Int.J.Curr.Microbiol.App.Sci (2020) *9*(11): 1482-1487

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 9 Number 11 (2020)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2020.911.175

Anthropogenic Influence on Tiger Corridor between Mudumalai Tiger Reserve and Mukurthi National Park in Nilgiri Biosphere Reserve, India

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Keywords

Anthropogenic, Corridors, Conflicts and Linkages

Article Info

Accepted:
12 October 2020
Available Online:
10 November 2020

A B S T R A C T

In the era of conservation forestry, protection of floral and faunal diversity is important prerequisite. Due to the effective implementation of conservation strategies in the protected areas, growth of faunal population will be in increasing phase which leads to the expansion of home range and territory. The present investigation was conducted to assess the human influence on the corridor between Mudumalai Tiger Reserve and Mukurthi National Park in Tamil Nadu during the period from August 2014 to July 2015.The anthropogenic disturbance level was moderate (0.04 out of 0.08) and habitat linkage was also moderate (0.03 out of 0.06). Regarding area suitability for Tiger habitat, around 12 sq km (8.33 %) of area was highly suitable and around 32 sq km (22.22 %) were not suitable. Naduvatum was maximum respondent (33.33 percent) due to proximate to forest (1 km). Regarding witness about carnivores population, Leopard was witnessed more (41.67 %) than Tiger (38.33 %). With regard to man animal conflict of the study area, results revealed that conflict was increasing year to year from 2013 to 2015 [in 2013 (22 cattle), in 2014 (35 cattle), in 2015 (7 cattle up to June)]. With respect to season February and March month recorded maximum conflicts. With regarding matrix ranking of conflict, livestock depredation was the major problem followed by crop raiding. Regarding carnivores, Leopard was the major conflicting animal (61.90 %) than Tiger (38.10 %). Maximum domestic animals were killed in reserve forest (53.57 %). Regarding collections of fuel wood, the maximum respondent (35.17 %) collected their fuel wood from their surroundings, and with respect to Non Wood Forest Product collection the maximum respondent (47.37 %) collected eucalyptus leaves for extraction of eucalyptu soil. These grid pathways when monitored regularly and given protection from human intervention, protect Tiger population and its expansion in Nilgiri Biosphere Reserve.

Introduction

Corridors play a very important role in wildlife conservation and help in increasing biodiversity, through colonization (by making ways for the animals to move and colonize new areas conducive for their survival), migration (making it easy for animals to relocate safely seasonally in search of better habitat) and Interbreeding (animals can find new mates in the new habitat so that genetic diversity can increase). Effective implication of National Tiger Conservation Authority guidelines and management strategies in

Mudumalai Tiger Reserve were leads to increase the population of tiger. Due to increasing population and its territories, the tiger starts to move towards one side that was Satyamangalam Reserve forest. Tiger starts moving on the other side of Mudumalai Tiger Reserve, i.e., Mukurthi National Park. This particular corridor between Mudumalai Tiger Reserve and Mukurthi National Park has to be explored to ascertain the condition of habitat especially from human influence.

Materials and Methods

Study area

Assessment of corridor was carried out between Mudumalai Tiger Reserve and Mukurthi National Park located in the Nilgiri District of Tamil Nadu at 11.5454ºN and 11.36533ºN latitiude to 76.5056ºE and 76.48723ºE longitude. It extends over an area of 144 sq km and forms a part of the Nilgiri Biosphere Reserve.

The study area is located in the Western Ghats, which is one of the 10 hottest biodiversity hotspots of the world (Mittermeier *et al.,* 2000). Altitude in the study area varies from 908 m to 2428 m above Mean Sea Level (MSL).

The study area was surrounded in north by Chamarajanagar District of Karnataka State, in North West by Wayanad District of Kerala State, in the South East by Coimbatore District and the North East by Erode District of Tamil Nadu

Land use pattern of study area

The total geographical area of the study area is 144 sqkm of which41.61 per cent (59.92 sq km) is under forest, the cultivable land was 4.90 per cent (7.06 sq km), the Grassland was 18.07 per cent (26.02 sq km), the Human settlements 9.17 per cent (13.2 sq km) and the tea estate was 26.25 per cent (37.8 sq km).

Forest type in study area

The study area has three major forest types' *viz*., Evergreen forest, Semi Evergreen forest and Shola Forest (Champion and Seth, 1968) and manmade plantation *(Eucalyptus globulus, Eucalyptus grandis, Eucalyptus citridora, Pinus patula, Grevillea robusta* and *Tectona grandis*).

Methods

The study area was divided in to grids of 4 Sq km. By using Qgis Software, a total 36 grid was laid out throughout the study area.

To assess the extent of human disturbance

The study relied on both primary and secondary data**.** For generating primary data, five villages *viz*., Gudulur, Mudiyamund, Naduvatum, Pykara and TR-Bazar, were identified which were more proximal to forest area. Each village households were randomly selected for surveying the anthropogenic pressure.

Based on the proportionate of house hold present, the primary data were collected using a structured questionnaire. In addition to the primary data, the secondary data were also collected from the government offices, like the forest department, and Panchayat offices.

Following this, households sample frame was established by collecting complete landholders list from the respective administration office.

Finally the selections of sample household were proportional to each stratification which was based on farm land distance from forests.

Results and Discussion

To study the anthropogenic pressures

Details of respondent in different village of the study area

Among the village Naduvatum was higher respondent due to proximate to forest and entire village fall on study area and population. With respect to distance of villages from forest, Gudulur was forest and Mudiyamund was the nearest village.

Direct and indirect evidence of carnivores witnessed by villagers in the study area

Among the carnivores, Leopard (41.67 %) were more witnessed than Tiger (38.33 %) through direct and indirect way by the villagers. It might be due to Leopard uses to roam in and around the forest fringe area. A similar findings were line with observed by Seidensticker *et al.,* (1990) Leopard was known for its use of habitat edges and its ability to live in close to human habitation, the Leopard was sighted in the Chemmanatham area its near to the human habitation was more so that Leopard witnessed by the people was more (Table 1).

Man animal conflicts in different year in the study area

The man animal conflict was increased every year from 2013 to 2015 it might be due to increasing the movement of carnivores and expanding the corridor area and territory. The domestic cow killed by carnivores high in 2013 and Goat/Sheep were killed maximum in 2014 it might be due to easily availability and ability of wide choosing of food by carnivores. As Sawarkar (1989) pointed out when large cats live in proximity to humans, some amount of conflict at the border of the park was inevitable and this usually take the form of some amount of cattle killing by the predator (Table 2 and 3).

Total number of incidence of man animal conflict in different month

Regarding the man animal conflict incidence, February and March recorded highest conflicts (25 %), its due to very low rain by this time the food and water availability also very low so conflicts was high. A similar finding were also observed by Sekhar (1998) reported that conflict were negative correlated with rainfall, less conflict when good rain occurs (Table 4).

Matrix ranking of facing conflict from wild life

Regarding matrix ranking of conflict, study was expressed that the livestock depredation was the major problem in a study area followed by crop riding, it might be due to human interferences into their natural habitats in the form of cattle grazing (Table 5).

Place of incidence by were domestic animal killed

The highest number of domestic animal kills were taken place in reserve forest (53.57 %) followed by estate area (21.43 %). Its due to forest were immediate adjacent to village and maximum people would allow the cattle to graze inside the reserve forest. These current finding were in accordance with the finding made by O'connell Rodwell (2000). Most of the conflict occurred in villages bordering with reserve forest and Elephants were responsible for twice as much aggression as Lions and attacked over a larger area.

Facing conflict from carnivores

Leopard was the major problem (62 %) than Tiger (38 %) in the study area. its due to the

Leopard were spend maximum time in village boundary, Linkie *et al.*, (2003).

Place of grazing

The maximum number of respondent (41.18 %) of the people would allow the animal graze in inside the reserve forest followed by agriculture area (26.47 %) it might be availability of more and nutrient food inside the forest.

Source of fuel wood

The maximum respondent would collect the fuel wood from home surrounding (35.17 %) followed by reserve forest (32.65 %) its due to availability of good number of tree species around the home, because of home present adjacent to the forest.

Information on NWFP collected by community

The maximum respondent would collect the Eucalyptus leaf for extraction of Eucalyptus oil (47.37 %), it might be a due to large number of Eucalyptus tree available inside the forest and there was no such restriction to collect the dry leaf and oil extraction factory situated inside the forest so it can converted easily. This finding was similar with the result revealed by Bidhan (2005) were reported that the villagers collected leaves to a greater extent for commercial and medicinal purpose.

Table.1 Distance of villages from the reserve forest

S.No.	Village	Km
1	Gudulur	1.5
2	Mudiyamund	0.5
3	Naduvatum	2.0
4	Pykara	1.5
5	TR-bazar	2.0

Table.2 Direct and indirect evidence of Tiger witnessed by villagers in the study area

S.No.	Frequency of Tiger visit	Number of respondent	Percentage
1	Once in amonth	23	38.33
2	Twice in a month	22	36.67
3	Thrice in a month	15	25.00
Total		60	100

Table.3 Direct and indirect evidence of Leopard witnessed by villagers in the study area

S.No.	Evidence found	Number of respondent	Percentage
1	Once in a month	16	26.67
2	Twice in a month	25	41.67
3	Thrice in a month	19	31.67
Total		60	100

Table.4 Man animal conflicts in different years of the study area

Animal	2013	Percentage	2014	Percentage	2015	Percentage	Total
Cows	9	40.91	10	28.57	3	42.86	22
Bulls	0	0	0	0	0	0	0
Buffalo	5	22.73	4	11.43	1	14.29	10
Goat/Sheep	7	31.82	16	45.71	0	0	23
Dogs	1	4.55	5	14.29	3	42.86	9
Total	22		35		7		

Table.5 Matrix ranking of facing conflicts from wildlife

Types of conflict	Ranking	Number of respondent	Percentage
Livestock depredation	I	25	40.32
Crop-raiding	II	17	27.42
Infrastructure damage	III	11	17.74
Human fatality/ injury	IV	9	14.52
Total		62	100

Anthropogenic pressure on forest

The maximum of 66.7 per cent of respondents were allowed their cattle to 2-3 km, 42.37 per cent of respondent were used to go 2-3 km for collection fuel wood, and 52.63 per cent were used to go for 2-3 km for collection of NWFP, due to the people were easily moving inside the forest such a distance would cause man animalconflictsandalsoreduceoffoodforanimal soitleadstodecalingananimalpopulation. If people will restrict the movement up to 0.5 km to 1 km, the animal population will increase and it can be moved easily through the forest. This finding was similar with the result revealed by Daniel (1996) reported that there was more conflict will occur in buffer region than in fringe area in Ranthambore National Park.

In conclusion the study revealed that the Tiger corridor between Mudumalai Tiger Reserve and Mukurthi National Park was having many land use pattern like Tea estate, Agriculture land and three major types of forests and there were six revenue villages. Naduvatum was maximum respondent village (33.33 %) due to proximate to forest (1 km). Regarding witness about carnivores population, Leopard was witnessed more (41.67 %) than Tiger (38.33 %).With Regard to man animal conflict of the study area, the results revealed that conflict was increasing year to year in 2013 (22 cattle), in 2014 (35 cattle), in 2015 (7 cattle up to June). With respect to season February and March month recorded maximum conflicts. Regarding matrix ranking of conflict, livestock depredation was the major problem followed by crop raiding. Regarding carnivores, leopard was the major conflict animal (61.90 %) than tiger (38.10 %). Maximum domestic animals were killed in reserve forest (53.57%).Regarding collection of fuel wood, the maximum respondent (35.17 %) collected their fuel

wood from their surroundings, and with respect to NWFP collection the maximum respondent (47.37 %) collected eucalyptus leaves for extraction of eucalyptus oil. People allowed their cattle to a maximum distance of 2-3 km (66.7 % respondent) for grazing. For collection of Non Wood Forest Product 52.63 per cent respondent used to travel 2-3 km inside the forest and for collection of fuel wood52.63 per cent respondent used to travel the same distance. This grid pathway when monitored regularly and are given protection from human intervention, we could protect tiger population and its expansion in Nilgiri Biosphere Reserve.

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How to cite this article:

Baranidharan, K., M. Vijayabhama and Vinay, J. R. 2020. Anthropogenic Influence on Tiger Corridor between Mudumalai Tiger Reserve and Mukurthi National Park in Nilgiri Biosphere Reserve, India. *Int.J.Curr.Microbiol.App.Sci.* 9(11): 1482-1487.
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