



Human Wildlife Competition due to Population Growth in Ecosystem: Principle of Coexistence

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Abstract: The estimated population of one horned Rhinoceros (*Rhinoceros unicornis*) of Jaldapara National Park has increased from the year 2019 to 2022, with growth of 23.20%. Excluding National Park area, human Population density of Madarihat-Birpara Block also has been increased from the census year 2001 to 2011 @46.83 people per unit area. Increase of Rhino population density is very meagre during the last 3 years from 2019 to 2022 in the Jaldapara National Park. Here Growth of human population though less significant, but density wise significance is much more than the Rhino population in the ecosystem of the same landscape. Apart from Rhinoceros, increasing population of other herbivores and carnivores are engaged in intra and interspecific competition for space, food and shelter in the fixed area of the National Park of that landscape. Population of wild animal beyond the carrying capacity leads to stray in the adjacent human habitation and ultimately leads to conflict and competition between human and wild animal. It is resulting into injury, death of either wild animal or human. In this field-based work during 2019 to 2022, apart from sensitization, awareness creation forest department adopted lots of innovative methods along with the community participation and assured compassionate coexistence between human and wild animal in the same landscape of shared ecosystem.

Keywords: Population growth, Human wildlife competition, Population density, Landscape, Deaths, Compassionate coexistence

The interaction between humans and elephants is often referred to as conflict, however, it is also seen as competition (Davidar 2018). Human-elephant competition (HEC) (Davidar 2018) is a negative interaction between the two species, resulting in crop loss, property damage, and can lead to the loss of life of both humans and elephants (Saha 2020). Competition may be direct and indirect (Saha 2020). The forest department promotes coexistence through different means with the help of local joint forest protection committees (JFPCs) (Saha 2020). Conflicts between wildlife and humans cost many lives, both human and wildlife, threaten the livelihoods of millions worldwide and jeopardize long-term conservation goals such as securing protected areas and building constituencies in support of wildlife conservation (Sukumar 1994, Treves and Naughton-Treves 2005). Most landscapes are now dominated by humans (Sillero-Zuberi et al 2007). In indirect competition people live in fear of elephants, which restricts free movement and day to day activities of people in forest fringe areas. Conflict occurs between competing interests for environmental resources; and solutions need compromise and strategies that do not necessarily involve sealing people off from nature but, on the contrary involve a respectful engagement with wildlife (Macdonald 2001). In Gir National Park, Gujarat in 2013 interaction with the local farmers of the fringe areas it was

observed that local farmers were very happy co-existing with lions in that landscape, although lions hunt the livestock of the local farmers (Saha 2021). They explained that they were compelled to night watch to protect their crops from the Blue Bull/Nilgai (*Boselaphus tragocamelus*) every night during the crop season on a rotation basis by the family members. When they spot lions resting surrounding/in their crop fields, they became tensionless and return home with the satisfaction that Nilgai will not raid their crop. Because lions prey mainly on Nilgai and in case of loss of livestock local farmers get suitable compensation from the state government. This wonderful embedded ethos of nature-culture linkage of fringe people is supporting the in-situ Asiatic Lion conservation in the Gir National Park, Gujarat (Saha 2021). The objective was to search the innovative method and mitigation measure to address the Human Wildlife Competition derived from the population growth of the same landscape of the shared ecosystem. The hypothesis is that the solution of Human Wildlife Competition is hiding on the awareness, approach, technique, learning, acceptance, and application of the principle of Compassionate Coexistence by the human population in the shared ecosystem of wildlife habitat.

MATERIAL AND METHODS

Madarihat-Birpara Block under Alipurduar District was

selected for population study of human, as Jaldapara National Park of wild animal habitat is situated in the same landscape (GPS location 26°41'29" N, 89°16'59" E) (Fig. 1 & 2). Census data of human population was collected from the internet (https://www.indiagrowing.com/West_Bengal/Jalpaiguri/Madarihat). Population data of one horned rhinoceros was collected from the Jaldapara Wildlife Division of the Jaldapara National Park, West Bengal through questionnaire. On a sample basis Chekamari and Khairbari villages of Madarihat-Birpara Block under Alipurduar District were selected as study area for field and household survey with the objective to get community feedback as a mitigation measure of Human Elephant Competition (HEC). Hidden solution of HEC with the objective to address population Growth in the same landscape of the shared Ecosystem was communicated to the local people through audio-visual aids.

Movement of One Horned Rhinoceros (*Rhinoceros unicornis*) was studied in non-invasive mode by following the foot trail. After the direction of the Principal Chief Conservator of Forests (Chief Wild Life Warden), West Bengal and specified method of Standard Operating Procedures (SOPs), the departmental 'Kunki' elephants were used in protection and patrolling duty. At 'Pilkhana' (resting place for departmental elephant) proper health care of the Departmental 'Kunki' elephants were taken on periodic and on required basis by the Veterinary Officer with the objective of unhindered protection patrolling for stray Rhinoceros by them. Health care/check-up observations of departmental 'Kunki' elephant were recorded in individual Service book along with food, medicine register for future need. The field staffs of the forest department were engaged in the protection patrolling duty along with the 'Mahout' or 'Mahabat' (rider/trainer/keeper of Departmental elephant), with the objective to study the movement of stray Indian Rhino from the safest distance. It was their routine work. Behaviour, movement, protection and driving of Rhino were studied based on totally non-invasive method. No direct wild animal handling was involved and therefore the study was not assessed by an animal ethics committee. All the methods utilized and procedures were conducted such that they were in accordance with the direction and guidance of the Chief

Conservator of Forests, Northern Circle and Principal Chief Conservator of Forests, Wildlife and Chief Wildlife Warden, Directorate of Forests, Government of West Bengal.

RESULTS AND DISCUSSION

During 10 years total human population of Madarihat-Birpara Block under Alipurduar District has been increased from 185499 (census of 2001) to 202026 (census of 2011) with the recorded population growth of 8.91%. Likewise estimated population of one horned Rhinoceros (*Rhinoceros unicornis*) of Jaldapara National Park in the same administrative block also has been increased from 237 (2019) to 292 (2022), with growth of 23.20% (Table 1).

The increase of population of wild animal on human population increase is very meagre but population growth of wild animal on the human population growth is significant in the same landscape of the shared ecosystem of Madarihat-Birpara Block under the Alipurduar District of West Bengal (Table 1). Excluding National Park area, human population density in 352.89 km² area of Madarihat-Birpara Block also increased from 525.66 to 572.49/km². Rhino population density in 216.53 km² area of Jaldapara National Park also increased from 1.09/ to 1.35/km² (Table 2).

Growth of human population though less significant, but density wise significance is much more than the Rhino population in the shared ecosystem of the same landscape with the perspective of competition for space and other natural resources like grasses, fodder trees, water etc. Apart from that, the fixed area of the National Park is also having huge number of other herbivores like profuse breeder Gaur (Indian Bison), Sambar Deer, Hog deer and Wild boar. All the herbivores in the same landscape are engaged with intra and interspecific competition for food and shelter. Carnivore like leopard is also there in the same landscape. Population of wild animal beyond the carrying capacity leads to stray in the adjacent human habitation. As on 14th January, 2022 movement of one greater one-horned Rhinoceros or Indian Rhino had occurred from its habitat of Jaldapara National Park to the adjacent landscape of Patlakhawa Protected Forest (GPS location 26°26'29" N, 89°20'0'46" E), surrounded by populated fringe villages of Coochbehar

Table 1. Comparison of population growth (Human vs. One horned rhinoceros)

Block	District and State	Species	Year of census/ population estimation	Population (Number)	Population growth (%)
Madarihat-Birpara	Alipurduar of West Bengal	Human	2001	18,5499	8.91
		Human	2011	202026	
		One horned rhinoceros	2019	237	23.20
		One horned rhinoceros	2022	292	

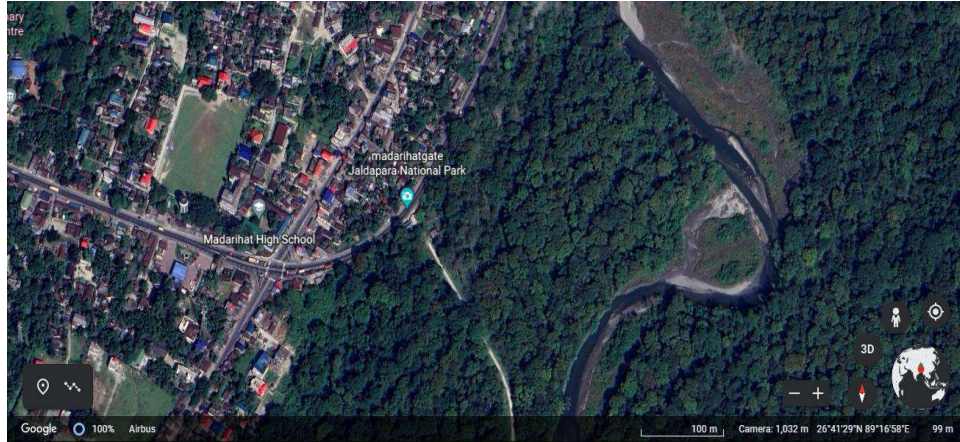


Fig. 1. 3D Satellite imagery of the human habitation of Madarihat-Birpara Block adjacent to Jaldapara National Park

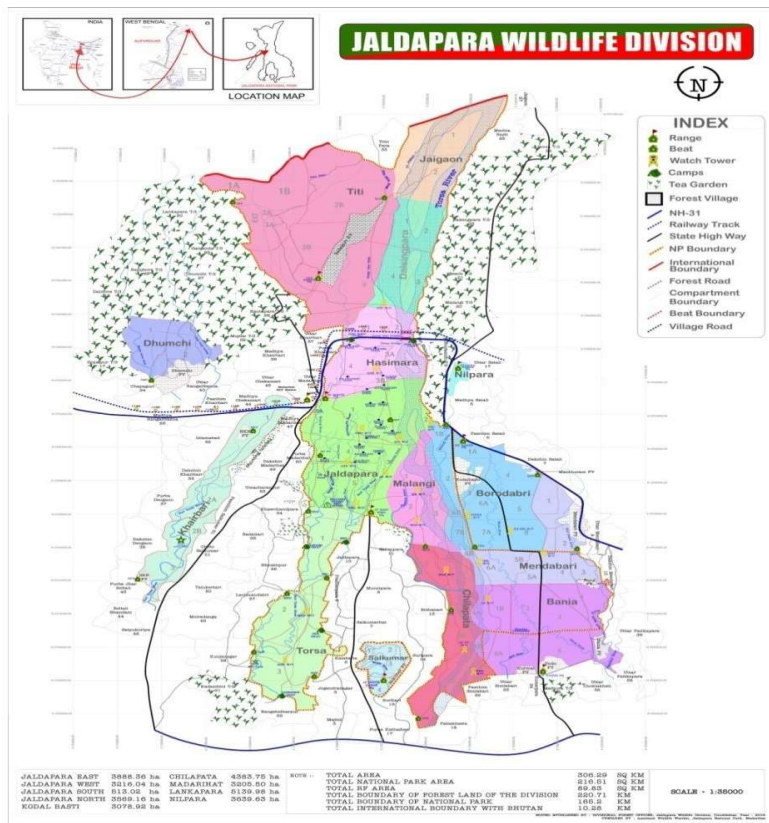


Fig. 2. Madarihat and adjacent Jaldapara National Park Landscape of that ecosystem (Source: Jaldapara Wildlife Division)

Table 2. Population density of human and one horned rhinoceros

Species	Year of census/ population estimation	Habitat area (Km ²)	Population	Density (per Km ²)	Population increase (Individual/unit area)
Human	2001	352.89	185499	525.66	46.83
	2011		202026	572.49	
One horned rhinoceros	2019	216.53	237	1.09	0.26
	2022		292	1.35	

district of West Bengal (Fig. 3). Huge resources like 20 Departmental 'Kunki' elephants (Elephant of Forest Department) and their mahouts (rider, trainer, or keeper of departmental elephant), Patawalas (fodder collectors) were engaged for almost 1 month for the guided driving of one stray Indian Rhino towards Jaldapara with the objective to remove the apprehension of local people regarding Human Rhino Competition or interaction, including the apprehension of forest personnel of poaching (Fig. 6). But we were unable to drive away the Indian Rhino from Patlakhawa Protected Forest. That Indian Rhino stayed for almost 2.5 months up to the end of March, 2022 at the human surrounded small forest of Patlakhawa and returned back to Jaldapara National Park in his own way without injuring anyone. This kind of massive unsuccessful intensive driving of wild animal for a certain period from protected forest to protected area incurred huge monetary loss of public resources just to remove the psychic apprehension of fringe people to avoid any direct confrontation.

During the period of force driving of stray Rhino from Patlakhawa Protected Forest to Jaldapara National Park, another stray of one adult Leopard was observed as on 27th January, 2022 in the populated Kolabagan area, Subhaspalli of Coochbehar town at a house premises. Field foresters of the Divisional Forest Officer tranquilized and rescued that stray leopard within 2 hours. Mob was a limiting factor behind our rescue work. The linear distance through River line from Patlakhawa Protected Forest (PF) to Kolabagan area of Coochbehar is approx. 20.8 (Fig. 4) km. As per our field data base 1 to 2 leopards were at Patlakhawa Protected Forest at that time. Through the Torsa River line Coochbehar town is approx. 37.73 Km away from Jaldapara National Park (NP) of Alipurduar District (Fig. 5). The current analysis, thorough scanning of Patlakhawa grass and wood land with the 10

Kunki elephant has compelled the Leopard to stray from Patlakhawa Protected Forest to Coochbehar town. There is hardly any probability of straying of Leopard directly from Jaldapara National Park, Madarihata to Kolabagan, Coochbehar town, as because Patlakhawa Protected Forest is situated in between Jaldapara National Park and Coochbehar town. But through Torsa river line Patlakhawa PF is 2 to 3 Km away from Dhoidhoi Beat of Jaldapara East Range side of Jaldapara National Park. But rejected the probability of straying from Dhoidhoi Beat side also, because if stray may happen from there, then Leopard had to come at Patlakhawa Protected Forest through river line. No such kind of previous record was also available in this regard. It is well established that through scanning of Patlakhawa Protected Forest by the departmental elephant to drive away the single Rhino towards Jaldapara, actually leads to stray of Leopard in the Coochbehar town as negative externalities of force driving. The force driving of stray animal is not a solution. It involves expenditure of lots of resources and time and most of the time may or may not give successful desired results also. It is the same landscape that has been shared by both human and wild animal population. Learning of the arts and techniques of patience, compassion and co-existence can be an innovative strategy to address the human-wild animal competition arisen from the population growth in the same landscape of that ecosystem.

Besides, the fixed area of Jaldapara National Park is also accommodating approx. 135-150 wild elephants. As per the previous study in the same landscape of Jaldapara National Park-Madarihata in between 2015-2018 there were 12 elephant deaths mostly by anthropogenic causes and 34 human deaths caused by the wild elephants (Saha 2020). The results of that study indicate that most of the direct encounter occurred at early morning and evening, when

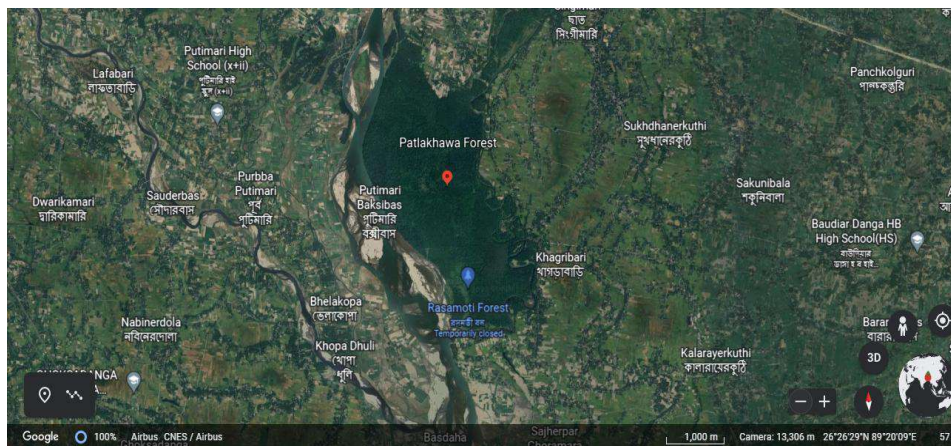


Fig. 3. Patlakhawa Protected Forest of Coochbehar District, West Bengal (One of the study sites) (Source: Google earth 3D imagery)

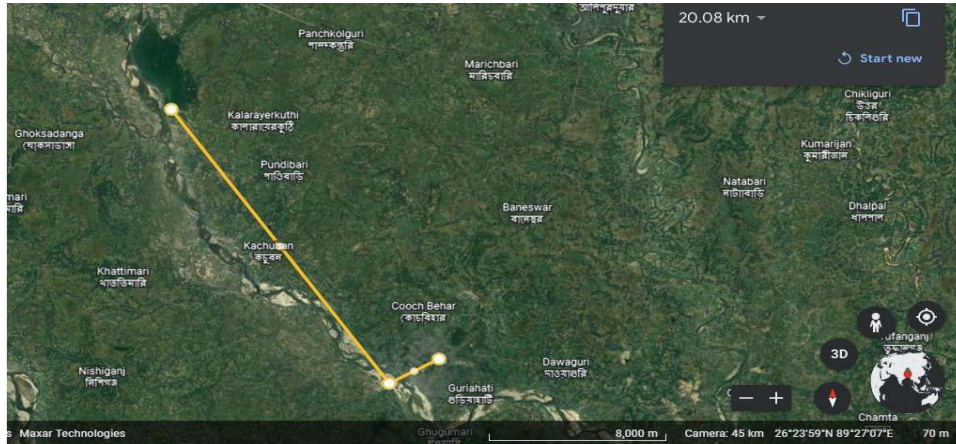


Fig. 4. Linear distance through River line between Patlakhawa Protected Forest to Kolabagan, Coochbehar town

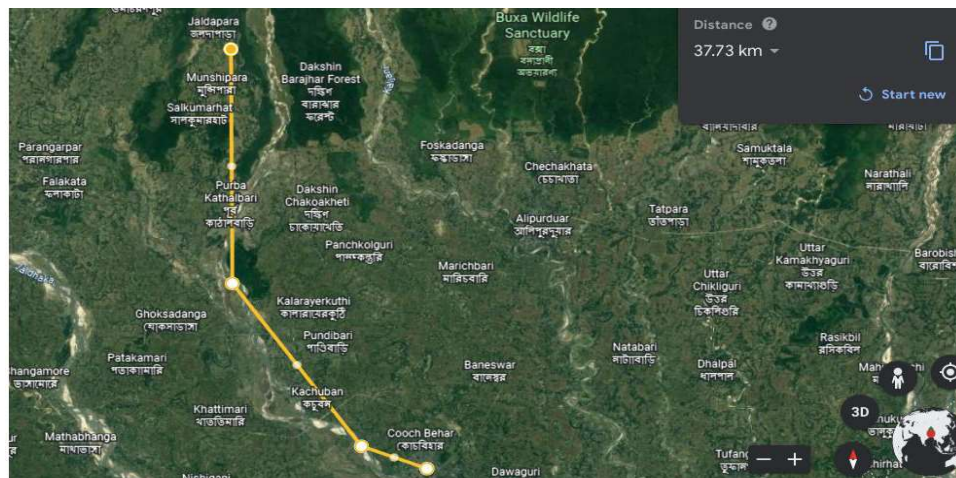


Fig. 5. River line distance between Jaldapara NP to Coochbehar town through Patlakhawa Protected Forest



Fig. 6. Unsuccessful effort of driving of stray Rhinoceros from Patlakhawa to Jaldapara National Park with the help of 'Kunki' elephant (Photo credit: Sanjit Kumar Saha)

people were gone for open defecation. Saha (2020) also supporting the findings that learning and acceptance of co-existence with the avoidance of direct interactions and confrontations through innovative implementable interventions are the keys to resolve the Human-Wildlife Competition in the same landscape of the shared ecosystem.

CONCLUSION

The solution of competition due to the pressure of population growth of human and wild animal in an ecosystem of the same landscape can be addressed by the awareness, approach, technique and learning of Compassionate Coexistence leading to Conservation. The local people can play a direct role in co-existence technique by staying in their houses at the time of stray of wild animal just to give a chance

to the stray animal either to go in the forest in his own timely manner or to facilitate the rescue personnel of the Forest Department by not becoming as mob. Tranquilization, capture and translocation of stray wild animal may be a short-term goal to mitigate the competition between human and stray wild animal, but ultimate solution is hidden with the acceptance of principles and strategies of co-existence with the same landscape of shared ecosystem between wild animal and human. In this bio-diverse world growing population of both the species human and wild animal in a same landscape demands space, shelters and rights over natural resources of the shared ecosystem, naturally it leads to competition and only way out is adoption of strategies of coexistence without confronting one another. We human beings as an apex species of this biological clock have to play a major role in coexistence for the greater cause of compassion, conservation and existence of all the living forms on the earth.

Ethics statement: Behaviour and movement of wild animal was observed in non-invasive mode from a safest distance. All the methods were carried out in accordance with relevant guidelines and regulations. All the operation performed as per the traditional procedure of the field forestry and wild life management of the Directorate of Forests, Government of West Bengal.

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