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Field Report

Observations on Indian Wolves near the sea coast in Jamnagar, Gujarat, India

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Abstract

The Indian wolf is an endangered species and evolutionary significant unit endemic to the Indian sub-continent. While they have a fragmented distribution across the native range, Gujarat is considered a bastion for the species with the contiguous Saurashtra-Kachchh-Thar landscape reported to hold the largest potential for wolf occupancy in India. Wolves were reported to occur in the Jamnagar district of the Saurashtra region about four decades ago, and persist to this day. Here we discuss the occurrence and conservation threats based on observations made during 2022 – 2024 on two wolf packs consisting of seven and four individuals each near the Gulf of Kachchh in Jamnagar. The wolves occupied approximately 80 km^2, of which protected areas constitute about 39%. The wolves seem to have persisted in the region owing to the relatively unchanged land use pattern and increased vegetation cover in these areas signifying the ecological role of such refugia. However, the non-protected areas within the wolf-occupied region are undergoing rampant and unprecedented land use change which poses a grave threat to the wolf habitat and movement corridors. Such anthropogenic pressure on the wolf habitat would also ultimately affect the wild prey populations inhabiting the region. Additionally, human-wolf conflict, hybridisation with domestic dogs, as well as diseases, all pose threats to this wolf population. The persistence of wolves may not hold strong if the current circumstances are allowed to prevail. The current situation warrants devising policy decisions aimed at wolf conservation planning on an urgent basis. Since the study region is a multi-use landscape with multiple stakeholders involved, a suitable management approach that incorporates social, economic, and ecological dimensions can ensure the long-term persistence of the wolf population in the region.

Introduction

The Indian wolf (*Canis lupus pallipes*) has received much research attention in the recent past. The species is endemic to the Indian sub-continent and is considered endangered as well as an evolutionary significant unit (Hennelly et al. 2021). It receives the highest legal protection status by being listed on Schedule 1 of the Indian Wildlife Protection Act (1972) and amendments thereafter. The status of the Indian wolf has been evaluated extensively at the local and country scales by several studies (Jhala et al. 2022). The distribution of the species shows a patchy occurrence in its range. However, the state of Gujarat has been known to be a stronghold for the species (Jhala and Giles 1991, Ram et al. 2020), with the contiguous Saurashtra-Kachchh-Thar landscape holding the largest potential for wolf occupancy in India (Jhala et al. 2022). Here we discuss the occurrence and conservation threats for the Indian wolf near the Gulf of Kachchh in the Jamnagar district of Gujarat, based on observations made during 2022 – 2024.

Methods

These observations were made by the field staff of the Gujarat Forest Department during regular patrols and subsequent monitoring of the wolf packs, as well as the area they inhabit. Jhala and Giles (1991) reported wolves to occur in this area and estimated a total population of 35 – 45 individuals in the erstwhile Jamnagar district. Jamnagar district is part of the

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Saurashtra region in Gujarat and currently lies between 21.41º and 22.58º N latitudes, and 68.57 º and 70.39 º E longitudes encompassing an area of 5846 km^2. Biogeographically, the region falls under the 4B Semi-arid Gujarat Rajputana province, flanked on the north by the coastal province in the form of Gulf of Kachchh (Rodgers et al. 2000). The climatic condition of the area is a typical dry tropical climate, characterised by frequent droughts, low rainfall, and high temperature. The average temperature ranges from 36° C in May to 18° C in January. Summer begins from March and lasts until June. The number of rainy days varies from 30 – 45 per annum during the monsoon months of July, August, and September, with rainfall varying from 22 – 146 cm. The monsoon is followed by a dry post-monsoon season, and winter sets in from December and continues till February. The overall terrain of the district is undulating with low to moderate hillocks except the coastal belts. Open Natural Ecosystems (ONEs) such as vidis (tropical savannah), scrublands, and thorn forests represent the dominant vegetation communities. The vegetation in the coastal belts includes plantations of *Salvadora persica*, *Suaeda nudiflora* and *Prosopis juliflora*. The faunal assemblages of the region hold ecological significance with many of the mammalian species being endemic to the Indian sub-continent. Some of these species include Indian leopard (*Panthera pardus fusca*), Indian wolf, Bengal fox (*Vulpes bengalensis*), blackbuck (*Antilope cervicapra*), and nilgai (*Boselaphus tragocamelus*).

Results & Discussion

Two wolf packs, consisting of seven and four individuals, have been observed in the northeastern coastal region of Jamnagar district. The determination of the age and sex class of these individuals has remained difficult during the field observations owing to their skittish nature. This population seems to be faring well considering that pups have also been recorded on certain occasions (Figure 1d). Additionally, denning and resting sites have been identified, but require continued monitoring to confirm and understand their use. The presence of wolves indicated in this paper is based on direct sightings and indirect evidence such as pugmarks, scats, evidence of dens, and camera trap images (Figure 1). These wolves inhabit *Prosopis juliflora* thickets and salt pans bordered by agricultural areas in some directions (Figure 2, Video 1). These thickets act as an ecotone between the semi-arid and coastal biogeographical regions. Based on the wolf presence locations in the study region, we constructed a Minimum Convex Polygon using QGIS 3.28.3 (QGIS 2022) to demarcate the area of which they occupied. This resulted in an occupied area of 80.2 km^2. A small proportion (39%) of this area is legally protected as forest and can provide a safe habitat while the remaining area utilised by these animals is unprotected and under the purview of the revenue department (Figure 3).

We accessed forty years of decadal land use and land cover data from 1985 – 2015 using Roy et al. (2016) and the Bhuvan portal (https://bhuvan.nrsc.gov.in/home/index.php) to assess land use in this wolf occupied area. Most of the legally designated forest areas are classified as wastelands, shrublands, and water bodies in these land cover classifications. The wastelands and water bodies show relatively consistent coverage indicating that most of the predominant wolf-occupied area has remained unchanged in the past four decades (Table 1). This may be a major factor governing the persistence of wolves in the landscape. The data suggests an increase in the shrubland and cropland cover. Most of the wolf locations occur in the wastelands that border *Prosopis* shrublands. Indian wolves are known to be highly adaptable and exist in human-use landscapes (Majgaonkar et al. 2019, Mahajan et al. 2022). For denning and rendezvous purposes, they prefer scrublands with good vegetation cover and water availability, such as *Prosopis* shrubland where the pup in Figure 1d was photographed. Human disturbance is also an important factor in selection of such sites (Jhala and Giles 1991, Jhala 2003, Singh and Kumara 2006, Habib and Kumar 2007, Kumar and Rahmani 2022). The shrublands in the study region are thus important sites for wolf conservation. It is imperative to note that most of the *Prosopis* thickets owe their existence to plantation efforts by the forest department, and hence also show a consistent increase in the area covered by them in the land use cover. However, these shrublands, especially in the non-protected areas are undergoing illegal removal by the locals and these are also being encroached upon rampantly for agricultural purposes. The decadal land use patterns are also indicative of such activities. If this practice continues unabated, it poses a grave threat in the form of habitat loss for the wolves in the region. The average wolf territory size has been reported to be 188 km^2 (Jhala et al. 2022), where small and safe habitat patches of 5 – 15 km^2 for denning and rendezvous sites are vital for successful recruitment (Jhala 2003). The wolf-occupied area in the study region is much lower than the average territory size, and most of the population occurs in the small forest lands highlighting the conservation significance of these legally protected units in the region. Hence the likely conducive and suitable habitats in the form of small and fragmented coastal forested patches in the proximity of the wolf-occupied area are vital for their persistence. Demand for the revenue land between these forested patches for developing salt pans is on the rise which would hamper wolf movement and lead to loss of corridors. Development of salt pans may lead to water inundation in the areas that wolves frequent and inhabit. Thus, this demand needs to be curtailed urgently. Wind farms also occur in the region and further demand for setting up more windmills can also damage the existing habitat patches and negatively affect wildlife (Kumara et al. 2022).

Table 1. Decadal percentage area coverage (in km^2) under different land use land cover classes in the wolf occupied region.

LULC Class	1985	1995	2005	2015-16
Waterbody	33.05	33.05	34.02	26.33
Wasteland	30.03	25.69	25.70	32.32
Shrubland	10.44	15.43	15.16	18.93
Cropland	10.92	10.26	25.13	18.06
Fallow land	15.57	15.57	0.00	4.22
Built up	0.00	0.00	0.00	0.13

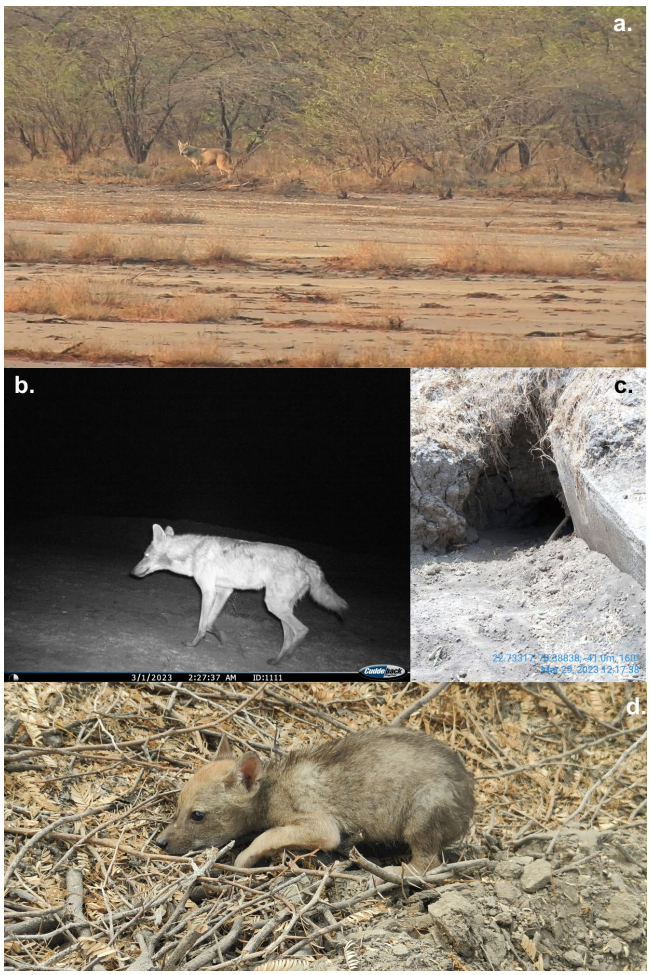

Figure 1. Images of direct observations and indirect evidence of Indian wolves in the study area: (a) an Indian Wolf in the vicinity of *Prosopis juliflora* thicket; (b) a camera trap image of an Indian wolf in the study area; (c) a photograph of a wolf denning site; (d) a pup observed in the study area.

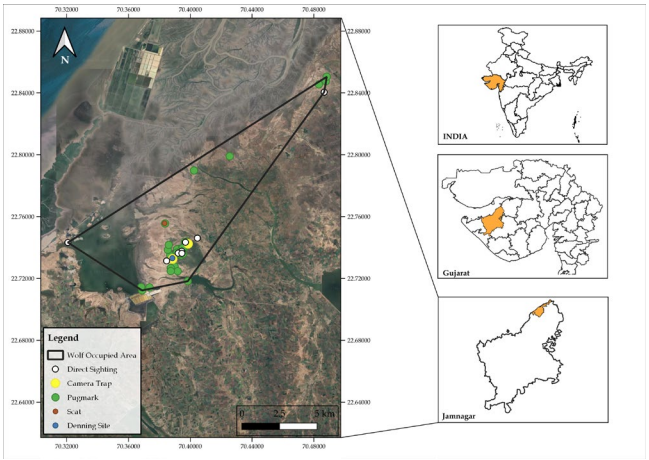

Figure 2. Map showing the presence locations of the Indian Wolf in the study area of Jamnagar, Gujarat, India.

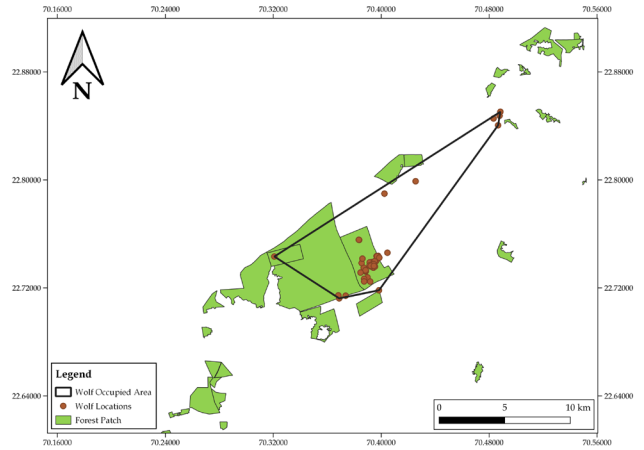

Figure 3. Map delineating protected and non-protected areas in and around the wolf-occupied region.

Availability of prey base is another important factor affecting their survival; habitat loss and anthropogenic pressure on the forested patches would also affect the wild prey populations. In such a scenario, wolf predation on livestock would increase thus leading to human-wolf conflict (Singh and Kumara 2006). As per the latest official government records, the abundance of key prey species for the wolves in the vicinity of the area are cattle *Bos taurus* (1357), buffalo *Bubalus bubalis* (3610), sheep *Ovis aries* (8194), goat *Capra hircus* (2159), nilgai *Boselaphus tragocamelus* (375), and wild pig *Sus scrofa* (150). Blackbuck (*Antilope cervicapra*) and Chinkara (*Gazella bennettii*) have not been recorded in the study region, but the wolves seem to subsist on the available prey species. However, the exact data on their foraging ecology needs to be collected to understand their food habits and dependence on wild and domestic prey species. The wolves in the study region have also been recorded to prey on waterfowl such as Common crane (*Grus grus*), Demoiselle crane (*Anthropoides virgo*) and pelicans (*Pelecanus onocrotalus, P. crispus*).

Though incidences of wolf persecution have not been recorded in this region, this looming threat cannot be completely ruled out. Adding to the prevalent and potential detriments of habitat loss and conflict, wolf-domestic dog hybridisation, and diseases can also pose grave consequences to this endangered wolf population. If the wolf population is to persist in this ecologically significant region, it is imperative to devise urgent policy interventions with a focus on wolf conservation. Since the landscape is a multi-use matrix with diverse stakeholders, the conservation planning needs to incorporate social, economic, and ecological dimensions. Like other parts of India, wolf conservation in the study region requires a strategic management approach at the landscape level (Singh and Kumara 2006, Sharma et al. 2019). Further studies targeted at developing insights into the ecology and genetics of this population would yield in substantiating the management decisions as well as designing robust action plans for the species.

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Biographical sketch

Dhawal B. Mehta is an ecologist interested in conservation biology, wildlife management, and human dimensions of wildlife conservation. His focus research taxa include mammals and birds. He holds a doctoral degree in Zoology, and serves as an Assistant Professor under the aegis of Gujarat Education Service at Bahauddin Science College.

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Pratik N. Joshi is the Range Forest Officer at Jamnagar range of Marine National Park. He is a young officer dedicated to the conservation of the marine biodiversity, and the coastal intertidal zone of the eastern end of Gulf of Kachchh in the state of Gujarat, Western India.

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