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New record of Smoot-coated Otter in Baluchistan, Pakistan

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Running Title: Smoot-coated Otter in Baluchistan, Pakistan

ABSTRACT

According to the literature review, smooth-coated otter (Lutrogale perspicillata) has never been reported in the Baluchistan Province of Pakistan. But a few reports from some fish farmers and hunters in Baluchistan and personal communications with the officials of Baluchistan Forests & Wildlife Department about the existence of the species in some of the areas of Baluchistan adjacent to Sindh Province provided the base for investigating the existence of the species in Baluchistan. About 2000 km^2 area was transverse in 25 field surveys each lasting three to seven days to study the otter distribution in Baluchistan. Different direct and indirect methods were applied to observe the otter's existence in the study area. 15 sites were identified as the potential habitat of the species with signs of its existence while at three site animals were directly sighted. At each site of otter existence GPS coordinates were recorded that were utilized for the development of distribution maps of the species. The species was found in isolated and fragmented habitats and according to the residents, its appearance is recently noticed especially after the heavy rains and floods in Sindh and Baluchistan during 2010 and 2011. The results of the study are the first evidence of the otter's existence in Baluchistan. It is a vital contribution to both wildlife conservation and ecological studies that will significantly alter the species' distribution.

Keywords: Otter, GIS, Baluchistan, Population density, Quetta, wildlife conservation

INTRODUCTION

The semi-aquatic Smooth-coated otter is known for its smooth coat and shorter fur. They inhabit various habitats, including lowlands, mangroves, freshwater wetlands, mangroves, rice fields, forested rivers, and lakes (Chanin, 1985). In Pakistan, the preferred habitat for the species is plain areas around rivers, canals, lakes, and fish ponds surrounded by thick vegetation. Smooth-coated is secretive, shy, and nocturnal, but social and gregarious animal (Shenoy, 2005). They are seasonal migrants according to the suitability of their habitats (Roberts, 1997). These carnivores, top predators of aquatic ecosystems are the indicators of aquatic body health. Otters are highly sensitive to water pollution and any deterioration along the food chain (Khan *et al*., 2009).

The home range of these territorial animals is 10-17 km2 (Hussain, 1993). Territories are defined based on droppings, called spraints (Roberts, 1997; 2005). Geographical location, habitat type, and the presence of other species effects the distribution of otters.

Smooth Coated Otters, the Southeast Asian species found in Southwest China, Thailand, Vietnam, Myanmar, Sumatra, Java, Malaysia, Nepal, Bhutan, India, Pakistan, Borneo, Iraq, Bangladesh, and Iran (Pocock, 1940; Corbet and Hill 1992; Hooshang *et al*. 1997; Robert 1997). In Pakistan, the distribution of smooth-coated otters ranges from Mangla Dam to coastal areas in Thatta district of Sindh (Blanford 1881). The species was once perceived to be extinct in various such as Keenjhar Lake, Chotiari Reservoir, Keti Shah riverine forest, and Nara Canal. However, a recent study has confirmed its existence in these areas (Khan *et al*., 2009). This one of the least studied species is categorized as 'Vulnerable' by the IUCN Red List of Threatened Species (2024). Although the species are protected under the Wildlife Protection Acts (Khan *et al*., 2009) in Pakistan, their populations are also declining due to habitat deterioration, pollution and the construction of irrigation channels (Khan *et al*., 2024). Despite their important role in biodiversity and aquatic ecosystems, they are significantly hunted by fishermen for their pelts (Roberts, 1997).

MATERIALS AND METHODS

The study area

Baluchistan, situated in South Western Pakistan, is the largest province of Pakistan that covers an area of 347,190 km2 in 32 districts. Bordered by Punjab, Sindh Province, and the Arabian Sea. Situated in a river valley near the Bolan Pass, Baluchistan is known for its unique culture, desert climate, and the

Sulaiman Mountains. The province's capital, Quetta, is situated in the densely populated Sulaiman Mountains. Despite its abundant renewable resources, the province's potential has not been systematically measured or exploited due to pressures from within and outside Pakistan. The local population has relied on sustainable water sources for thousands of years.

Population and distribution estimation

To study the population and distribution of smooth-coated otters in Baluchistan, a total 2000 Km2 area was investigated from April 2021 to November 2021 (Figure 1; Table 1). A total of 25 different sites were identified from interviews with wildlife authorities and key individuals from nearby communities living along the riverside (Khan *et al*. 2009).

After that, sites were physically visited to confirm the otter's existence. A total of 25 surveys were conducted, each for three to seven consecutive days, depending upon the terrain and habitat condition. A thorough examination was conducted along each side of the river bank, covering a distance of at least 1,000 m, to detect any indications of otters at every survey site (Khan *et al*., 2009).

GPS coordinates were noted for each location, which were utilized to create maps and pictorial impressions as proof of the otter's presence (Khan *et al*., 2009). These GIS-based distribution maps provided insights into the distribution patterns of the species, the health of otter territory, and the level of danger to otter populations in the study range.

Population estimates for Smooth-coated otters were made by utilizing distinctive direct and indirect population estimation strategies like the total count technique, sample count technique, track count technique, and line transect method. Since the Smooth-coated otter is a nocturnal creature field visits, and observations were also based on indirect evidence like observing tracks and trails, feeding remains and spraints of the otter, and making deductions from such clues (Khan *et al*., 2009).

The Line Transects or Strip Census method technique was modified and combined with the Track Count Technique, where otter tracks were counted in different strips or transect lines of various types' lengths. Smooth-coated otter tracks and trails were discovered, with fresh tracks (approximately 1–2 days old) along transect lines being assessed and quantified for analysis. By measuring these tracks, various animals were identified and the differences in track sizes indicated distinct animals (Khan *et al*., 2009).

Each track was considered an animal, allowing for the calculation of the Smooth-coated otter population in the study area. Smooth-coated otter population and population density were estimated as $P = AZ / 2XY$ and $Dp = N/A$ (Khan *et al*., 2009).

Where;

A = Total study area
Dp = Population density
N = Total population
P = population of the animals
X = length of transect line or strip
Y = width of the transect line or average flushing distance
Z = number of animals observed or flushed

For point count, the Area of the circle was used in the formula as = π r, whereas 2 r = radius of the circle and $\pi = 22/7$

The information gathered during fieldwork was assessed at the Laboratory of the Pakistan Wildlife Foundation Islamabad. Visits to various potential otter locations were carried out with the assistance of the wildlife departments in Baluchistan. The GIS Laboratory of the Pakistan Wildlife Foundation was utilized to create distribution maps. To deduce population differences within the distribution sites, we applied ANOVA and an unpaired t-test with Statistical Package (SPSS) for Windows version 12 (SPSS Inc., Chicago, IL, USA) (Khan *et al*., 2009).

Maps of each district in the study area, field guidebooks, binoculars (Nikon 7576 Monarch 5, 8×42, Nikon Corporation, Japan), searchlights (Fos LED 15W), digital cameras (Nikon D7200, DSLR, Nikon Corporation, Japan), handheld GPS receivers (GPSMap® 76CSx, Garmin Ltd., USA), and measuring tapes were used as field-kits and equipment for data collection during fieldwork (Khan *et al*., 2009).

RESULTS

During the survey, 15 different sites were identified as the potential habitat of the species while at three sites the Smooth-coated otter was sighted in Baluchistan (Table 1). The study area represents different types of habitats like thickly vegetative areas, fishponds, canals and rivers.

Table 1: Potential otter sites identified during the reconnaissance survey

Sr. No.	Site	District	GPS Coordinates
1	Dawood Tala	Sohbat Pur	N 28°. 41785 E 68°. 56344
2	Mammul lake	Jafarabad	N 28°. 29687 E 68° .35301
4	Kot Maghsi	Jhal Maghsi	N 27°. 94346 E 67° .63138

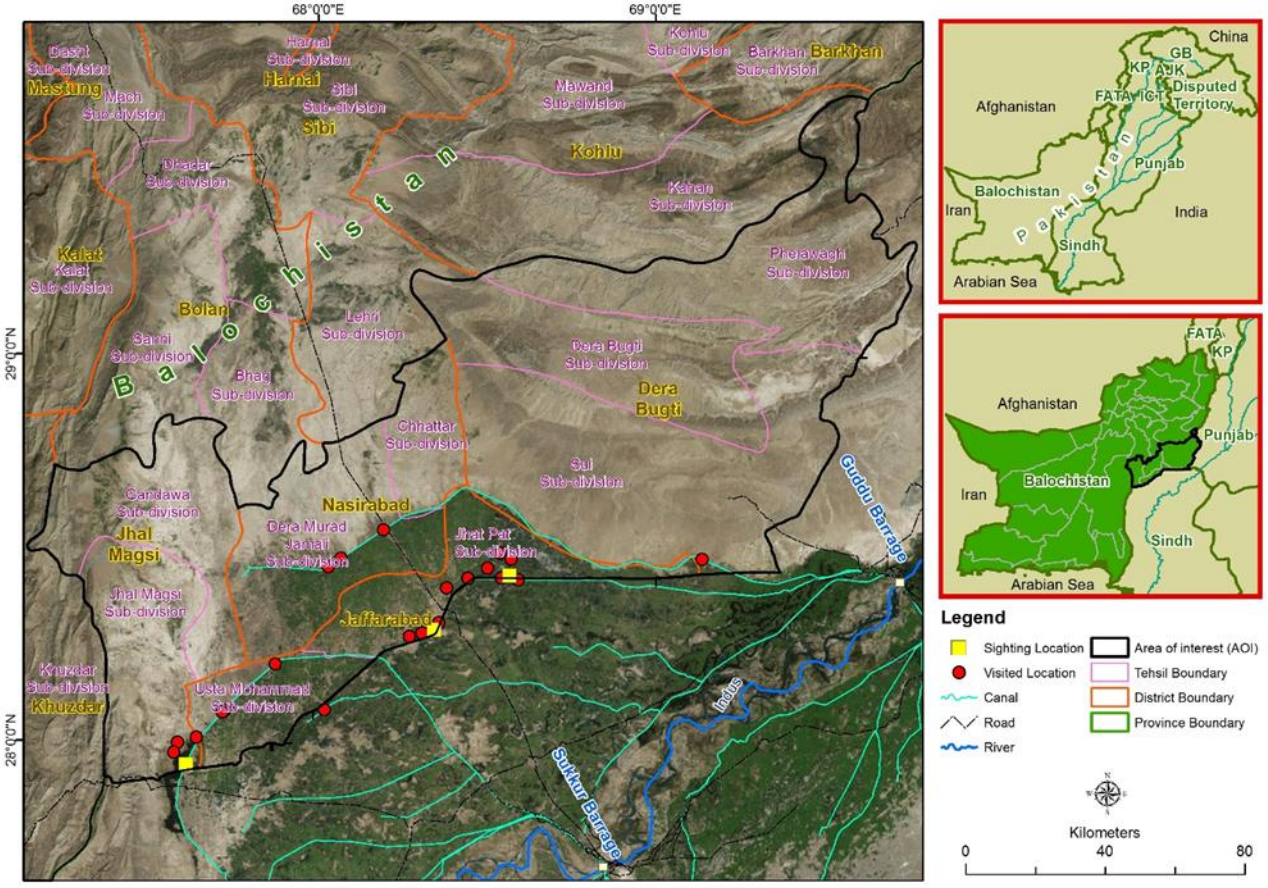

Figure 1: Potential habitat distribution of smooth-coated otter in Baluchistan

DISCUSSION

Smooth-coated otters (Lutrogale perspicillata), semiaquatic mammals, are found in the Indus River Basin and other water-rich regions from Mangla Dam to coastal areas in the Thatta district of Sindh, Pakistan (Robert 1997). They are the most common species, thriving in large rivers, lakes, and wetlands (Khan *et al*., 2009). Baluchistan, the largest province of Pakistan, has not been recognized as a habitat for otters due to its arid climate and limited water resources.

In Pakistan, The 2010 flood was a catastrophic natural disaster that caused significant damage to infrastructure, agriculture, and ecosystems across the country. For the protection of the Sukkur Barrage, authorities deliberately break the riverbank upstream to divert floodwaters away from the barrage, resulting in a temporary but extensive deluge of areas that typically dry. This unusual diversion of water facilitated the movement of otters into Baluchistan, creating temporary aquatic habitats that could have served as corridors for otters from water-rich areas into the country. Once the floodwaters retreated, otters may have found suitable microhabitats, such as seasonal streams and oases, where they could establish a stable population. This hypothesis was based on the known behavior of otters to explore and colonize new areas when environmental conditions allow.

Field surveys conducted across Baluchistan provided strong evidence supporting our hypothesis. Signs of otter activity such as tracks, spraints, and dens at 15 sites, as well as direct observations of the animals at three sites confirmed its presence in Baluchistan. All these potential habitat sites lie under

the 2010-flooded area. The occurrence of species suggests a stable population rather than a transient one. This also strengthens the hypothesis that flood facilitated the otter movement and establishment in Baluchistan. The results of the study are the first evidence of the otter existence in Baluchistan so insufficient data is available from literature to compare the past and present status of the species in this region.

The novel discovery of otters in Baluchistan, Pakistan, is a notable event in both wildlife conservation and ecological studies that will significantly alter the species' distribution ideas. This finding opens up new paths for research into the adaptability and movement of otter populations under changing environmental conditions. The presence of otters in Baluchistan suggests that they can survive in arid environments with sufficient water resources and prey availability. This novel event also highlights the dynamic nature of wildlife distributions and the potential for natural events like floods to reshape ecological landscapes.

This finding presents both challenges and opportunities for conservation as the study results highlighted the population in scattered and fragmented habitats. This population is also at risk of decline due to several anthropogenic activities like hunting and killing (Khan *et al*., 2009; 2024). The lack of baseline data on otters' ecology and behavior in their new environment is a primary challenge, while the region's harsh climatic conditions and limited water resources pose significant threats to their long-term survival. However, the presence of otters could enhance local biodiversity and contribute to the ecological balance, provided their habitat requirements be met. Engaging with local communities through education and awareness programs is crucial for conservation efforts. To ensure the Baluchistan otter population's survival, policy and management recommendations should include habitat protection, pollution control, human-wildlife conflict mitigation, ecotourism development, and research and monitoring. Long-term monitoring programs are essential to track the population's health and identify threats (Khan 2024).

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