



Opportunities of Habitat Connectivity for Tiger (*Panthera tigris*) between Pench Tiger Reserve and Navegaon-Nagzira Tiger Reserve in Maharashtra, India

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ABSTRACT

Habitat connectivity is essential in sustaining regional populations of Tiger (*Panthera tigris*), as they require contiguous forest connectivity for dispersal and genetic exchange between populations. An important conservation tool for these carnivores has been to understand connectivity of these fragmented habitats that have helped to identify critical threats to the existing populations. Wildlife corridors have long been a subject of discussion amongst wildlife biologists and conservationists with contrasting schools of thought arguing their merits and demerits. However, it is largely believed that wildlife corridors can help minimize genetic isolation, offset fragmentation problems, improves animal dispersal, restore ecological processes and reduce man animal conflict. This study attempted to evaluate the possibilities of identifying a suitable wildlife corridor between two very important wildlife areas of central India – Pench Tiger Reserve and Navegaon-Nagzira Tiger Reserve – with tiger as the focal species. Geographic information system (GIS), information collected from Forest Department and Local communities was used to identify likely routes for movement of tigers. Results indicate the movement pattern of tiger in the fragmented landscape on the basis of indirect signs and secondary information. It was also found that the potential corridor in fragmented area which is different from corridor marked by the forest department. Resultant maps, displaying bottle necks and weak points in the corridors, are marked to direct field-based research and conservation efforts. Field assessment and refinement of the corridors is ongoing. The establishment and proper management of linkages between the habitats is of great importance for future survival of tigers.

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Introduction

The 21st century has brought many conservation challenges to the forest. One very important and significant challenge that has evoked considerable scientific interest is the fragmentation of wildlife habitat. Habitat fragmentation is an umbrella term describing the complete process by which habitat loss results in the division of large, continuous habitats into a greater number of smaller patches of total area, isolated from each other by a matrix of dissimilar habitats, and is not just the pattern of spatial arrangement of remaining habitat. Over a larger time span, species inhabiting isolated habitats also face the risk of extinction through mechanisms such as excessive inbreeding.^{[1][2][3]}^[4] It is the most important environmental issues of public concern and the worst threat to biological diversity. In the recent times, considerable scientific and media attention has been focused in India on large mammals – particularly large cats – and their conflict with man largely attributed to shrinking habitat.^[5]

Today, most wild tigers live in small, isolated Protected Areas within human dominated landscapes in the Indian subcontinent.^[6] Future survival of tigers depends on increasing local population size, as well as maintaining connectivity between populations. While significant conservation effort has been invested in increasing tiger population size, few initiatives have focused on landscape-level connectivity and on understanding the effect different landscape elements have on maintaining connectivity.^[6]

The idea of wildlife corridors was first time proposed by Wilson and Willis^[7] for conserving biodiversity based on theory of island biogeography. A wildlife corridor has been defined as a “linear landscape element which serves as a linkage between historically connected habitat and natural areas, and is meant to facilitate movement between these natural areas.”^[8] Creation of wildlife corridors has received much global attention during the last two decades. While the utility of wildlife corridors has been debated,^[9] it is largely believed that wildlife corridors facilitate animal dispersal from isolated habitats and help counter biological processes that lead to species extinction.^{[10][11]}

While the idea of connecting fragmented patches may appear simplistic at first sight, the identification, design and development of wildlife corridors in large landscapes presents unique challenges. Beier & Loe observed that the critical features of a wildlife corridor are not its physical traits but its functionality.^[12] The importance of wildlife corridors for tiger conservation in India has also been significantly reiterated by Jhala, Qureshi, Gopal and Sinha^[5]

The present study was undertaken to explore the possibilities of establishing connectivity between two wildlife areas – Pench Tiger Reserve, Maharashtra and Navegaon Nagzira Tiger Reserve, Maharashtra in the Central Indian Landscape

Materials and Methods

Study Area: Pench Tiger Reserve is located in the Satpuda-Maikal hills of Nagpur district. It covers an area of 257 sq. km. Nagzira-Navegaon forest is located in Bhandara and Gondia district. Because of dense forests it is rich in wildlife and has good number of tiger population.^[5]

Status of Connectivity in Study Area: Pench Tiger Reserve & Mansighdeo Wildlife Sanctuary is connected to the forests of Bhandara dist. which includes forests of Deolapar and Paoni range. It comprises of FDCM area which provides great opportunity to the animals for migration due to its connectivity with the Pench Tiger Reserve. The National Highway no. 7 passes through these forest patches which has very heavy vehicular traffic. Movement of many animals likes Tiger, Sloth bear, Chital and Jackel is affected due to this vehicular traffic. There are few small villages with agricultural fields & lakes with fragmented forest which has network of roads.

The major forest type of this area is teak dominant. FDCM has cleared some area near Mogarkasa Lake for plantation. The forest of Lendezari Range is well flourished and has connectivity with Paoni range as well as Nakadongri range of Bhandara forest division. Due to Bawanthadi Irrigation Project huge water body is created in this area. Behind this water body, the forest is connected to Balaghat (MP) forest area.

Nakadongri range has good forest patch with Chandpur Lake and further connectivity of Chandpur forest is broken by Wainganga River. Further there is a non-forested or degraded forest patch having 15kms aerial distance between Chandpur Forest and Nagzira Wildlife Sanctuary. Moreover according to the study conducted by Wildlife Conservation Trust in 2014 this area inhibits about 9 tigers.

Study Aims and objectives:

- To study presence and movement of carnivores and other mammals in the fragmented landscape
- To demarcate the possible corridor between the protected areas.

Methodology

- Reconnaissance survey
- Gathering secondary data from forest department on tiger presence, man animal conflict and cattle kills.
- Questionnaire survey of villages in fragmented landscape.

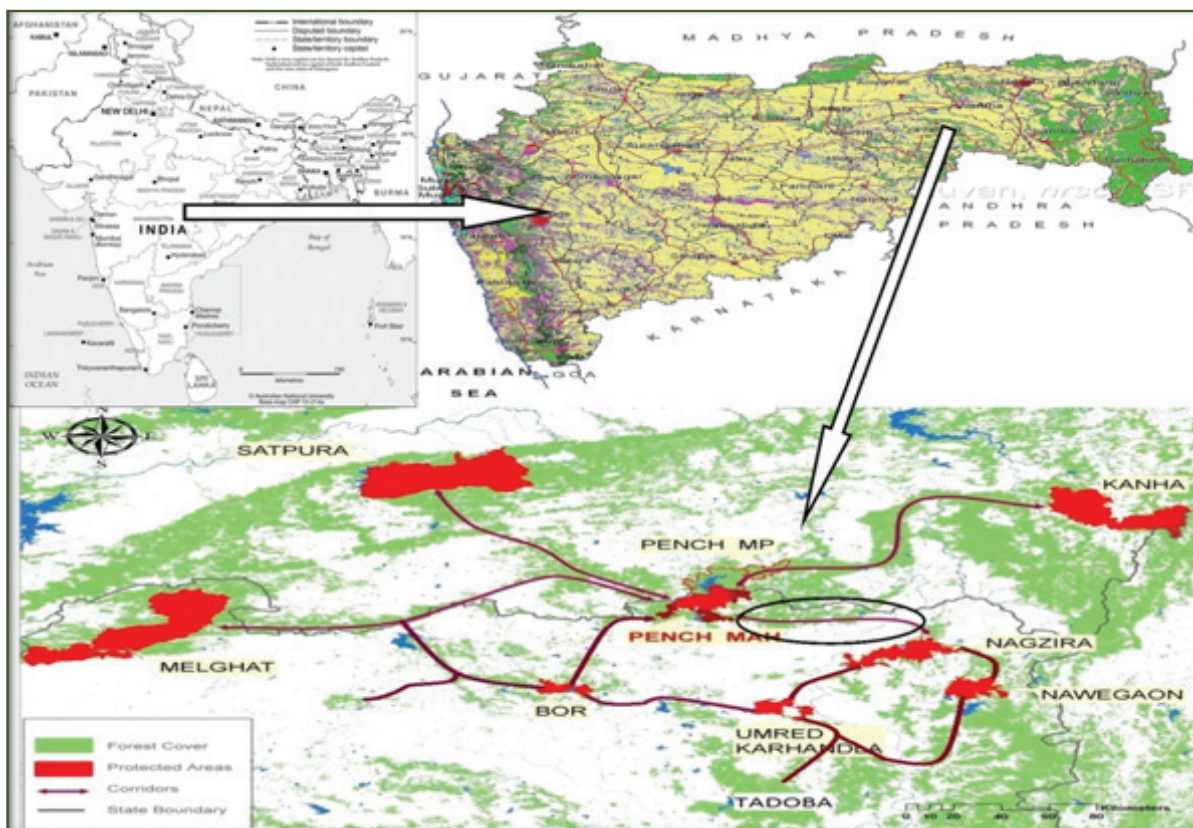


Fig. 1: Study Area Map.

(Source: Pench Foundation)

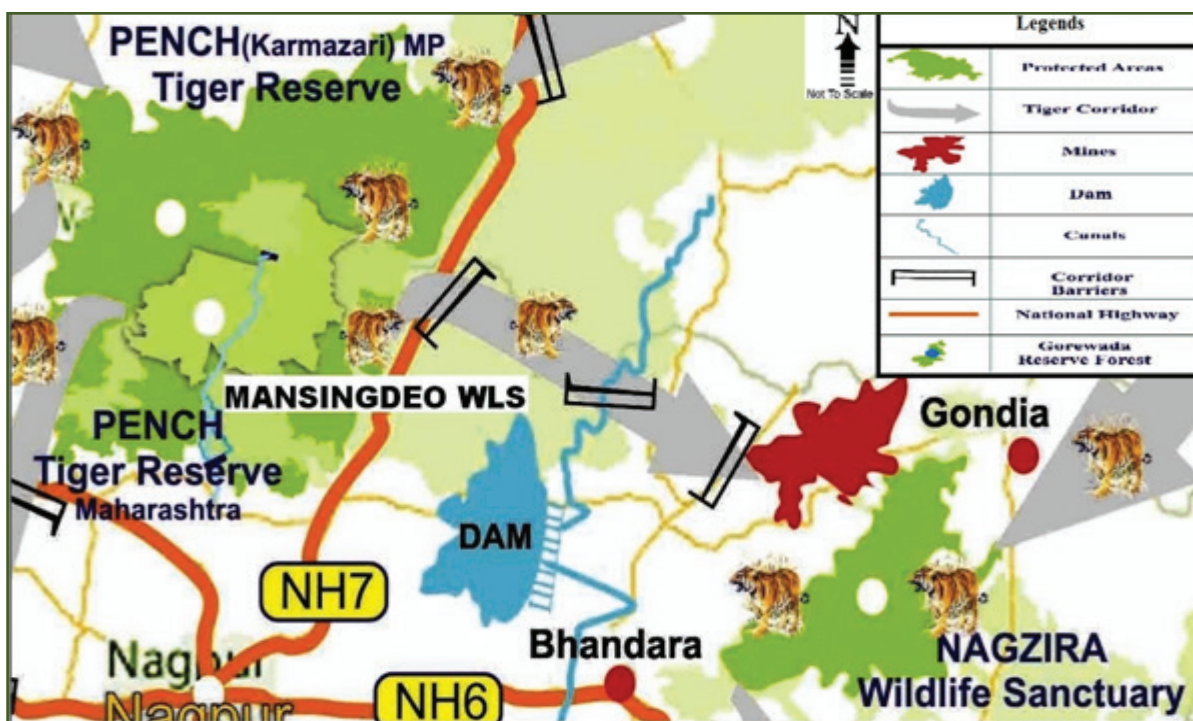


Fig. 2: Threats to the Corridor.

(Source: Pench Foundation)

The basic data about the village which includes socio-economic aspects and presence of wild animals was collected from any one of the person viz.; Gram Panchayat, Sarpanch, Gram Sevak, Police Patil, Peon.

Result & Discussion

The area is fragmented and at certain points the forest patch becomes too narrow creating a bottle neck to the connectivity of the path. There are 2 major bottle necks and 2 major threats as shown in Fig. 03 and Fig. 04. The major threats include the fragmented area between Bhandara Forest Division and Buffer area of Navegaon Nagzira tiger reserve and the other threat is National Highway 07 which passes adjacent to the buffer of Pench Tiger Reserve (Maharashtra) all the way to Seoini which also dissects the Kanha-Pench Corridor.

The wildlife presence survey carried out in 171 villages present in the deforested rather fragmented region between Tumsar, Tiroda and some area of Gondia in the Pench-Nagzira corridor; out of which, 46 villages showed big carnivore presence. The major forest type of this area consists of scrubland and grassland inhibited by woodlands surrounding the agricultural patches.

Tiger, Leopard, Wild Dog, Jungle Cat, Fox, Hyena, Wolf, Bear, Chital, Sambar, Blue Bull, Wild boar, Langur and Rhesus macaques were the animals seen by the villagers in their surroundings. Amongst these wild boar was found to

be present in most of the villages and Blue Bull was found to be present in very few villages. Out of all the villages surveyed Tiger and Leopard presence was found in 9% of the villages (Fig. 04). On the basis of survey completed in the fragmented landscape Fig. 05 shows the presence of all mammals occurring in the fragmented area along with Tiger and Leopard.

The secondary data collected from the forest department about Man-Animal interaction like cattle kill, human kills combined with the data generated from the wild animal survey as well as some direct observation in the fragmented landscape of study area were plotted on Google Earth.

The observations show that the corridor shown by the forest department might not be used due to various hindrances. Moreover there are 2 major tehsils Tumsar and Tirora fall on the opposite side of the so called corridor suggested by the forest department. Also many villages occur in this shown corridor which might create another problem. However there aren't any instances of man-animal negative interaction in this patch. Hence this path might not be used by the animals for their movement.

As shown in the Fig. 06 the presence of tiger was observed more in the villages towards the Wainganga river side. This presence was found continuous as compared to the presence of tiger in the corridor shown by Forest Department. Additionally there have been instances of cattle kill as well as human kill in the possible corridor suggested by

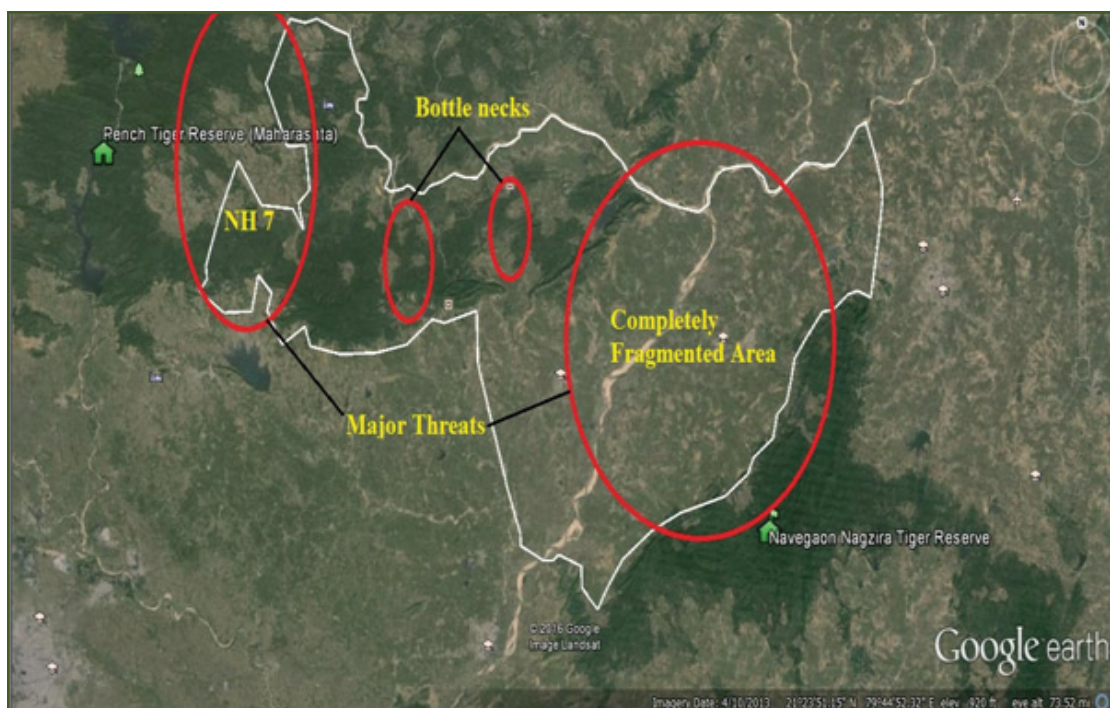


Fig. 3: Bottle Necks and Major Threats.

(Source: Google Earth)

BNHS. During the survey it was also observed that most farmlands of the villagers living near to Wainganga River were towards the river side and far from the main village. Moreover according to the conversation with the villagers,

they visit their farmlands only during daylight and return back with the dusk. Thus this might give the wild animal's easy access to these farmlands and migrate or move using them during the night time.

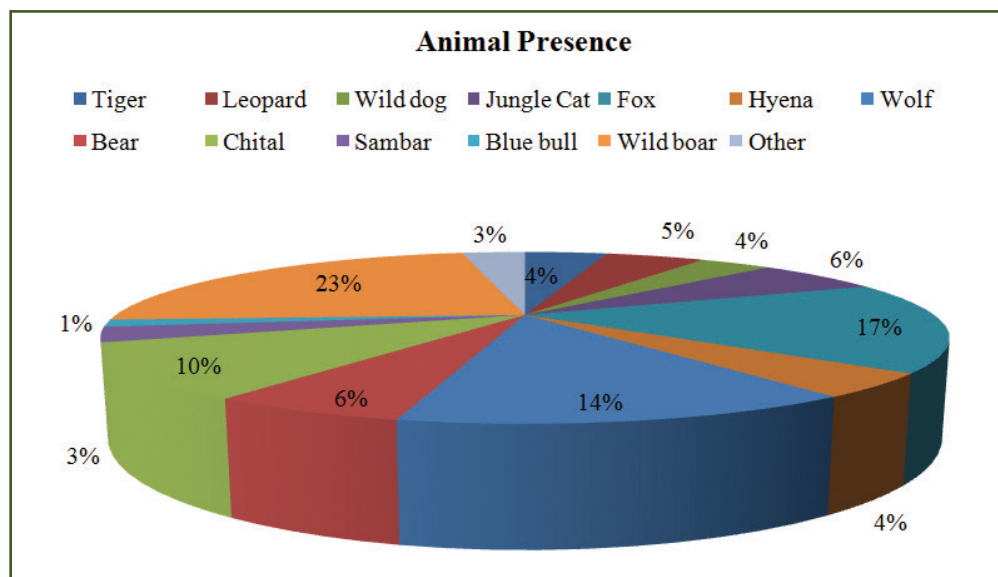


Fig. 4: Animal Presence in Fragmented Area.

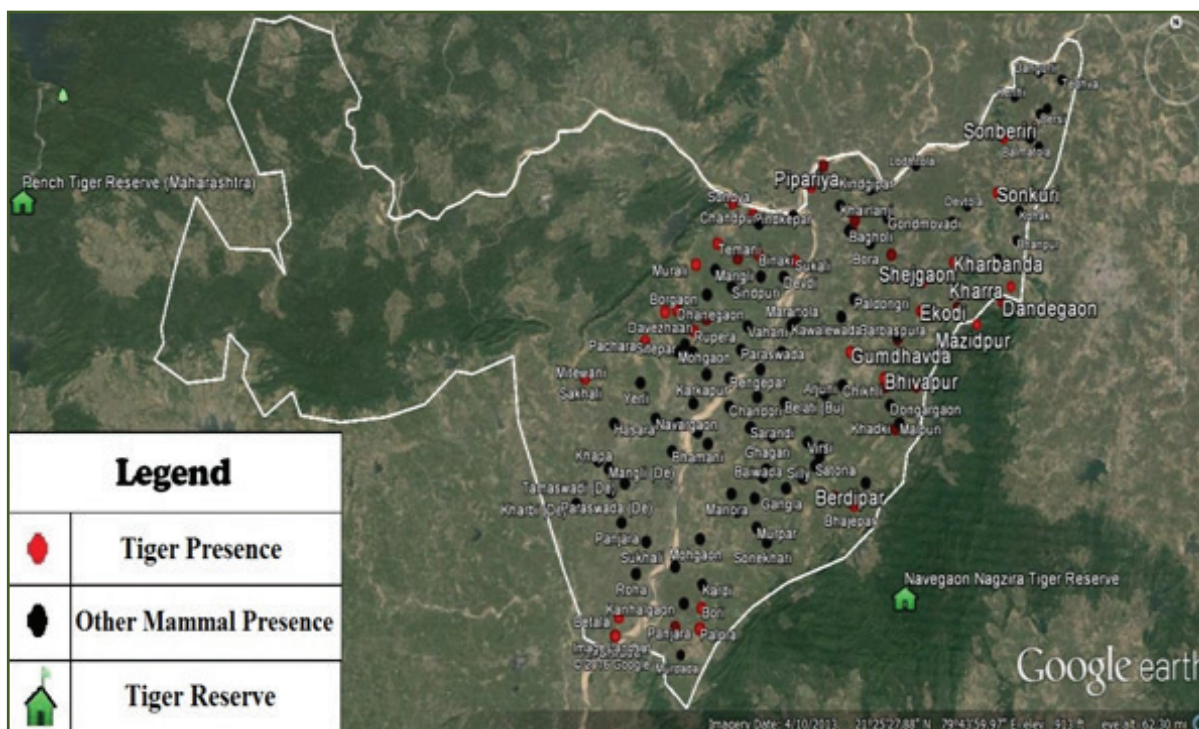


Fig. 5: Animal Presence Map in Fragmented Area.

(Source: Google Earth)



Fig. 6: Map Showing Difference in the possible corridor (BNHS) and corridor shown by Forest Department. (Source: Google Earth)

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Competing interests

None Declared

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