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Ecology, Behavior and Health of Indian Wolf and its Conservation in India

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Introduction

The Indian wolf, scientifically known as *Canis lupus pallipes*, is a subspecies of the grey wolf (*Canis lupus*) native to the Indian subcontinent. Indian wolves are found primarily in India, but they also inhabit parts of Pakistan and possibly Nepal. They are smaller and more lightly built compared to some other subspecies of grey wolves. Their fur is usually short and coarse, colored a mix of grey, brown, and sometimes reddish tones. Indian wolves typically live in arid and semi-arid regions, including scrublands, grasslands, and desert areas. They are adapted to survive in environments with limited water It is intermediate in size between the Himalayan wolf and the Arabian wolf, and lacks the former's luxuriant winter coat due to it living in warmer conditions. Within this subspecies, the "Indian plains wolf" is genetically basal to all other extant *Canis lupus* apart from the older-lineage Himalayan wolf, with both proposed as separate species. The Indian wolf travels in smaller packs and is less vocal. The Indian wolf is one of the most endangered populations of gray wolf in the world. Indian wolves have been part of local folklore and mythology in various regions of India for centuries, often depicted as cunning and mysterious creatures. Conservation efforts are ongoing to protect the remaining populations of Indian wolves and their habitats, given their ecological importance and cultural significance in the region.

Habitat loss, fragmentation, construction, development and degradation, retaliatory killing coupled with disease threats have rendered Indian wolves prone to population decline. Despite protection measures are increased in recent times free ranging populations continue to show declines; therefore, maintenance of viable ex-situ populations for ensuring their long-term persistence remains imperative. Scientific management that ensures their long-term genetic viability and demographic stability can make sure effective ex-situ conservation of Indian wolves. The Central Zoo Authority (CZA), working alongside zoos across India, take initiative for conservation breeding program aimed at safeguarding endangered species within Indian zoo settings.

Taxonomy

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Carnivora
Family	Canidae
Genus	Canis
Species	Canis lupus
Sub-species	Canis lupus pallipes

General Biology

Gray wolves look like the domesticated dog breed (German shepherds or husky) in appearance; however, its large skull and teeth distinguish it from other closely related members of the family canidae. The animals are characterized by yellowish-brown coat colour interspersed with black. Coat colour is usually lighter during summers as most of the fur is shed and only sparse long hair remain on its body, giving the species a characteristic thin, long-legged appearance. Adult wolves can be distinguished from juveniles in the field by their size, behaviour, and white markings that develop above the eyes, on the chin and under the throat. The front foot has five toes, including a short dewclaw, placed proximal to other four, whereas the hind foot has four toes. The legs are moderately long with digitigrade limb posture;the chest is narrow and keel-like with forelimbs seemingly pressed into chest, and elbows turned inward and paws outward. Wolves have long legs and powerful leg muscles, which facilitate tireless travel at a usual rate of 8 km per hour and a running gait of 55 to 70 km per/day. The extended rostrum provides abundant surface for the olfactory organ, allowing the wolf to detect odors of prey at distances around 2.5 km under favorable conditions.

Habitat ecology

The Indian wolf inhabits regions dominated by scrublands, grasslands, and semi-arid pastoral agro-ecosystems. It relies on undisturbed patches providing shade during the day, crucial for activities such as whelping, denning, and providing play areas for pups. Similar to other subspecies of gray wolves, Indian wolves are territorial animals, with pack size, prey density, and prey size influencing the size of their home range. Wolves in areas with abundant prey have smaller territories, while those relying on livestock and scavenging cover larger areas. Pack territories typically range from 150 to 300 square kilometers, whereas lone male wolves have territories ranging from 180 to 220 square kilometers. The smaller body size of Indian wolves allows them to sustain themselves on smaller ungulates, lagomorphs, and rodents, enabling solitary individuals to survive. They have adapted to hot and arid regions by shedding under fur and using behavioral thermoregulation, making effective use of the limited shade in their habitats. Wolves are adept hunters capable of taking down prey much larger than themselves, employing strategies such as stalking, rushing, or chasing in packs. Their elongated craniums, long jaws, and powerful masseter muscles contribute to their formidable predatory abilities. Indian wolves exhibit a gregarious nature with well-defined social structures.

A typical wolf pack consists of a family unit where adult parents guide group activities through a division of labor: the female primarily cares for the pups, while the male focuses on foraging and territory maintenance. The breeding alpha pair dominates the pack, with the alpha male dominant over all wolves except the breeding female. Wolves display submissive behavior to the dominant pair, especially when pups are present. Solitary wolves may coexist near packs and occasionally share kills. Breeding among Indian wolves occurs in winter, with mating typically taking place from October to November, restricted to the alpha pair. Courtship can span days to months, culminating in copulation during a 5 to 7-day estrus period. The mating pair engages in a copulatory tie lasting 20 to 30 minutes. Gestation lasts 62 to 63 days, during which the alpha female prepares a den with occasional help from the alpha male. She stays near the den 5 to 7 days before giving birth, usually to 2 to 6 pups inside. Pups are born blind and develop blurred vision by 15 days, with milk teeth erupting around 3 weeks. Weaning occurs around 5 weeks, after which the female remains near the pups for at least 2 months while the male and other pack members provide food. Wild wolves reach sexual maturity by 18 months and

may disperse from their natal pack around this age.

In many parts of India, wolves' distribution spans beyond 'protected areas'. These regions typically have low densities of natural prey species, leading wolves to primarily rely on domestic livestock. Observations and findings clearly indicate that local communities provide subsidies to wolves through livestock depredation, particularly goats and sheep. Additionally, the protection of ungulates by local communities ensures sufficient food for the wolf population during times of scarcity in livestock or migration. The wolf populations in human-dominated landscapes and community lands are less affected by drought conditions compared to those in protected areas, consistent with findings from other research. This resilience is attributed to access to water sources provided by locals for livestock and other herbivores, driven by religious and cultural practices. This indirect support underscores the significant role that human landscapes, community subsidies, and traditional sacred groves can play in the conservation and management of wolves, as well as other threatened species.

Challenges and Conservation Efforts :

The Indian wolf (*Canis lupus pallipes*) faces several challenges to its conservation, primarily due to habitat loss, expansion of agriculture areas, prey depletion, human-wildlife conflict, disease, and limited awareness and understanding. Rapid urbanization, agricultural expansion, and infrastructure development have led to habitat loss and fragmentation, reducing suitable areas for wolves to live and hunt. Territoriality likely influences the susceptibility of wolves to anthropogenic and natural disturbances. Wolves often prey on livestock, leading to conflict with local communities dependent on agriculture and extensive animal husbandry practice. Retaliatory killings by farmers and shepherds are also significant threat. Wolves are sometimes targeted by poachers, indirectly due to conflicts arising from livestock depredation. Habitat disturbances, climate change affects prey availability and water resources, affecting the survival and distribution of wolves.

Limited knowledge about wolf ecology and behavior impedes the development of effective conservation strategies. There is a lack of widespread understanding regarding the significance of wolves and their role in ecosystems. It is crucial to establish and manage protected areas and corridors where wolves can safely roam and breed. Efforts are being made to designate specific zones where wolves can thrive without direct human interference. By educating local communities and offering alternative livelihoods, as well as compensating for livestock losses, human-wildlife conflict can be minimized and support for wolf conservation can be fostered. It is essential to conduct scientific research to gain insights into wolf ecology, behavior, diseases threats and population dynamics to for conservation planning. Monitoring wolf populations using camera traps, GPS collars, and genetic analysis is key to tracking their numbers and movements in many protected areas. Enforcing wildlife protection laws to prevent poaching and illegal wildlife trade is critical. Raising awareness among local communities, policymakers, and the public about the ecological importance of wolves and the necessity for their conservation encourages support and advocacy for their protection. Collaborating with international organizations and sharing successful strategies with other nations facing similar conservation challenges ensures a comprehensive approach to wolf conservation.

Threats and Status

In India, the majority of wolf populations reside in landscapes heavily influenced by human activities, outside of protected areas. These wolves primarily depend on livestock for sustenance. Unfortunately, this reliance has led to conflicts with pastoralists due to livestock depredation, resulting in retaliatory killings that significantly impact survival and population.

Additionally, diseases such as canine parvovirus (CPV), canine distemper virus (CDV), and canine adenovirus (CAV), which affect domestic dogs and sympatric wild canid species, pose an additional threat. Rabies and canine distemper are particularly prevalent, with rabies being identified as a major cause of mortality among adult Indian wolves, further exacerbating population declines. The Indian wolf (*Canis lupus pallipes*) is classified under Schedule I of the Wildlife (Protection) Act, 1972. This classification provides the highest level of protection under Indian law, aiming to prevent hunting, trade, and other forms of exploitation that could endanger the species. Schedule I status indicates that the species is considered endangered species, specifically listed in Schedule I Part I, highlighting the urgent need for conservation measures across its range in India.

The future outlook for wolf conservation in India

Addressing conflicts between wolves and local communities remains a significant challenge. It is crucial to continue implementing effective measures to mitigate these conflicts and promote coexistence. The rapid expansion of urban areas, agriculture, and infrastructure continues to fragment wolf habitats. Ensuring connected landscapes will be vital for the long-term survival of wolf populations. Climate change, with its increasing temperatures and altered precipitation patterns, poses additional threats by potentially affecting prey availability and habitat suitability for wolves. These changes could impact their distribution and survival. Despite legal protections, wolves are vulnerable to poaching and illegal wildlife trade. Strengthening enforcement efforts and raising public awareness are essential to combat these threats. Further research is necessary to deepen our understanding of wolf ecology, behavior, diseases characteristics and population dynamics across different regions of India. Enhancing monitoring techniques and data collection will support well-informed conservation strategies. Engaging local communities through education, alternative livelihoods, and collaborative conservation programs can reduce human-wildlife conflicts and garner support for wolf conservation.

Improving wildlife protection laws and integrating conservation priorities into land-use planning and development frameworks will strengthen wolf conservation efforts. Technological advancements, such as satellite tracking, remote sensing, and genetic analysis, offer promising avenues for monitoring wolf populations and understanding their movements and habitat requirements. Collaboration with international organizations and sharing knowledge and best practices with other countries facing similar challenges will provide valuable support for wolf conservation in India. Increasing public awareness about the ecological significance of wolves and the benefits of their conservation can inspire advocacy and support for their protection.

Future Directions:

Looking ahead, the conservation of wolves in India depends on merging conservation efforts with sustainable development practices, bolstering legal safeguards, improving research and monitoring capabilities and promoting community involvement. By addressing these challenges and capitalizing on opportunities, there is potential to secure a more promising future for Indian wolves, enabling them to prosper in their natural habitats alongside human communities. Continued teamwork and research innovation will play crucial roles in shaping this vision for the future.

Conclusions:

Indian wolf (*Canis lupus pallipes*) continues to remain threatened in its natural habitats across its distribution range in India and is accordingly listed in Schedule I of the Wildlife (Protection) Act of India. The factors responsible for their decline remains operational and the populations across their range are in threat. Further recent molecular genetics studies have

demonstrated them to be genetically distinct from other populations of the sub-species. Maintenance of demographically stable and genetically viable ex-situ populations is thus crucial for ensuring the continued survival of the species. Efforts have focused on protecting habitats, mitigating human-wildlife conflict, research and understanding wolf ecology. Successful conservation initiatives include the establishment of protected areas and community-based conservation programs. However, wolves continue to face threats such as habitat loss, poaching, and retaliatory killings. Sustained efforts are needed to ensure their long-term survival, including improved monitoring, enforcement of wildlife laws, and fostering coexistence with local communities. While challenges persist, concerted efforts by government agencies, conservation organizations, local communities, and researchers are crucial for the successful conservation of the Indian wolf. Continued commitment to addressing these challenges through innovative strategies and collaborative efforts will be essential for ensuring the long-term survival of this important species in India.