the area.

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RESUME

PREMIERE PREDATION SUR *Iguana iguana* PAR *Pteronura braziliensis* DANS LE BASSIN MOYEN DE LA RIVIERE TILLAVÁ EN COLOMBIE

La loutre géante (*Pteronura brasiliensis*) est un mammifère semi-aquatique répertorié comme en danger (EN) aux niveaux national et international. Le 20 avril 2021, une loutre géante P. brasiliensis a été observée et une vidéo a enregistré une attaque mortelle d'un iguane vert commun (*Iguana iguana*). Dans cette courte note, nous rapportons le premier enregistrement d'attaque et de consommation d'un iguane par la loutre géante et incluons la loutre géante dans la liste des prédateurs occasionnels de ces lézards répandus sur un affluent de la rivière Tillavá, tributaire de la rivière Vichada, dans le département de Meta, en Colombie.

RESUMEN

EVENTO DE DEPREDACIÓN DE *Iguana iguana* POR *Pteronura brasiliensis* EN LA CUENCA MEDIA DEL RÍO TILLAVÁ, COLOMBIA

La nutria gigante (*Pteronura brasiliensis*) es un mamífero semiacuático que se encuentra en Peligro (EN) a escala nacional e internacional. El 20 de abril de 2021, *P. brasiliensis* fue registrada y filmada en video depredando una iguana verde común (*Iguana iguana*). En esta nota corta reportamos el primer registro de ataque y consumo de iguana por parte de la nutria gigante e incluimos la nutria gigante en la lista de depredadores ocasionales de estas iguanas ampliamente distribuidas en un tributario del río Tillavá, afluente del río Vichada, Meta, Colombia.

A R T I C L E

REVIEW OF ENVIRONMENTAL POLICIES AND OTTER CONSERVATION IN NEPAL

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Abstract: Nepal has several policies and legal provisions for species conservation, but no specific protection for otter species. This study aims to identify the legal provisions of Nepal. Protecting riverine animals, including otters, by analyzing legal documents and publications describing environmental policies as they apply to the conservation of riverine species. The review suggests that development projects in the country are not following the provisions of environmental impact studies during project formulation, implementation, or monitoring. Established policies emphasize the conservation, restoration, and effective management of wetlands for biodiversity and environment conservation. Minimal effective implementation of the unified Wetland Acts and regulations and a lack of coordination among related agencies are the major gaps in the conservation of otters in Nepal.

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Key words: Otters, policy, conservation, Nepal

INTRODUCTION

Wildlife habitat has degraded rapidly in the last few decades in Nepal, with a heavy loss of wildlife. Rapid human population growth and infrastructure development has meant the gradual elimination of many large mammals from their historical ranges.

The weakness of legal provisions for otter conservation in Nepal has led to uncertainty for long-term conservation of the three species said to inhabit the country. Both Eurasian and Smooth-coated otters are protected under the Aquatic Life Protection Act, 1961 (Acharya and Rajbhandari, 2011a), which prohibits the catching, killing and harming of certain aquatic animals. Small-clawed otters have no protective provisions. Success in conserving threatened species depends on an understanding of their basic

biology, including distribution, abundance, genetic diversity, and environmental variables affecting their survival, in addition to legal protections (Kruuk, 2006; Lee and Hung, 2007; Acharya and Rimal, 2007). However, the successful application of scientific knowledge is affected by choices made for the overall interests and welfare of society (Gutleb, 2007). In this study, we systematically review the legal protections afforded otter species in Nepal.

Three species of otter are reported to inhabit Nepal: the Eurasian otter (*Lutra lutra*), Smooth-coated otter (*Lutrogale perspicillata*) and Small-clawed otter (*Aonyx cinereus*) (Acharya and Rajbhandari, 2011b), although knowledge of the status of these species is uneven and limited.

The status of these three species is not well established in Nepal, but it is clear that there have been continuous population declines (Acharya, 1997, 2006; Acharya and Rajbhandari, 2011b; Basnet et al., 2020 a,b). The Eurasian otter has been documented in Begnas and Rupa Lakes (Acharya and Gurung,1994) and more recently in the West Seti, Barekot, Tubang, Utterganga, and Pelma Rivers (Shrestha et al. 2021a; b) and is thought to be widely distributed in mountain rivers and wetlands (Acharya and Gurung, 1994; Yonzon, 1998). The Smooth-coated otter inhabits mainly protected areas in major lowland river basins of the Terai region. Small-clawed otters were last recorded in 1839 (Hodgson, 1839), and are perhaps extirpated from Nepal.

METHODOLOGY

Nepal laws and regulations were systematically reviewed with relevance to environmental policies directly or indirectly influencing the conservation of aquatic species, as well as literature in relevant databases (Table 1). Both published and unpublished case studies and reports were reviewed, and experts and stakeholders were directly engaged.

Table 1. Nepal laws and relevant literature that were reviewed.

Legal frameworks reviewed	Thematic literature reviewed
Three Treaties	Water: relevant pollution and its effect on otter conservation
Seven Acts	Forests: Forest fragmentation and vegetation loss
Twenty-two Policies (Rules and Regulations, Guidelines and Manual)	Climate Change: Ecological alterations
	Human activities: Human encroachment such as settlements, sand and gravel mining, industrial and municipal pollution, noise and infrastructural development

The following four steps were taken in the review:

Step 1: Framing the questions

Research questions were specified via expert discussion and the research committee.

Step 2: Identifying relevant laws

A search for laws pertinent to conservation of otters was undertaken, on government agency websites and published policy documents including relevant treaties, and discussed with experts for relevancy.

Step 3: Identifying appropriate literature

A literature review pertaining to water issues (relevant pollution and its effect to otter conservation), forests (forest fragmentation and vegetation loss), climate change, ecological alterations, and human activities (encroachment, settlement, mining, industrial and municipal pollution, noise and infrastructural development) were reviewed in consultation with experts and stakeholders.

Step 4: Summarizing the outcome of the study

A synthesis was developed, consisting of links among reviewed legal documents, identifying otter conservation gaps, and likely reasons for these gaps and suggestions for mitigation.

LEGAL ASPECTS OF OTTER CONSERVATION IN NEPAL

Nepal joined the Convention on Biological Diversity (CBD) in 1993. Aichi Biodiversity Targets (ABT) were also incorporated into national actions through national indicators, integration of biodiversity across sectors, and legal and institutional preparedness (GoN/ MoFE, 2018a). The Nepal Biodiversity Strategy Implementation Plan (NBSIP) prioritizes wetland ecosystems for conservation. Focused sectoral strategies of wetland management have been implemented, for example, in internationally significant Ramsar sites, but the NBSIP has not prioritized a conservation strategy for otter species (HMGN/MoFSC, 2006). The Nepal Biodiversity Strategy and Action Plan (NBSAP) (2014-2020) focuses on priority actions such as controlling mining of sands and gravels from the rivers, conserving the threatened dolphin, crocodile and native fish (GON/MoFSC, 2014). Wildlife conservation outside protected areas is normally the responsibility of the Department of Forests and Environment, which manages most of Nepal's public lands. As the national authority of biodiversity conservation, this Department has been engaging in biodiversity conservation under the framework of the Biodiversity Strategy and Action Plan. The Department of National Parks and Wildlife Conservation is responsible for protected area management and biodiversity conservation.

The Government of Nepal also formulated the National Water Resources Policy in 2020 (NWRP 2020). The NWRP has 11 strategies, of which two are relevant to conservation (GoN/MoEWRI, 2020):

1. Develop appropriate institutional arrangements for conservation, development, management, and regulation of water resources,
2. Promote the participation of the private sector and concerned stakeholders in the conservation and development of water resources.

The Water Resources Strategy (WRS, 2002) in Section 6.3 focuses on the management of watersheds and aquatic ecosystems (HMGN/WECS, 2002). Similarly, the Water Resources Act (WRA, 1992) requires an environmental study for water resource and electricity projects (HGN, 1992). The Water Resources Rules (WRR, 1993) requires an environmental impact analysis, and measures to be taken to minimize the adverse effect of a project on the environment, and for the conservation of aquatic animals and the environment (HMGN, 1993).

Sections 8.4 and 8.5 of National Forest Policy (NFP 2018) emphasize the in-situ and ex-situ conservation and management of vulnerable, endangered and protected wildlife and plants (GoN/MoFE, 2018b). They emphasize the conservation, management and sustainable use of wetlands. The following are biodiversity specific

policies: the Soil and Watershed Conservation Act (SWCA 1982), which prohibits activities on land that generate vulnerabilities (GoN/MoLJPA, 2020 b), the Forest Act (2019), and the Forest Regulation (1995) which prohibits the capture or killing of wildlife in violation of prevailing law and to extract or transport rocks, soil, boulders, pebbles, and sand from a river flowing through a forest (HMGN, 1995; GoN/MoLJPA, 2020 b). The Hydropower Development Policy (HDP) 2001 enforces hydropower projects to release water at least 10% of the minimum monthly average discharge of the river or the minimum required amount as identified in the environmental impact study report (GoN/MoLJPA, 2001). Poor enforcement of laws and of effective implementation of these provisions, together with lack of specific programs focused on conservation of aquatic vertebrates in the 2019 Forest Act outside protected areas, are considered important gaps in otter conservation.

An Environmental Impact Study (EIA) is mandatory in the Environment Protection Act (EPA) (GoN/MoLJPA,2020 b), whose rules require a brief environmental study and an environmental impact assessment in connection to extraction of sands, stones and soil from river banks. The construction of hydroelectric projects of more than 1-25 megawatts and > 25 megawatts capacity in a forest conservation area, conservation area, buffer zone, environment conservation area or Ramsar sites require an Initial Environmental Examination and Environmental Impact Assessment respectively (GoN/MoLJPA, 2020a; Nepal Gazette, 2020). However, these laws and monitoring lack strict enforcement.

The Aquatic Life Protection Act (ALPA 1961) provides for some legislative protection of the habitats of aquatic species. 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 the intent of catching or killing aquatic life. Although both noxious and explosive materials are increasingly used in Nepal, there is no reported case of a person being persecuted under the Act (Belbase, 1999). Nor has there ever been a reported case of prosecution for a breach of ALPA. Similarly, Section 4 of the ALPA prohibits closing the doors of or destroying a fish ladder, dam, bridge or water system with intent to catch or kill aquatic life. Under Section 4(a), the government is empowered to prohibit catching, killing and harming certain kinds of aquatic animals by notification in Nepal Gazette, and further empowers the government to prohibit catching, killing, and harming certain kinds of aquatic animals in a specified season and condition. Section 5 of ALPA also empowers the government to prohibit catching, killing and harming aquatic animals in certain specified water bodies by publishing a notification in the Nepal Gazette, without written permission of the Government or local authority, and the government has authority over aquatic animals in these water bodies. However, a notice under this Section has never been published by the government. A serious omission of the Act is that there is no government agency responsible for its implementation and enforcement (Belbase, 1997, 1999).A 2002 amendment to the 1961 ALPA prohibits the hunting and killing of Eurasian and Smooth-coated otters, both within and outside protected areas (Nepal Gazette, 2002). The Small-clawed otter is not afforded protection by the ALPA. These amendments could be crucial in preserving the biodiversity of aquatic ecosystems through interagency cooperation. The lack of strict enforcement of legal provisions and lack of monitoring of implementation of provisions of this act within and outside the protected areas threaten otter populations.

The goals of National Parks and Wildlife Conservation Act (NPWCA) prohibits possession without a permit of 27 mammal species, but no otter species (Government of Nepal, 1973). Section 5 of the Act prohibited various activities such as hunting, land

clearing, building dwelling, grazing livestock, cultivation, cutting or removing plants. Restrictions were imposed on carrying weapons, explosives, or any item that could be used to kill or injure wildlife, such as nets, poison, and baits as were prohibitions against hunting or harassing wildlife. The Act also imposed restrictions against extraction of stones, sand, gravels, soil, and minerals, diverting or blocking the river channel or allowing any water source to bring poisonous materials into waters that flow into a park (GoN/MoLJPA, 2020b). The NPWCA was later amended to include buffer zones and to raise revenues for habitat and conservation activities relevant to otters (Acharya and Rajbhandari, 2012).

The Wildlife Reserves Rules (WRR 1977), Rule 6, prohibits encroachment of land, livestock grazing, extraction of sand and stones, diverting river channels and use of explosive materials into waters that flow into a reserve (GoN/MoLJPA, 2020b).

The Mountain National Park Rules (MNPR), Rule 7, prohibits building dwellings, cultivation, encroachment, livestock grazing, removing plants, extracting sand, stones and boulders, diverting river channels. Rule 11 prohibits fishing within the rivers of parks without a permission letter. Fishing by local residents was allowed only by using fishing rod but restricts the use of other materials (GoN/MoLJPA, 2020 b).

The Conservation Area Management Rules (CAMR 1996), Section 5, and Section 1 of Conservation Area Government Management Rules (CAGMR, 2001) prohibits wildlife hunting, destruction of habitat, extraction activities and use of electric current in the river to kill and catch fish (GoN/MoLJPA, 2020b). The Buffer Zone Management Regulations Rules (BZMR 2005), Section 5, prohibits extraction of stones, soil, sand or minerals, the use of poisons or explosives in the river draining along the buffer zones, and hunting and harming of wildlife (GoN/MoLJPA/Law Book Manage Committee, 2020b). The Buffer Zone Guideline (Mapdanda 2005) has provisions for stone, gravel, sand, but not for the use of explosives and not in environmentally sensitive habitats (GoN/MoFSC/DNPWC, 2016).

The Policies on Physical Infrastructures Construction and Operation within Protected Areas (2008) has some provisions for hydroelectric projects construction outside parks (except < 1 megawatt) and mandates a minimum of 10% of the monthly discharge during the construction and operation. In protected areas, while diverting or blocking the river, a project must release at least 50% of the natural flow. In the process of diverting or blocking the river for electricity production, the project must release at least 50% of the monthly discharge (GoN/MoFSC/DNPWC, 2016). The Nepal government approved the National Ramsar Strategy and Action Plan (NRSAP 2018-2024) to fulfill the obligations of Ramsar Convention and is congruent with both the Sustainable Development Goals and the Aichi Biodiversity Targets (GoN/MoFE, 2018b). Ramsar Convention wetlands are broadly defined, and any project activities near Ramsar sites trigger special attention for conservation. Nepal is a signatory to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). At the 2019 CITES meeting, the Smooth-coated otter and Small-clawed otter were shifted to Appendix I from Appendix II. This listing allows no trade in the species, due to steep population declines throughout their range. A motion of the 2020 IUCN World Conservation Organization Congress describes a “high risk of extinction” of the Smooth-coated otter (IUCN, 2020). Lowland Nepal offers prime habitat for Smooth-coated otters and should be prioritized for its conservation. Nepal-specific CITES-enabled legislation guides the National Parks and Wildlife Conservation Act, 1973 (NPWC Act); the Forest Act, 1993; The Export Import (Control) Act, 1961; The Customs Act, 2007; The Police Act, 1995 and The Environment Protection Act, 1997. The CITES Act 2017 has made provisions for a maximum of 500,000 rupees fine and

imprisonment of 10 years if any person is convicted for the crime of killing otters in Nepal (GoN/MoLJPA, 2020b). Lack of effective law enforcement and stringent implementation of provisions of CITES legislation continues to threaten otter species in Nepal.

The National Climate Change Policy (NCCP 2019) contributes to the sectoral policies concerned with wetlands at risk of climate change and actions to conserve rare and endangered wildlife and plants and sensitive ecological systems (GoN/MoFE, 2019b). It includes measures to minimize adverse impacts on river ecosystems while generating hydroelectricity by selecting environments that factor in climate change.

The National Environment Policy (NEP) controls pollution, manages wastes and promotes greenery so that citizens can live in a healthy environment (GoN/MoFE, 2019c). Some of the policies, strategies and work policies outlined in 8.1 Section highlight pollution control via point and nonpoint sources. The policy emphasizes the importance of many stakeholders in environment-related decision making.

POLICY GAP SYNTHESIS

Lack of stringent enforcement to control mining, conservation strategy otters, monitoring of implementation of provisions of EIA (especially requirements of key indicator species of river basins) in development projects and effective implementation of NWP (2012) are the important gaps in the conservation of riverine biodiversity. The inclusion of biodiversity features into the EIA policy has increased significantly, but several weaknesses persist, including the continued absence of substitution solution assessment, a current analysis of cumulative impacts, the evaluation of impacts on common species, inclusion of an ecological network scale, and the lack of monitoring and evaluation measures (Bigard et al., 2017).

Enactment of separate wetland conservation legislation is required for providing a legal base for the NWP (Belbase, 2007), but as of 2021, the national ABT target in controlling industrial pollution in five major rivers and another 5 major wetlands progressed at an insufficient rate towards the target (MoFE, 2018a).

The impact of pollutants on aquatic life is poorly known in the river systems of Nepal. Protected areas should be a priority in designing water quality monitoring protocols (Acharya and Rajbhandari, 2014). For example, aquatic predators face formidable pressures from industrial pollution in the Narayani River, resulting in loss of habitat and food scarcity, and perhaps the reason for the disappearance of otters from this river (Acharya and Lamsal, 2010). Lack of monitoring of effects of discharges from industries into the river and lack of monitoring of EIA provisions of water resource projects has seriously threatened otter populations. Effluents from industries are being directly discharged into the Narayani and other rivers, causing bioaccumulation of pollutants in the prey-base and also causing loss of habitats. Research on levels of water pollution and its effects on aquatic life including otters is needed (Acharya and Rajbhandari, 2011a, 2012).

Some conservation progress has been made as the government has prepared national action plans for endangered species such as tiger, rhino, red panda, gaur, dolphin, and gharial in line with NBSAP policy framework (GoN/MoFE, 2018a; DNPWC, 2018; DNPWC & DoFSC, 2021). Yet, no similar effort has been made to formulate an otter action plan. Protection of otters is not given priority in achieving the national objectives of the Aichi Biodiversity Targets. Considerations of habitat requirements, habitat restoration, population recovery, improvement of habitats and monitoring of habitats and population should be given priority to ensure its long-term conservation. The NBSAP plan gave little priority to the conservation of otters and the

NBS 2002 does not focus on specific programs on ecosystem requirements and conservation measures for threatened, vulnerable and endangered key aquatic species. There has been no specific focus on habitat requirements, habitat restoration, and recovery of population and preparation of conservation strategies for otter conservation in NBSIP as well. Development projects are not following the provisions of EIA during project formulation, implementation, and monitoring, and there is weak incorporation of Ramsar Convention requirements in this policy.

Lack of maintaining optimal volume of water for aquatic species or monitoring of water quality, ineffective enforcement of policies and lack of incorporation of ecosystem requirements of otters in EIAs of development projects are important gaps in NWRP 2020. The dams constructed along rivers in many parts of the country have caused the loss of prime otter habitats and led to fragmentation of small isolated populations as well as reducing food availability. All river-based development projects, including dam constructions, while conducting an EIA, should focus on effects on otters and other species (Acharya and Rajbhandari, 2011a). Ineffective enforcement of laws and regulations and monitoring of water quality hamper protection of otters. There is no specific focus on effects of industrial pollution on otter habitats in WRS 2002.

The NFP 2018 does not specify conservation measures and ecosystem requirements for the long-term conservation of indicator species in river basins within protected areas/national forest areas. Lack of stringent enforcement of laws and lack of effective implementation of provisions and lack of specific programs focused on conservation of aquatic vertebrates in Forest Act 2019 outside protected areas are important gaps in otter conservation.

The SWCA Act (1982) does not explore any conservation measures and ecosystem requirements for the long-term conservation of indicator species in watershed areas of river basins.

Weak enforcement of regulations and ineffective monitoring provisions of HP Policy 2001 threatens the otter species in Nepal. Hydropower Projects can cause irreversible loss of otter habitats, i.e., decreased food resources and destruction of otter dens (Bouros, 2015).The HIAM 2018 focuses only on the diversity of fish populations but does not reflect on fish dependent mammals such as otters. The lack of enforcement of laws and lack of effective implementation and monitoring of provisions of EPR Rules 2020 threaten otters. The Conservation Area Management Rules (1996) does not specify any conservation measures and ecosystem requirements of indicator species in river basins.

Ineffective implementations of AAPA provisions, lack of incorporations of Ramsar Convention requirements, NWP provisions, lack of coordination between government agencies, lack of attention to the major threats faced by fishers and fishing activities, lack of designated agency to administer and enforce AAPA, all severely threaten otter populations. No agency has been given the responsibility of administering and enforcing AAPA, a clear obstacle for the protection of aquatic species (Belbase, 1999). Revision of AAPA and review of compliance with legislation and regulation and incorporation of ecosystem requirements of otters are urgently needed.

Attention to otter species in Nepal's parks has been overshadowed by conservation measures for charismatic species such as tiger and rhinoceros. Park managers are not enforcing laws for aquatic biodiversity in provisions of EIA/IEE in sand and stone mining and industrial pollution. Park management should monitor the implementation of EIA reports and assess the impacts of construction of diversion channels, irrigation intakes, drainage and small impoundment, and bridges (Acharya, 2017).

Ramsar Convention provisions as well as habitat requirements of otters should be incorporated into the wetlands of the Terai. Nepal is signatory to the Ramsar Convention in 1988, but current legislation in Nepal precludes optimum fulfillment of the Convention's requirements (Belbase, 2007). There is a need to focus on protection of a wide range of habitats in lowland Ramsar sites for enhancement of otter and wetland conservation (Brooks et al., 2011), for example, into the Koshi Tappu Wildlife Reserve Management Plan. The RSAP (2018-2024) should also consider ecosystem requirements of otters in their implementation plan. The government prepared the site-specific management plan of Beeshazari, Ghodaghodi and Rara Lakes without addressing habitat requirements of otters. The limited legislation provides only a modicum of wetland conservation, with glaring deficiencies (Belbase, 2007).

The NCCP 2019 does not explore the effects of climate change on ecosystem requirements of otters. Climate change vulnerability of Himalayan otters showed future climate and land use change will reduce (by 6-15%) and shift (by 10%-18%) the geographical range of *Lutra lutra, Lutrogale perspicillata,* and *Aonyx cinereus* in the Himalayas (Jamwal et al., 2021). *L.lutra* and *L. perspicillata* are notably affected by change in the mean annual temperature. The most specialist species, *L. perspicillata,* shows the highest vulnerability in comparison with the most generalist, *L. lutra* (Jamwal et al., 2021). Mean diurnal temperature was the most important variable for *A.cinereus* (Cianfrani et al., 2018). Incorporating into Nepali law the alterations in the environment due to climate change is a high priority.

Lack of effective law enforcement and stringent implementation of provisions of CITES legislation have threatened the otter species in Nepal. Many CITES parties are non-compliant, CITES over-relies on regulation, there remains a lack of knowledge and monitoring efforts of CITES species, and the Convention ignores market forces in decision-making and implementation terms among CITES actors (Challender et al., 2015). To more effectively manage trade, interventions need to go beyond regulation and should be multifaceted, reflecting the complexity of wildlife trade and its drivers. This will require 1) a concerted research effort into factors undermining wildlife trade governance at the national level; 2) sustainable harvest rates and adaptive management of CITES species; 3) buy-in by local communities in implementing CITES; 4) supply and demand based market interventions; and 5) means to quantify the illegal trade, political processes and influence within CITES (Challender et al., 2015). Nepal needs to improve national legislation to meet CITES requirements and improve regulatory systems and implementation to curb the illegal wildlife trade (Gomez et al., 2016).

CONCLUSION

A review of the legal framework of Nepal documents the lack of species-specific conservation measures for otter conservation in Nepal. Otter species are still neglected by the conservation policy as compared to the conservation of large mega-vertebrates. Thoughtful revisions of wetland related acts and regulations is urgently needed to create an integrated policy for the conservation and effective management of otter species in Nepal. Policies that currently address the conservation, restoration, and effective and sustainable management of wetlands for biodiversity and environment conservation have not addressed how to achieve long-term conservation of key riverine indicator species. Minimal effective implementation, lack of unified wetland acts and regulations, and lack of coordination among related agencies are major gaps in the conservation of otters. The lack of integration between ecological conservation policies and infrastructure developments is a key factor. Ecosystem-related policies require dynamic and adaptive approaches supported by peer-reviewed science. Lack of inter-

institution coordination in the implementation and enforcement of legislation and jurisdictional overlapping in the management of otter habitats is a serious gap in otter conservation.

Our review of Nepali laws and regulation proposes the following actions to improve the conservation status of three otter species:

1. Otter-specific conservation policies integrated into wetland acts and regulations,
2. Effective coordination between communities, stakeholders, implementing agencies and all tiers of government on conservation policies,
3. Enforcement of wildlife laws outside of protected areas and effective monitoring and implementation of provisions of the Environmental Impact Analysis policy,
4. Engagement of the National Natural Resource Conservation Commission in overall management outcome of conservation,
5. Robust research and development and effective monitoring and evaluation of water quality standards, specifically key indicator species and climate change,
6. An EIA that effectively addresses pollution and river bank disturbance,
7. Internalization of the Biodiversity Convention provisions of the Biodiversity Strategy and Action Plan,
8. Engagement of Criteria 2, 3 and 4 of the Ramsar Convention related to otter species.

Strong legislation, effective enforcement of conservation laws and policies, redesigning and strict implementation of policies based on habitat management and human-wildlife coexistence, including threat mitigation measures and strong interagency co-operation in planning and implementing policies are considered important for successful conservation efforts (Bist et al., 2021). More awareness programs for local people would help in strengthening stakeholder participation in policy formulation and regulation (Thapa et al., 2020; Joshi et al., 2021). The strongest part of biodiversity conservation in Nepal is institutional representation at every level of government. The effective implementation of laws and policies that govern conservation requires both scientific validity and stakeholder engagement. At the planning level, dynamic adaptive policy pathways need to be practiced in the complex and uncertain world of climate change.

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RESUMÉ

SYNTHESE DES REGLEMENTATIONS ENVIRONNEMENTALES ET CONSERVATION DE LA LOUTRE AU NÉPAL

Le Népal a plusieurs règlementations et dispositions légales pour la conservation des espèces, mais aucune protection spécifique pour les espèces de loutres. Cette étude vise à identifier les dispositions juridiques du Népal. Protéger les animaux riverains, y compris les loutres, en analysant les documents juridiques et les publications décrivant les politiques environnementales telles qu'elles s'appliquent à la conservation des espèces riveraines. La synthèse suggère que les projets de développement dans le pays ne respectent pas les dispositions des études d'impact environnemental lors de la formulation, de la mise en œuvre ou du suivi des projets. Les règlements existants mettent l'accent sur la conservation, la restauration et la gestion efficace des zones humides pour la conservation de la biodiversité et de l'environnement. Une mise en œuvre efficace minimale des lois et des réglementations unifiées dans les zones humides et le manque de coordination entre les agences concernées sont les principales lacunes de la conservation des loutres au Népal.

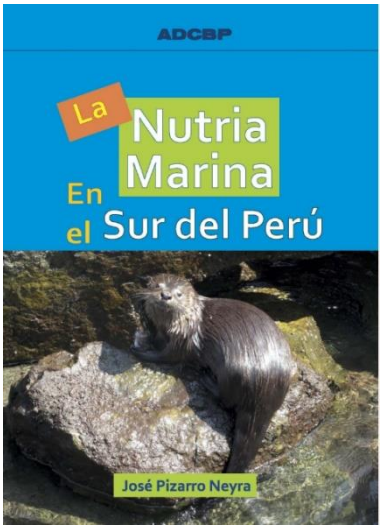
RESUMEN

REVISIÓN DE LAS POLÍTICAS AMBIENTALES Y LA CONSERVACIÓN DE LAS NUTRIAS EN NEPAL

Nepal tiene varias políticas y provisiones legales para la conservación de especies, pero no tiene protección específica para las especies de nutria. Este estudio está dirigido a identificar las provisiones legales de Nepal vinculadas con la protección de los animales fluviales, incluyendo las nutrias, analizando los documentos y publicaciones legales que describen las políticas ambientales aplicables a la conservación de las especies fluviales. La revisión sugiere que los proyectos de desarrollo en el país no están siguiendo las provisiones sobre estudios de impacto ambiental durante la formulación, implementación o monitoreo de los proyectos. Las políticas establecidas enfatizan la conservación, restauración y manejo efectivo de los humedales para la biodiversidad y la conservación ambiental. Los mayores huecos en la conservación de nutrias en Nepal son la mínima implementación efectiva de las Leyes de Humedales unificadas, y la falta de coordinación entre agencias relacionadas.

NEW BOOK

La Nutria Marina en el Sur del Perú (The Marine Otter in South Peru)
José Pizarro Neyra



The book is a compilation of research results on the marine otter (Lontra felina) carried out in the Peruvian regions of Tacna, Moquegua and Arequipa. The work is focused in conservation issues of the species such as: interaction with fisheries, absence of effective conservation within the marine protected areas, habitat fragmentation, and ocurrence in anthropic habitats. Measures are suggested to improve the conservation of the marine otter in both within and outside Peruvian protected areas.

The present work is based on studies carried out on the seashore, specifically in the regions of Tacna, Moquegua and in the province of Islay, in Arequipa. This book presents results onthe ecology, behavior, and conservation status, and makes suggestions on how to achieve healthier populations of marine otters in our country, especially in southern Peru. But why the south of Peru only? Well, first, because there have been many studies carried out in this area during the last twenty years, but the resulting information has not been systematized nor had many specific actions n proposed based on these results. The south of Peru is the region with the most studies on marine otters in Peru. In addition, despite the research on this species reaching critical mass in recent years in Peru, institutions and society in general do not seem to have taken this on board, and do not perceive that changes can be made in the sectors that interact with the marine otter, to reduce threats against the species. This book aims to communicate the information in an accessible and attractive manner.

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O S G M E M B E R N E W S

The Otter Specialist Group contains 360 members at 8 April 2022.

New Members of OSG

Since the last issue, we have welcomed 4 new members to the OSG: you can read more about them on the Members-Only pages.

Valentina Artemeva, Germany: I have been a veterinarian for more than five years, specialising in ceteceans, pinnipeds and mustelids. I worked in the Commander Islands on sea otters, doing necroscopies, diet analysis and mortality monitoring. I am now part of the ITAW otter project in Germany, doing similar work.

Balram Awasthi, Nepal: I am a Lecturer in Zoology at Tribhuvan University, Nepal and completing my PhD work at the Xishuangbanna Tropical Botanical Garden, at the Chinese Academy of Sciences. My research interests are focused on otter ecology and conservation, conservation biology and ethnobiology of Indigenous people and their role in biodiversity conservation.

Sayanti Basak, India: I am a Research Scholar in the National Mission for Clean Ganga, Widlife Institute of India. My interests are in the ecology of otters, and otter conservation through community participation and education

Stephen Dias, India: I am a Research Associate at Planet Life Foundation, Goa, India, working on the temporal variations in smooth coated otter diet, vocalizations within family groups, and importance of mangroves for the reproductive success of the species. In the past, I have conducted habitat selection studies on *L.perspicillata* in estuarine, urbanized areas of Goa, as well as qualitative studies to assess fisherfolk's perception towards the species in the rural fishing areas of Goa.