

Field report

First record of mixed species association between dholes and a wolf from Satpura Tiger Reserve, India



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Abstract

The Asiatic wild dog or dhole (*Cuon alpinus*) is the only endangered, social canid in the tropical Indian forests. The Indian grey wolf (*Canis lupus pallipes*) is another social canid found in India which is primarily found in grassland ecosystems and agro-forestry landscapes in human dominated areas. The two species co-occur in some regions, but their ecological niches overlap little with each other. This note reports two observations of a lone Indian grey wolf associated with a pack of Asiatic wild dogs in Satpura Tiger Reserve, Madhya Pradesh, India. The possible reasons for the wolf's association with dholes in terms of mixed species group interactions are discussed. This record is significant considering the atypical interspecies interactions, population status, effects of habitat loss, fragmentation, and conservation of the two canid species in India.

Introduction

'It is to the death,' said Akela. 'Thou hast never met the dhole—the Red Killer.' – Red Dog, *The Second Jungle Book*, Rudyard Kipling.

Asiatic wild dogs, or dholes (*Cuon alpinus*), are a monotypic species of endangered, wild canid found in the tropical forests of South and Southeast Asia (Kamlar et al. 2015). Phylogenetically classified under the family Canidae, dholes are the only species in the world belonging to the genus *Cuon* (Iyengar et al. 2005). The characteristic unicuspид talonid on the lower carnassials (Van Valkenburgh 1991), 6 – 7 pairs of mammae (Burton 1940), and unique whistle-like vocalizations distinguish dholes from other members of the Canidae. India is also home to two subspecies of wolves: the Indian grey wolf (*Canis lupus pallipes*, Sykes 1831) and Tibetan Wolf (*Canis lupus chanco*, Gray 1863). The Indian grey wolf, belonging to the genus *Canis* (wolves, jackals, domestic dogs) is distributed across isolated grassland ecosystems in peninsular India from Rajasthan in the West, to West Bengal in the East, and from Haryana in the North to Karnataka in southern regions of the country (Shahi 1982, Sharma et al. 2019). Dholes are primarily forest-dwelling species, whereas wolves occupy varied types of habitats ranging from scrublands, grasslands, forest fringes, and agro-forestry landscapes. Although their ecological niches do not exhibit high overlap, dholes and wolves have been known to co-occur in forests of Central India, especially in forest buffers of protected areas.

This field note reports two sightings of inter-genus interactions between a lone male wolf and a pack of dholes from Satpura Tiger Reserve, India. The observations raise interesting ecological questions about the dynamics of dhole-wolf interactions in this region, and the impact of these interactions

on the conservation of both the endangered dhole and wolves in central India.

Results

Satpura Tiger Reserve (STR; 22°15' – 22°45'N; 77°50' – 78°30'E) is a protected area located in the Satpura range in Madhya Pradesh, India. STR consists of the Bori and Pachmarhi Wildlife Sanctuaries, and the Satpura National Park with a core area of 1,339 km² and buffer area of 794 km². The elevation of STR ranges from 320 – 1,320 m above sea level (Borah et al. 2009). STR consists of a mosaic of tropical dry and moist deciduous forests. Following the classification of Champion and Seth (1968), the forest types in STR are classified as Southern moist mixed deciduous, Southern dry mixed deciduous, and dry peninsulas Sal (Gurjar et al. 2013). STR area has three distinct seasons: winter (November – February), summer (March – June), and monsoon (July – October), with a significant variation in temperature and precipitation (Gurjar et al. 2013). There are 1,300 species of plants, 52 species of mammals, 287 species of birds, and 31 species of reptiles found in STR (Gurjar et al. 2013). The dominant faunal species found in STR are *Tectona grandis*, *Shorea robusta*, *Buchanania latifolia*, *Butea monosperma*, *Madhuca latifolia*, and *Lagerstroemia parviflora* (Edgaonkar 2008, Gurjar et al. 2013). The presence of a relict population of Sal in a predominant teak bearing area is a peculiar ecological phenomenon of STR (Singh et al. 2001). Besides dholes, the faunal diversity of the region consists of carnivores like the tiger (*Panthera tigris*) and leopard (*Panthera pardus*). The sloth bear (*Melursus ursinus*), jungle cat (*Felis chaus*), jackal (*Canis aureus*), hyena (*Hyaena hyaena*), and prey species like gaur (*Bos gaurus*), sambar (*Rusa unicolor*), spotted deer (*Axis axis*), nilgai (*Boselaphus tragocamelus*), barking deer (*Muntiacus muntjac*), four-horned

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antelope (*Tetracerus quadricornis*), and wild pig (*Sus scrofa*) are also reported from STR. There have been stray records of wolves from the forests of STR. Besides Sanjay-Dubri Tiger Reserve, Nauradehi and Gandhi Sagar Wildlife Sanctuaries, wolf signs in the State of Madhya Pradesh are mostly abundant outside protected areas (Jhala et al. 2016). There are four tourism zones in STR (Madhai, Pachmarhi, Churna, and Bagra), where tourism activities like vehicle safaris are permitted.

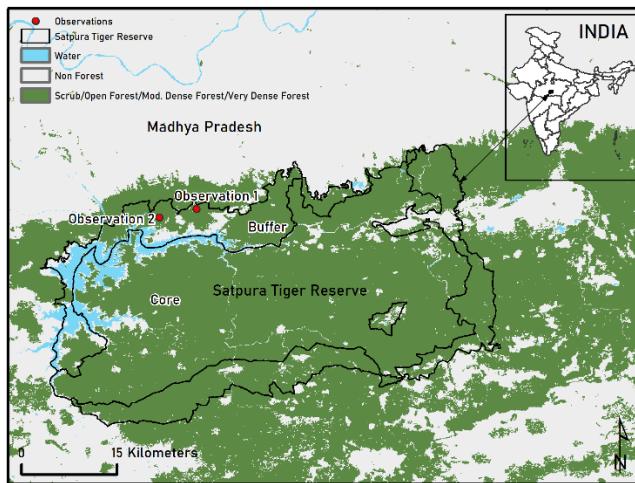


Figure 1. Map of the two locations where the dhole pack and wolf interactions were observed in the buffer of Satpura Tiger Reserve, India.

The first dhole-wolf interaction was recorded on a vehicle safari on 16th March 2020 in the Bagra Tourism Zone of STR (22.6115804 N, 78.1279743 E). The dhole pack of seven was observed feeding on a cattle carcass and exhibited agonistic behaviour towards a wolf which tried to feed on the same carcass (Video 1). Intra-pack aggression in dholes has been reported when kills were small (Ghaskadbi et al. 2016) and has also been reported in wolves and foxes (*Vulpes vulpes*) (Macdonald 1977, Packard et al. 1980). Kleptoparasitism has been observed between dholes, tigers, and leopards in Tadoba Andhari Tiger Reserve. However, this observation seemed more like an opportunistic feeding attempt by the lone wolf which was chased away by the dhole pack. On a second occasion, 26th October 2020, a lone male wolf was observed walking along with the dhole pack of four individuals (two males, one female, and one unknown sex). No apparent agonistic interactions were observed between the dholes and the wolf (Video 2). The observation was approximately 6 km from the first dhole-wolf interaction (22.5984824 N, 78.0717176 E) which indicates that it may be the same dhole pack and wolf (Figure 1). Based on the second observation after six months, it seems possible that the wolf may have become a part of the dhole pack or associated with the pack temporarily (Figure 2).

Discussion

Interspecific group formation in mammals has been rarely described, except in primates (Garber 1988, Whitesides 1989, Oates and Whitesides 1990, Noë and Bshary 1997, Stensland et al. 2003). Fundamentally, the co-occurrence of two species together can be defined as either an aggregation due to a clumped/limited resource like food or an association as a result of attraction between the participants themselves (Stensland et al. 2003). An association of a mixed species group should occur irrespective of concentrated resources. However, associations need not be due to mutual attraction between two species as long as the presence of one species is tolerated by the other (Stensland et al. 2003). Although the first dhole-wolf observation from STR could be due to the kill, and therefore be classified as a mere aggregation over resources, the second instance strongly suggests an association between the two species belonging to two different genera: *Cuon* and *Canis*. Another instance of such an interaction was reported from Debrigarh Wildlife Sanctuary, Odisha, where a wolf persistently associated with a pack of dholes for at least a month from March – April 2013 (Nair and Panda 2013).

The limited literature on the subject suggests that foraging advantages and predator avoidance are typically the functional explanations for formation

of such associations, although there need not necessarily be a functional explanation (Arita and Vargas 1995, Stensland et al. 2003). Moreover, the benefits and costs of such associations need not be symmetrical between species and may vary seasonally or based on presence of external threats like predators (Stensland et al. 2003).

The dhole-wolf association reported here may be due to foraging advantages like food detection or anti-predator advantages like large predators (tigers and leopards) detection and avoidance. However, foraging advantages may be the less likely explanation in this case as both the predators have unique hunting strategies and ecological niches. Where wolves have been known to hunt in relays (Muro et al. 2011), or by encircling weak prey and launching an attack to capture and kill the prey (Mech and Peterson 2003, MacNulty et al. 2007), dholes have a characteristic hunting strategy wherein they eviscerate and may rapidly consume their prey (Nurvianto et al. 2016), even before it is completely subdued or dead (Ghaskadbi et al. 2016). Moreover, the tiger population in STR has recovered after extensive village relocations and the latest population assessment estimated tiger density as 1.39 (SE 0.20) tigers per 100 km (Jhala et al. 2020). Such an increase in density of tigers may intensify inter-specific competition between large, co-occurring predators in the region. Simultaneously, the lone wolf may be a dispersing individual with no other conspecific groups in the vicinity, a potential sign of regional decline in wolf habitat and/or the wolf population, and therefore found it advantageous to associate with another social species to temporarily seek safety in numbers.

Prior to this record, mixed species groups have been recorded in carnivores in only one case in North America, between badgers (*Taxidea taxus*) and coyotes (*Canis latrans*) (Kiliaan et al. 1991, Minta et al. 1992, Stensland et al. 2003). We suggest that it is important to monitor the association of this pack on a long-term basis. It warrants further investigation into various hypotheses around these fascinating observations to draw further inferences. Lastly, both of these social canid species, dholes and wolves, are under tremendous threat from habitat fragmentation and habitat loss. To sustain viable populations of the endangered dholes and wolves, a landscape approach in conservation planning needs to be adopted.



Figure 2. A still image of the lone wolf and one of the dholes from the dhole pack exhibiting no agonistic interactions.

Supplementary online material

[Video 1](#). The first observation of the dhole-wolf interaction on 16th March 2020 at a kill site, Satpura Tiger Reserve, India. © Jesan Das.

[Video 2](#). The second observation of the dhole-wolf interaction on 26th October 2020 where the lone wolf is seen moving with the dhole pack, Satpura Tiger Reserve, India. © Vineeth Mahadev.

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References

- Arita, H.T. and Vargas, J.A. 1995. Natural-history, interspecific association, and incidence of the cave bats of Yucatan, Mexico. *Southwestern Naturalist* 40: 29-37.
- Borah, J., Deka, K., Dookia, S. and Gupta, R.P. 2009. Food habits of dholes (*Cuon alpinus*) in Satpura Tiger Reserve, Madhya Pradesh, India. *Mammalia* 73: 85-88. doi: [10.1515/MAMM.2009.024](https://doi.org/10.1515/MAMM.2009.024)
- Burton, R.W. 1940. The Indian wild dog. *Journal of the Bombay Natural History Society* 41: 691-715.
- Champion, H.G. and Seth, S.K. 1968. A revised survey of the forest types of India. Government of India Publication, Delhi, India.
- Edgaonkar, A. 2008. Ecology of the leopard (*Panthera pardus*) in Bori Wildlife Sanctuary and Satpura National Park, India. PhD thesis, Saurashtra University, Rajkot, India.
- Garber, P.A. 1988. Diet, foraging patterns, and resource defence in a mixed species troop of *Saguinus mystax* and *Saguinus fuscicollis* in Amazonian Peru. *Behaviour* 105: 18-34.
- Ghaskadbi, P., Habib, B. and Qureshi, Q. 2016. A whistle in the woods: an ethogram and activity budget for the dhole in central India. *Journal of Mammalogy* 97: 1745-1752. doi: [10.1093/jmammal/gyw141](https://doi.org/10.1093/jmammal/gyw141)
- Gurjar, R.L., Singh, R.P. and Mishra, A. 2013. Density of the Indian Peafowl *Pavo cristatus* in Satpura Tiger Reserve, India. *Podoces* 8: 12-18.
- Iyengar, A., Babu, V.N., Hedges, S., Venkataraman, A.B., Maclean, N. and Morin, P.A. 2005. Phylogeography, genetic structure, and diversity in the dhole (*Cuon alpinus*). *Molecular Ecology* 14: 2281-2297. doi: [10.1111/j.1365-294X.2005.02582.x](https://doi.org/10.1111/j.1365-294X.2005.02582.x)
- Jhala, Y.V., Qureshi, Q. and Nayak, A.K. (eds.) 2020. Status of tigers, co-predators and prey in India, 2018. National Tiger Conservation Authority, Government of India.
- Jhala, Y.V., Qureshi, Q., Saini, S., Bora, J.K., Goswami, S. and Laha, D.R. 2016. Status and distribution of major mammalian fauna in the state of Madhya Pradesh. Wildlife Institute of India, Dehradun. TR 2016/013.
- Kamler, J.F., Songsasen, N., Jenks, K., Srivaths, A., Sheng, L. and Kunkel, K. 2015. Cuon alpinus. The IUCN Red List of Threatened Species 2015: e.T5953A72477893. Downloaded on 28 October 2020.
- Kiliaan, H.P.L., Mamo, C. and Paquet, P.C. 1991. A coyote, *Canis-latrans*, and badger, *Taxidea-taxus*, interaction near Cypress Hills Provincial-Park, Alberta. *Canadian Field-Naturalist* 105: 122-123.
- Macdonald, D.W. 1977. The behavioural ecology of the red fox, *Vulpes vulpes*: a study of social organisation and resource exploitation. PhD thesis, University of Oxford, Oxford, United Kingdom.
- MacNulty, D.R., Mech, L.D. and Smith, D.W. 2007. A proposed ethogram of large-carnivore predatory behavior, exemplified by the wolf. *Journal of Mammalogy* 88: 595-605. doi: [10.1644/06-MAMM-A-119R1.1](https://doi.org/10.1644/06-MAMM-A-119R1.1)
- Mech, L.D. and Peterson, R.O. 2003. Wolf-prey relations. Pp 131-160 in: *Wolves: behavior, ecology, and conservation* (Mech, L.D. and Boitani, L. (eds.)). The University of Chicago Press, Chicago, USA.
- Minta, S.C., Minta, K.A. and Lott, D.F. 1992. Hunting associations between badgers (*Taxidea taxus*) and coyotes (*Canis latrans*). *Journal of Mammalogy* 73: 814-820. doi: [10.2307/1382201](https://doi.org/10.2307/1382201)
- Muro, C., Escobedo, R., Spector, L. and Coppinger, R.P. 2011. Wolf-pack (*Canis lupus*) hunting strategies emerge from simple rules in computational simulations. *Behavioural processes* 88: 192-197. doi: [10.1016/j.beproc.2011.09.006](https://doi.org/10.1016/j.beproc.2011.09.006)
- Nair, M. and Panda, S. 2013. 'Just Friends'. *Sanctuary Asia*: 33 No. 3.
- Noë, R. and Bshary, R. 1997. The formation of red colobus-diana monkey associations under predation pressure from chimpanzees. *Proceedings of the Royal Society of London B* 264: 253-259. doi: [10.1098/rspb.1997.0036](https://doi.org/10.1098/rspb.1997.0036)
- Nurvianto, S., Eprilurahman, R., Imron, M.A. and Herzog, S. 2016. Feeding habits of pack living dhole (*Cuon alpinus*) in a dry deciduous forest of east Java, Indonesia. *Taprobanica* 8: 10-20.
- Oates, J.F. and Whitesides, G.H. 1990. Associations between Olive colobus (*Procolobus verus*) and Diana guenons (*Cercopithecus diana*) and other forest monkeys in Sierra Leone. *American Journal of Primatology* 21: 129-146. doi: [10.1002/ajp.1350210206](https://doi.org/10.1002/ajp.1350210206)
- Packard, J.M. and Mech, L.D. 1980. Population regulation in wolves, pp 135-150. In *Biosocial mechanisms of population regulation* (Cohen, M.N., Malpass, R.S. and Klein, H.G. (eds.)). Yale University Press, CT, USA.
- Shahi, S.P. 1982. Report of grey wolf (*Canis lupus pallipes* Sykes) in India-a preliminary survey. *Journal of the Bombay Natural History Society* 79: 493-502.
- Sharma, L.K., Mukherjee, T., Saren, P.C. and Chandra, K. 2019. Identifying suitable habitat and corridors for Indian Grey Wolf (*Canis lupus pallipes*) in Chotta Nagpur Plateau and Lower Gangetic Plains: A species with differential management needs. *PLoS one* 14: e0215019. doi: [10.1371/journal.pone.0215019](https://doi.org/10.1371/journal.pone.0215019)
- Singh, R.P., Tripathi, N., Nema, S. and Rai, R.K. 2001. Pachmarhi Biosphere Reserve, Biosphere Reserve Information Service, Vol. 1 (No. I). Environmental Planning & Coordination Organisation, Bhopal.
- Stensland, E.V.A., Angerbjörn, A. and Berggren, P.E.R. 2003. Mixed species groups in mammals. *Mammal Review* 33: 205-223. doi: [10.1046/j.1365-2907.2003.00022.x](https://doi.org/10.1046/j.1365-2907.2003.00022.x)
- Van Valkenburgh, B. 1991. Iterative evolution of hypercarnivory in canids (Mammalia: Carnivora): evolutionary interactions among sympatric predators. *Paleobiology* 17: 340-362. doi: [10.1017/S0094837300010691](https://doi.org/10.1017/S0094837300010691)
- Whitesides, G.H. 1989. Interspecific association of Diana monkeys, *Ceropithecus diana*, in Sierra Leone, West Africa: biological significance or chance? *Animal Behaviour* 37: 760-776. doi: [10.1016/0003-3472\(89\)90062-6](https://doi.org/10.1016/0003-3472(89)90062-6)

Biographical sketch

Pallavi Ghaskadbi studies large carnivores with particular focus on dhole behaviour, movement ecology and co-predator interactions in the Central Indian forests.

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Vineith Mahadev is a well-travelled naturalist at Forsyth Lodge, Satpura Tiger Reserve with a lot of experience in tracking mammals and birdwatching in the Indian wilderness, especially in the Western Ghats.

Bilal Habib studies large mammalian ecology, human-animal conflict, road ecology with focus on the analytical and applied aspects which can aid policy makers and conservation efforts on ground.