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A Mini-Review on Distribution, Threats, and Conservation Strategies for Otters

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ABSTRACT

There are five species of otter found in Asia, and they can be found in freshwater as well as along the coastal regions of the sea. These are semi-aquatic mammals that live in a variety of freshwater and coastal marine environments on the continent. They are morphologically modified to live in water, their bodies are streamlined, their heads are long with a beam pattern, they have sensitive vibrissae, and round ears. The interesting aspect of the Eurasian otter is that it has a long and hairy tail that ends conically to a sharp end. Also being apex predators, otters are very vital in their ecosystem. Their precious fur, organs, and exotic pets are subjected to illegal international trade that is a major threat to the otter population all over the world, as well as habitat loss and pollution. As much as otters groom themselves to ensure waterproofing and insulation, they are unable to regenerate fur. Many organizations are actively working in Pakistan and elsewhere in the world to conserve the lives of otters through conservation programs. The purpose of this review is to gather all the information about the otters, their nutritional requirements, habitat, and conservation.

INTRODUCTION

There are five otter species in Asia out of the 13 species in the world [1]. These are of Eurasian otter (*Lutra lutra*), smooth-coated otter (*Lutrogale perspicillata*), Asian small-clawed otter (*Aonyx cinereus*), and hairy-nosed otter (*Lutra sumatrana*) [2]. Otters are top predators that are native to Asia and can be located in both freshwater and coastal marine ecosystems [3]. They play vital roles in ensuring that the aquatic ecosystems are healthy and well-balanced. They are critical biological indicators, and they lead to the health of wetlands [4]. Otters are sea animals that are mammals with a family of Mustelidae that are found on all continents except Australia and Antarctica [3]. Aonyx cinereus is an indigenous species in South, Southeast, and some parts of East Asia [5]. The reintroduction programs are in existence in some of the countries, such as Spain and the United Kingdom [6]. The smooth-coated otter may be found in Indonesia, Southwest China, Bhutan, Nepal, India, and Pakistan, and is reported as vulnerable [1]. Several otter species are classified as Near Threatened on the IUCN Red List, though statuses vary by species. *L. p. perspicillata* may be found in Iraq, Iran, the southern Yunnan Province of China, Sumatra, Java, and Borneo on the Malaysian Peninsula. *L. p. Sindica*, and Eurasian or common otter (*Lutra lutra*), which are from Pakistan [7].

Irrespective of existing literature on the ecology and threats of otters, no integrated and local research has been conducted on the population dynamics, genetic diversity, and anthropogenic pressures on the smooth-coated otters (*Lutrogale perspicillata*) in the fragmented Indus River system in Pakistan. A decrease in habitat fragmentation, illegal trade, pollution, and human-otter conflict, exacerbated by poor enforcement of protection laws and

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lack of awareness among the population about the ecological value of the species are causing the decrease in the smooth-coated otter population in Pakistan. This study aims to evaluate the existing distribution, status of population, and key threats of smooth-coated otters in Pakistan and also suggests a community-based conservation model to curb habitat loss, illegal trade, and encourage coexistence.

Morphology of Otters

Otters share a suite of common anatomical adaptations for their aquatic lifestyle, including elongated, streamlined bodies, elongated skulls, sensitive vibrissae (whiskers), small, rounded ears, and webbed paws [8]. Their most critical adaptation is a dense, water-repellent pelage that insulates them in cold water, covering the entire body except for the nose and paw pads [9]. There is great morphological diversity among species. The tail structure also varies significantly as the Eurasian otter (*Lutra lutra*) has a long, thick, tapering tail [10], whereas the smooth-coated otter (*Lutrogale perspicillata*) has a more dorsoventrally flattened tail with a pronounced lateral keel [11]. *Lutra sumatrana* bears a hairy nose characteristic of a rhinarium that has short and dark hairs [5]. There is also variation in body size even among species. The smooth-coated otter is usually larger (711 kg) than the Eurasian otter. The sea otter (*Enhydra lutris*) is an extreme example of the subfamily *Lutrinae*, the heaviest mustelid, with a mass of up to 45 kg, but one of the smallest sea mammals [12]. Such morphological variations indicate different ecological preferences and evolutionary pathways among *Lutrinae*.

Ecological Importance of Otters

The smooth, soft-coated otter is accepted as a reliable indicator of the well-being of wetlands because it is sensitive to environmental shifts and the trickle-down impact of environmental degradation in the food chain. As apex predators, they have a top-down control of the prey population, hence they affect the aquatic community structure. Yet, this very high trophic status makes them especially susceptible to bioaccumulation of toxins such as polychlorinated biphenyls (PCBs) and heavy metals, which makes them important sentinels of ecosystem health [13]. Otters are one of the earliest animals to be extinct as toxins such as PCBs damage their habitat since they are on top of the food chain: organochlorines and heavy metals, including polychlorinated biphenyls (PCBs) [14]. The threats to sea otters, as per the study, are in a diagrammatic form, as a result of destroying the habitat, waste materials are concentrated in the seawater, and most of the chemicals contained in the waste materials also impact the body and organs of the otters. The figure demonstrates the routes of habitat deterioration, contamination, and consequences on the well-being of the otter (Figure 1).

Figure 1: Conceptual Diagram of Major Anthropogenic Threats to Sea Otters (*Enhydra lutris*)

The study of otter behaviour is important in learning about the mental capacities of their behaviour, social life, and their ecological functions. Object play, especially rock juggling, in which the stones or shells are thrown back and forth between the forepaws and the mouth very quickly and frequently in a bipedal manner, is one of the most recorded and unique behaviours [15]. This behaviour is most commonly found when the otters are at rest, and commonly in a reclined position [16], which underscores the way play is incorporated into activity patterns and energy budgets. Age and sex influence the prevalence of this behaviour, and it may be linked to the ecological development. Object play is more common among juveniles than adults, which is congruent with a significant period of neuromuscular growth and skill learning [15]. It implies that play can serve as a form of training, training the necessary manual dexterity and coordination needed for foraging, since some species of otters can use their paws to manipulate their prey and even utilize some stones as foraging tools to crack open hard-shelled invertebrates [17]. These abilities directly influence the efficiency of survival and feeding and relate the personal patterns of behaviour to ecological performance. Moreover, some studies show sex-based variation in play behaviour that could reflect different social or parental roles in the future, but the various causes are less apparent and are probably species-specific [15]. In general, object play is not simply a capricious exercise but is probably an ontogenetic evolution that equips young otters with the dexterous foraging skills of their aquatic environments, and thus makes object play a direct cause of individual behaviour and its ontogenetic linkage to survival and ecological roles, and niche specialization.

Gender Effects on Otters' Behaviors

The frequency of rock juggling varies according to gender, reflecting the increased intrasexual rivalry that young males will encounter as adults. Female, young chimps (*Pan troglodytes*) engage in more stick-holding behaviors during object play than male juvenile chimps, which is thought to be connected to parental care tasks and is more prevalent

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in female animals than male [14].

Communications and Social Living

With a wide range of social forms, including solitary living, monogamous pairings, and larger family groupings, otters are a diversified group of animals. Nevertheless, many species display intraspecific social differences, which may result from the environment. Every otter social system is assumed to be a variation on the theme of smaller male territories invading larger female territories [18, 19]. According to the literary works, several other species have more in common with other animals of the same genus than with entirely distinct species of otters. In the south, adult river otters are thought to live alone and are only sighted in groups for copulation during the mating season (Lélias *et al.* 2021)(Table 1).

Table 1: Social Behaviors of Various Otter Species and Their Group Dynamics Based on Documented Studies

Otter Species	Social Behavior	References
River Otter (*Lontra canadensis*)	Generally solitary; small social groups with females and young; males form bachelor groups.	[20]
Hairy-Nosed Otter (*Lutra sumatrana*)	Solitary; females with young during mating.	[21]
Eurasian Otter (*Lutra lutra*)	Overlapping male and female territories; small family groups depending on location.	[19]
Neotropical Otter (*Lontra longicaudis*)	Solitary: maternal groups only during breeding; females create burrows in core areas.	[20]
Smooth-Coated Otter (*Lutrogale perspicillata*)	Large groups (up to 11); dominated by an alpha female.	[21]
African Clawless Otter (*Aonyx capensis*)	Solitary or small groups (2–6 individuals); pairs with young are common.	[20]
Asian Small-Clawed Otter (*Aonyx cinereus*)	Highly sociable; groups of 12–20 led by an alpha pair, with only the alpha pair reproducing.	[21]

Similarly, the hairy-nosed otter is generally self-sufficient. In contrast, females with youngsters appear to be expected when mating with the sea otter (*Lontra felina*) and pinpoint-necked otter (*Hydrictis maculicollis*) [21]. While maternal groups of females and their offspring are sometimes visible during breeding seasons, the Neotropical otter (*Lontra longicaudis*) is considered a solitary animal. Groups, however, solely contain females with immature babies that have not yet been weaned because males do not offer parental care. This species has significant intra-sex range overlap, and females frequently visit core regions to create burrows [20]. The social circle of other species differs in specific ways. The smooth-haired otter (*Lutrogale perspicillata*) has been seen living in groups of up to 11, with the alpha female ruling the others [21]. These diverse social systems are fundamentally linked to foraging ecology and resource availability. The male ranges of the Eurasian otter (*Lutra lutra*) intersect those of the females and can be utilized by numerous animals of both sexes simultaneously. Eurasian otters may often reside in small family groups, depending on the communities studied. Otters in Spain, for example, are more commonly matched with their companion animal than would be anticipated by accident, and every otter connects effectively, demonstrating substantial social flexibility [19]. The African clawless otters (*Aonyx capensis*) are likewise thought to live alone, with a pair of adults and two to three offspring. However, collections of four to six of these creatures have been sighted occasionally. The northern American river otters (*Lontra canadensis*) like to congregate in small social groups that frequently include the female and her young offspring. However, other adults may be present as well. Male bachelors associate with otter species from North America. Men were sociable in 46% of the locations they went to in Alaska, whereas women were only sociable in 26% of the places they went, despite being in mixed-sex groups 78% of the time [20]. One of the most sociable otter species is the Asian small-clawed otter. Males and females live in groups of 12 to 20 people in small-clawed otters' permanent homes, which may include unrelated people. The alpha pair is the only group that can reproduce. Vast groups of small-clawed otters were reported to dwell in waterways and paddy fields [21].

Prey Species and Foraging Methods

When their primary food source is depleted, otters can feed on different prey, such as frogs or new prey, like invading fish and crustaceans, even though otters primarily consume fish, crabs, and mollusks. Furthermore, they mostly take the primary resource opportunistically, depending on the environment to be exploited. Fishing for crustaceans in rice fields, trout in lotic streams, bream in lentic rivers, and rocky fish on rocky coasts [17]. Otters have evolved two separate eating strategies: prey gathering with their hands and prey gathering underwater. However, as aquatic creatures, otters frequently use three main strategies to find food: physically manipulating prey with their frequently clawless fingers, diving to gather shells or aquatic supplies, or pursuing moving prey directly in the water [22]. Furthermore, sea and small-clawed otter species have been shown to manipulate and break the shell or covering of their prey in the wild using stones as tools, demonstrating remarkable hand dexterity [17].

Distribution of Otters in Pakistan

Only the smooth, soft-coated otters (*Lutrogale perspicillata* silica) and the Eurasian common otter (*Lutra lutra*) are found in Pakistan. The otters in Sindh are the subspecies in Pakistan, and the smooth-coated otter is called Oad Balao in Urdu. The IUCN now classifies the species' status in Pakistan as vulnerable . It prefers level terrain and may be found in Sindh, certain areas of Punjab

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province, and a few locations in Khyber-Pakhtunkhwa close to the Indus River. A semi-aquatic lifestyle has evolved in the nocturnal mammal. The average body weight is seven kilograms, with a head and body length of 61 cm and a tail length of around 40 cm. The smooth, soft-coated otter, the top predator in wetlands, gets up to 96% of its nutrition from fish. It is recognized as a fair indicator of how much pollution is present in a wetland. Any time of the year is suitable for breeding. The young are born covered in fur and do not open their eyes for up to 10 days. Gestation lasts between 61 and 63 days. After weaning, which takes around 130 days, the young child animals start eating fish at three months. While five or six cubs are uncommon, six cubs have recently been spotted in Sindh. Litter size ranges from 2 to 4 cubs on average. The smooth, soft-coated otter is known as Ludhar, Ludhro, Da Khuwarr Spay, and Oodh Balao in Pakistani Punjabi, Sindhi, Pashto, and Urdu (Table 2).

Table 2: Characteristics and Distribution of Smooth-Coated Otter (Lutrogale perspicillata) in Pakistan

Aspects	Details	References
Common Names	Oad Balao (Urdu), Ludhar (Punjabi), Ludhro (Sindhi), Da Khuwarr Spay (Pashto), Oodh Balao (Urdu)	[23]
IUCN Status in Pakistan	Vulnerable	
Habitat	Found near Indus River in Sindh, Punjab, and Khyber-Pakhtunkhwa	
Body Measurements	Weight: ~7 kg; Head and body length: 61 cm; Tail length: ~40 cm	
Diet	Fish (96% of diet)	
Breeding	Year-round; Gestation: 61–63 days; Weaning: ~130 days; Litter size: 2–4 (up to 6 recorded)	
Ecological Role	Indicator of wetland pollution	
Taxonomic Note	Some authors consider Lutrogale synonymous with Lutra	

Breeding in Otters Observed in the Pakistan Range

Young ones can be born at any time of the year, and breeding can occur at any time. They establish powerful monogamous relationships where the ladies are still in charge despite the males being larger. The gestation period lasts 61 to 63 days. Mating in captivity has been demonstrated to occur in the water. The newborns are coated in fur after birth, and their pupils do not open until 10 days later. The puppies are not permitted to leave their dens for up to six weeks. The young start eating fish three months following weaning, which takes approximately 130 days [24].

Group Size of Otters Observed in Pakistan

Reported home range sizes for smooth-coated otters vary. For example, in Pakistan's Indus River system, observed ranges span 7–12 km^2. Comparatively, in India's National Chambal Sanctuary, male ranges average approximately 17 km^2, while female ranges are smaller, around 5.5 km^2 [25].

Risks and Threat of Otters in Pakistan

In Pakistan, the otters (*Lutrogale perspicillata* silica, especially the smooth-coated otter) are under a major threat mainly due to degradation of their habitats, illegal trade due to the sale of their skins and body parts, and human-otter conflict. The construction of barrages, irrigation systems, and water pollution follows habitat degradation and fragmentation of their natural environments. In Pakistan, smooth-coated otters (*Lutrogale perspicillata*) are affected by anthropogenic threats that are interrelated and put them at risk of extinction. Riverine habitats are disrupted by the construction of barrages and irrigation systems. The agricultural and industrial runoffs directly contaminate the water to the detriment of the water. Otters are poached as their precious pelts fetch PKR 30, 000- 60,000 in the black market due to demand in the international market [26]. Also, they are poached away body parts that they used in unproven traditional remedies. Being regarded as competitors to fish stocks, otters can be frequently exterminated by local fishermen, which results in the revenge killings [27]. Although poaching and habitat encroachment are not discouraged, enforcement of the law is weak despite being under provincial wildlife law [23].

Conservation of Otters in Pakistan

Wildlife conservation efforts in Pakistan began in the early 1970s with the publication of a report on the World Wildlife Fund (WWF) mission to Pakistan. To conserve otters in Pakistan, we must mitigate habitat degradation, hunting, and human otter conflicts with a multi-pronged approach. Provincial wildlife legislation lists the smooth-coated otter as near threatened and needs effective enforcement of species listed under Article 20 of the Provincial Wildlife Protection Act 1971 [27]. Habitat restoration, notably in the Indus River and its irrigation systems, is required to reduce the fragmentation of the otter population [26]. Educating the local community on the ecological importance of otters in community-based conservation programs will go a long way in reducing hunting pressures and encouraging co-existence. Other livelihood alternatives that incentivize discouraging exploitation can also be created for otter hunting communities. Mapping otter populations and assessing their ecological needs can be done more effectively through research and monitoring programs and can inform further conservation. Cooperation between governmental bodies, NGOs (WWF-Pakistan), and local stakeholders will largely determine otters' survival and otters' aquatic habitat conservation in Pakistan [27]. Above all, even intelligent individuals are ignorant of the ecological significance and worth of the species. In 2008, WWF Pakistan began working on the nation's otter protection, and an unofficial awareness-raising and conservation campaign was launched. Because of this,

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many environmentalists from various governmental and non-governmental organizations have actively assisted otter conservation. Creating a Survival Breeding Centre in Thatta, which is still not fully operational but already serves as an Informational Centre for learners, scholars, and the public, is SWD's most significant effort for otter conservation in Sindh. This year, SWD will establish Pakistan's first otter wildlife sanctuaries in the Sanghar district [27].

This review is based mainly on the available literature and reports located on the region, which might represent areas of missing information, particularly about recent population estimates, genetic research and specific impact evaluation of local conservation measures in Pakistan. The next generation research must focus on field-based population studies, genetic diversity, and longitudinal observation of the location of otters in Pakistan. It was suggested that community-based conservation, enforcement of the law, and the establishment of protected otter corridors along the Indus River should be implemented in order to achieve the recovery of species.

CONCLUSIONS

This review synthesizes the critical ecological role, diverse behavioral adaptations, and pressing threats facing otter populations, with a specific focus on Pakistan. The evidence confirms that otters function as keystone species and apex predators, regulating aquatic food webs and serving as sensitive bioindicators of wetland health. Their complex social systems and specialized foraging morphology are direct adaptations to their aquatic niches. In Pakistan, the Vulnerable smooth-coated otter (*Lutrogale perspicillata*) exemplifies the confluence of threats endangering otters globally: habitat fragmentation, pollution, illegal trade, and human-wildlife conflict. Current protective legislation lacks effective enforcement, and community awareness of the species' ecological value remains low.

Authors' Contribution

Conceptualization: MMH
Methodology: MMH
Formal analysis: RY
Writing and Drafting: RY
Review and Editing: MMH, RY

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

All the authors declare no conflict of interest.

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REFERENCES

[1] Basnet A, Ghimire P, Timilsina YP, Bist BS. Otter research in Asia: Trends, Biases, and Future Directions. Global Ecology and Conservation. 2020 Dec; 24: e01391. doi: 10.1016/j.gecco.2020.e01391.

[2] Koepfli KP, Kanchanasaka B, Sasaki H, Jacques H, Louie KD, Hoai T *et al.* Establishing the Foundation for an Applied Molecular Taxonomy of Otters in Southeast Asia. Conservation Genetics. 2008 Dec; 9(6): 1589-604. doi: 10.1007/s10592-007-9498-5.

[3] Garcês A and Pires I. Biological and Conservation Aspects of Otter Mortality: A Review. Conservation. 2024 Jun; 4(2): 307-18. doi: 10.3390/conservation4020020.

[4] Abdullah-Fauzi NA, Sariyati NH, Narrshen T, Haris H, Othman N, Ramli FF *et al.* Coexistence and Potential of Smooth-Coated Otter (Lutrogale Perspicillata) as Biological Control for Invasive Nile Tilapia (Oreochromis spp.) in Southern Peninsular, Malaysia. Journal of Wildlife and Biodiversity. 2025; 9(1): 1-6.

[5] Wright L, Olsson A, Kanchanasaka B. A Working Review of the Hairy-nosed Otter (Lutra sumatrana). IUCN Otter Spec. Group Bull. 2008; 25(1): 38-59.

[6] Duplaix N and Savage M. The Global Otter Conservation Strategy. IUCN/SSC Otter Specialist Group, Salem, Oregon, USA. 2018: 166.

[7] Guerrini M, Forcina G, Chua MA, Theng M, Al-Sheikhly OF, Haba MK *et al.* Spatial Genetic Structure in the Vulnerable Smooth-Coated Otter (Lutrogale Perspicillata, Mustelidae): Towards an Adaptive Conservation Management of the Species. The Raffles Bulletin of Zoology. 2020; 68: 719-34.

[8] Kitchener A. Form and Function of the Musteloids. Oxford Scholarship Online. 2018 Jan. doi: 10.1093/oso/9780198759805.003.0003.

[9] Strobel SM, Miller MA, Murray MJ, Reichmuth C. Anatomy of the Sense of Touch in Sea Otters: Cutaneous Mechanoreceptors and Structural Features of Glabrous Skin. The Anatomical Record. 2022 Mar; 305(3): 535-55. doi: 10.1002/ar.24739.

[10] Pedroso NM, Sales-Luís T, Santos-Reis M. The Eurasian otter Lutra lutra (Linnaeus, 1758) in Portugal. Munibe Monographs. Nature Series. 2014 Nov; 3: 132-44. doi: 10.21630/mmns.2014.3.11.

[11] Ten Hwang Y, Larivière S. Lutrogale perspicillata. Mammalian Species. 2005 Dec; 2005(786): 1-4. doi:

DOI: https://doi.org/10.54393/mjz.v6i4.186

10.1644/786.1.
[12] Riedman M and Estes JA. The Sea Otter (Enhydra lutris): Behavior, Ecology, and Natural History. US Department of the Interior, Fish and Wildlife Service. 1991.
[13] Kumar M and Das N. Ecological Biodiversity, Functioning, and Ecosystem Services of the Aquatic Ecosystem of Southern Asia. InRiver Basin Ecohydrology in the Indian Sub-Continent. 2024 Jan: 69-100. doi: 10.1016/B978-0-323-91545-8.00004-8.
[14] Pountney A. Analysis of the Population Genetics and Polybrominated Diphenyl Ether (PBDE) Burdens of Otters in England and Wales: With Case Studies of Populations in South West England. 2008.
[15] Allison ML, Reed R, Michels E, Boogert NJ. The Drivers and Functions of Rock Juggling in Otters. Royal Society Open Science. 2020 May; 7(5): 200141. doi: 10.1098/rsos.200141.
[16] Zellmer NT, Timm-Davis LL, Davis RW. Sea Otter Behavior: Morphologic, Physiologic, and Sensory Adaptations. Inethology and Behavioral Ecology of Sea Otters and Polar Bears. Cham: Springer International Publishing. 2021 Jul: 23-55. doi: 10.1007/978-3-030-66796-2_3.
[17] Thorp JH. The Otter and the Fairy Shrimp. Springer Nature. 2024 Sep. doi: 0.1007/978-3-031-64029-2.
[18] Leles B, Georgiadis G, Kaczmarek N, Brandão R, Campello S. Group Dynamics and Habitat Use of the Giant Otter, Pteronura brasiliensis (Zimmermann, 1780). Seasonally Flooded Forest in the Araguaia River, Central Brazil: A. 2022: 125-46. doi: 10.1101/2022.01.30.478386.
[19] Lélias ML, Lemasson A, Lodé T. Social Organization of Otters in Relation to Their Ecology. Biological Journal of the Linnean Society. 2021 May; 133(1): 1-27. doi: 10.1093/biolinnean/blab016.
[20] Blundell GM, Ben-David M, Bowyer RT. Sociality in River Otters: Cooperative Foraging or Reproductive Strategies? Behavioral Ecology. 2002 Jan; 13(1): 134-41. doi: 10.1093/beheco/13.1.134.
[21] Cuculescu-Santana M, Mason J, Purchase K, McKie R. Outdoor Enclosure Use and Behaviour of Adult and Cub Asian Small Clawed Otters Aonyx Cinereus in Summer and Winter. IUCN OSG Bull. 2021 Jan; 38: 3-27.
[22] Davis, R.W., and Bodkin, J.L. Sea Otter Foraging Behavior. In Ethology and Behavioral Ecology of Sea Otters and Polar Bears. Cham: Springer International Publishing. 2021 Jul: 57-81. doi: 10.1007/978-3-030-66796-2_4.
[23] Khan WA, Akhtar M, Ahmed MS, Abid M, Ali H, Yaqub A. Historical and Current Distribution of Smooth-Coated Otter (Lutrogale perspicillata sindica) in Sindh, Pakistan. Pakistan Journal of Wildlife. 2010; 1(1): 5-15.
[24] Jahangeer M, Muhammad S, Shakeel M, Saleem MM, Usman A, Abid H. Diversity and Conservation Status of Large Mammals in Ghamot National Park, Azad Jammu and Kashmir, Pakistan. Kashmir Journal of Science. 2024 Oct; 3(2). doi: 10.63147/krjs.v3i2.44.
[25] Moraes CG, Hegg J, Giarrizzo T, Andrade MC. Feeding Behavior and Trophic Niche Partitioning Between Co-Existing River Otter Species. Hydrobiologia. 2021 Oct; 848(18): 4167-77. doi: 10.1007/s10750-021-04614-w.
[26] Dias SJ. Determination of Fisher Perception Towards Smooth-Coated Otters (Lutrogale Perspicillata): A Case Study in Western India. New Visions in Biological Science. 2021 Oct; 4: 58-65. doi: 10.9734/bpi/nvbs/v4/1963C.
[27] Khan TU, Ahmad S. Protect Pakistan's otters. Science. 2024 May; 384(6695): 519-. doi: 10.1126/science.ado4810.