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SEASONAL VARIATION OF PREY DENSITY IN SIMILIPAL TIGER RESERVE, ODISHA, INDIA

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Abstract

A 3 day transect line survey was conducted in May 2016 and November 2016 in 75 transect lines covering core area over entire landscape of 1194.75 sqkm^2 of similipal Tiger reserve (STR) for relative abundance of prey species. During survey period prey species were encountered along the transect lines like sambar, chital, Barking deer, wild pig, common langur, Rhesus macaque, Indian gaur, Giant squirrel, pea fowl, Hare and Elephant. In Pre-Monsoon over all 32.7±4.32SE/km^2 prey population was estimated in Similipal Core division.Simillarly in Post-Monsoon over all 37.3±2.3SE/km^2 was estimated in Similipal Core division.Continous prey population monitoring is going on in Similipal Tiger Reserve which may indicates the rising of prey populations in the tiger reserve.

Keywords*: Transects; Prey populations; Density; Similipal tiger reserve; Odisha*

Introduction

The abundance of large carnivores is directly releated to the large herbivore abundance and its distribution. Terrestrial mammalian prey is important to maintain the large carnivore population and insufficient prey will leads to locally extinction of the carnivore species. For example, the decline in tiger population worldwide mainly linked with prey density along with habitat loss and poaching. The ungulate density is the key determinants for large felids and in majority of the Indian forests large ungulate play a major role in shaping the carnivore communities especially in south, Central and Eastern Indian forests. Therefore to conserve and manage endangered or threatened species, it is crucial to understand prey densities in their natural habitat. Prey species either directly or indirectly influence the population dynamics of their predators. Therefore to conserve and manage endangered or threatened species, it is essential to understand prey densities in their natural habitat [1]. Prey selection by large carnivore is a complex phenomenon [2-4]. In forested habitat the actual estimation of prey density is a difficult task.There are several hypothesis that have been proposed to explain prey selection by predators [5]. These hypothesis pertain to ultimate causal factors such as energetic cost –benefit involved [6, 7] as well as to proximate mechanisms of selection such as search images or prey vulnerability [8-10]. The estimation of population size and status assessment of prey density in forested habitat is important for wildlife managements. Although ungulate (prey) census may be releatively easy in open grassland or meadow areas, it is much harder in forest habitats [11]. However, in recent past, continued depletion of prey population and

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fragmentation of natural habitats, apart from poaching is a serious issue acknowledged by conservationists as well as managers. These two major factors led to the present dilemma of tigers in the wild and will determine its survival in future [12-15]. Prey Species either directly or indirectly influence the population dynamics of their predators.Therefore, to conserve and manage endangered or threatened species, it is essential to understand prey densities in their natural habitat. Prey selection by large carnivore is a complex phenomenon. In forested habitat the actual estimation of prey density, is a difficult task. In this connection we evaluated the ungulates density in Similipal Tiger Reserve through distance sampling method [16]. Seasonal comparisons among available ungulate density which is urgently required for survival of the large predators and their co-predators in terms of their available food resources.

Study area

Similipal Tiger Reserve located in the Mayurbhanj District of Odisha and spreads over 2750km^2 of the Chotanagpur plateau (Figs. 1 and 2). The park is surrounded by high plateaus and hills, the highest peak being the twin peaks of Khairiburu and Meghashani (1515m above mean sea level). At least twelve rivers cut across the plain area, all of which drain into the Bay of Bengal. The prominent among them are Budhabalanga, Palpala, Bandan, Salandi, Khairi, Khadkei, Budhabalanga, West Deo and East Deo. An astounding 1078 species of plants including 94 species of orchids find their home in the tiger reserve. It host 55 species of mammals, 304 species of birds, 60 species of reptiles, 21 species of frogs, 60 species of fishes and 164 species of butterflies that have been recorded from the park. The core area comprises of ranges with an area of 1194.75km^2.The land scape of Similipal encompasses numerous rolling hills covered with tropical semi-evergreen forest, tropical moist deciduous forest, dry deciduous hill forest, high level sal forest land and Savannah. The Climate of Similipal is tropical. Three distinct seasons are experienced inside the Similipal during the Year.

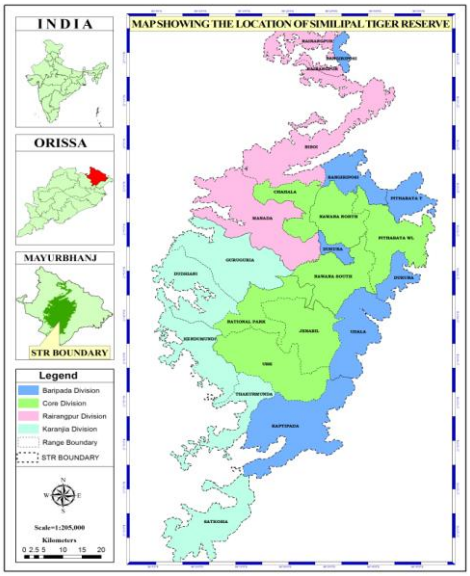

Fig. 1. Map showing the Study area

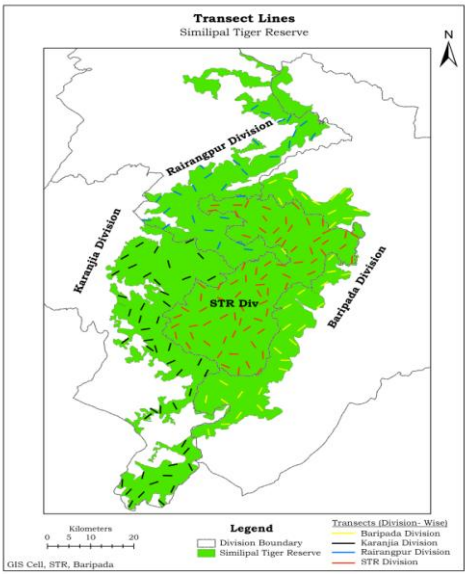

Fig. 2. Map showing the Transect line

The annual rain fall ranges from 100mm to 2000mm. The temperature varies from 5c to 40c. The Southern and western portion is cooler and north-eastern portion are warmer. The major prey species found here are chital (*Axis axis*), Sambar (*Rusa unicolor*), gaur (*Bos gaurus*), Barking deer (*muntiacus muntjac*), Mouse deer (*Traguius kanchil*) and Wild pig (*Sus scrofa*). The carnivore species in Similipal are Tiger (*panther tigris*), Leopard (*Panthera pardus*), Jackal (*Canis aureus*), hyena (*Crocuta crocuta*), wolf (*Canis lupus*), dhole (*Cuon*

alpinus), Jungle cat (*Felis chaus*) and leopard cat (*Prionailurus bengalensis*). Primate species found are common langur (*Semnopithecus entellus*) and Rhesus macaque (*macaque mulata*).The Indian Porcupine (*Hystrix indiaca*), blacknaped hare (*Lepus nigricollis*), flying fox (*Pteropus giganteus*), flying squirrel (*Petaurista petaurista*), giant squirrels (*Ratfua indica*) and Indian pangolin (*Manis crassicaudata*) also occur in this Tiger reserve.

Methods

Line transect method by distance sampling was used to estimate densities of prey species in the study area. This method has been widely applied for estimation of prey species in tropical forests. Each forest beat was taken as Sampling unit. Transect lines of 2kms distance laid in the intensive study area. Each transect was covered three times (total 738km) during pre-monsoon and post-monsoon for 2016. Transects were walked early in the morning in the first two hours after the sunrise when the animals are most active. In this way total 75 transect lines were covered in the study area in a random sampling method.

The density of prey species was analyzed using software DISTANCE version 7.0.The density estimated for major prey species such as common langur, rhesus macaque, chital, sambar, wildpig, barking deer and mouse deer. We fitted several plausible detection probability models generated under hazard-rate, half-normal and uniform detection functions to the observed distance data to select the most appropriate models.

Result

It was observed that Range wise highest prey population is found in UBK (39.90±7.60SE/km^2) followed by Jenabil (30.29±7.79SE/km^2), Chahala (25.23±10.56SE/km^2), National Park (24.18±4.41SE/km^2), Nawana-South (23.69±7.86±SE/km^2), Nawana-North (20.10±6.81SE/km^2) and Pithabatha (17.01±4.41SE/km^2) in Pre Monsoon. The prey population profile of STR is getting improved and is much higher than observed in last year monitoring. Similarly in Post Monsoon Highest prey population was found in UBK (37.43±6.10SE/km^2) followed by Jenabil (32.23±8.14SE/km^2), Chahala (29.01±9.35SE/km^2), Pithabatha (28.27±7.58/km^2), Nawana-south (26.74±3.77SE/km^2), Nawana-North (24.53±5.99SE/km^2) and National Park (23.66±8.17SE/km^2) (Figs. 3 and 4).

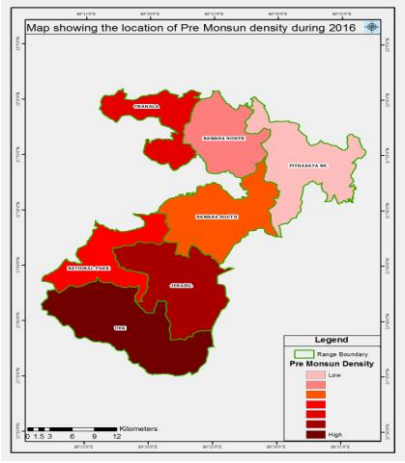

Fig. 3. Map Showing the Range wise Density during Pre-monsoon

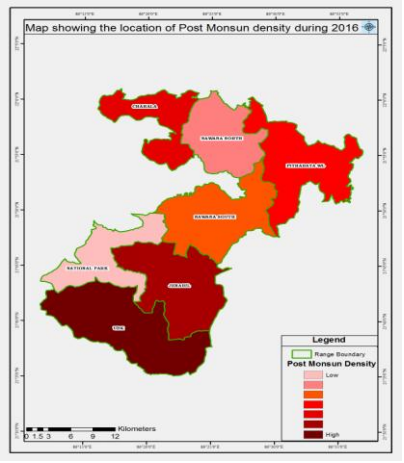

Fig. 4. Map Showing the Range wise Density during Post-monsoon

Season wise available prey density data was collected. The pre-monsoon and Post-monsoon prey data was analyzed separately. The Most important five prey species were found

on the transect lines from various parts of the Tiger Reserve of the core area. During the post-monsoon Sambar was found to be most abundant prey species (*9.86±1.96SE/km*^{2}) followed by the Common langur (9.67±1.3SEkm^2), Wild pig (8.4±1.04SE/km^2), Chital (7.90±1.7SE/km^2) and Barking deer (7.4±0.8SE/km^2). Similiarly in the Pre-monsoon Sambar was found to be the most abundant prey Species (11.13±2.74SE/km^2) followed by Chital (9.51±2.9SE/km^2), Wild pig (6.35±2.48SE/Km^2), Barking deer (5.9±0.98SE/km^2) and Common langur (5.44±0.91SE/km^2).

Discussion

Densities of most tropical forest ungulate species are now significantly lower and many of them are facing extinction because of human interference in their habitat, directly or indirectly. As several of these species have critical ecological roles, such population changes may impact forest and agricultural ecology. The line transect method was used to estimate ungulate density in Similipal for the present study. This is considered more appropriate method for calculating prey density with the associated coefficient of variance (CV %) since it takes into account the temporal variation in species detection. During the present study data was gathered using a laser range finder for distance and compass for bearing of the animal groups from the line transect. Comparison of ungulate prey densities /abundance between 2011 through 2016 shows gradual but remarkable increase in prey density on temporal scale. Previous study in Similipal estimated ungulate density 19.98per square kilometer between 2012 and 2013. During the year 2014 the estimated ungulate density was 28.9 per square kilometer. In 2009 there were vicious violent attacks in Similipal Tiger Reserve. The staffs and tourists were assaulted; rest houses and offices were burnt. All the staff posted in the core area and adjacent buffer area deserted their posts. No staff ventured inside the core area of the Reserve till August 2009.Thereafter the staff gradually started venturing in the core area and with gradual but sustained efforts spanning over a year most of the anti-poaching camps started working again. Up to July, 2009 the poachers and hunters had a field day and they indiscriminately killed thousands of large and small animals, adversely affecting ungulate population in the reserve. While analyzing ungulate density variation between the Ranges during the period, it was observed that from 2013 onwards the ungulate density of Jenabil Range has overtaken that of UBK (Upper barakamuda) range (both of these ranges are occupied by the major prey species in Similipal Tiger Reserve). Here it is significant to note that jenabil village was completely relocated outside of Similipal Tiger Reserve, to a place near Udala named Ambadiha in 2010.This provided a new open space of around 120ha, which was more than the total open grasslands available in the critical wildlife zone area. The abandoned agriculture fields turned slowly into meadows having tender, nutritious grasses.

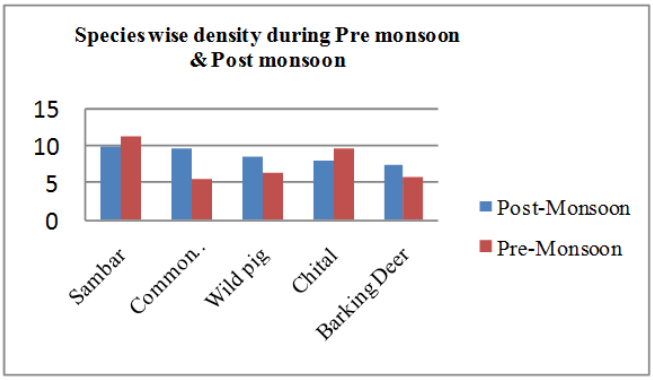

Fig. 5. The Species wise density during pre & post monsoon

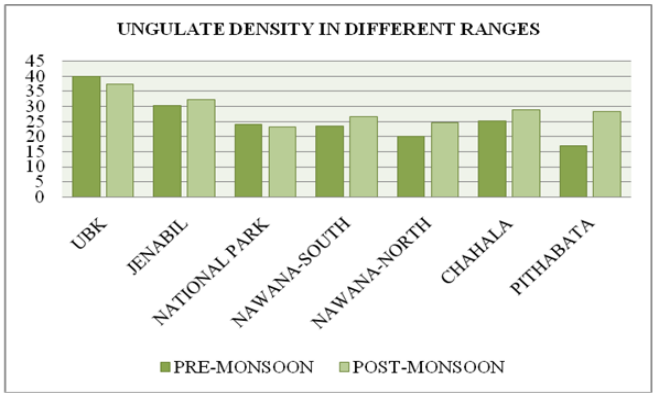

Fig. 6. The Ungulate Density in Different Ranges

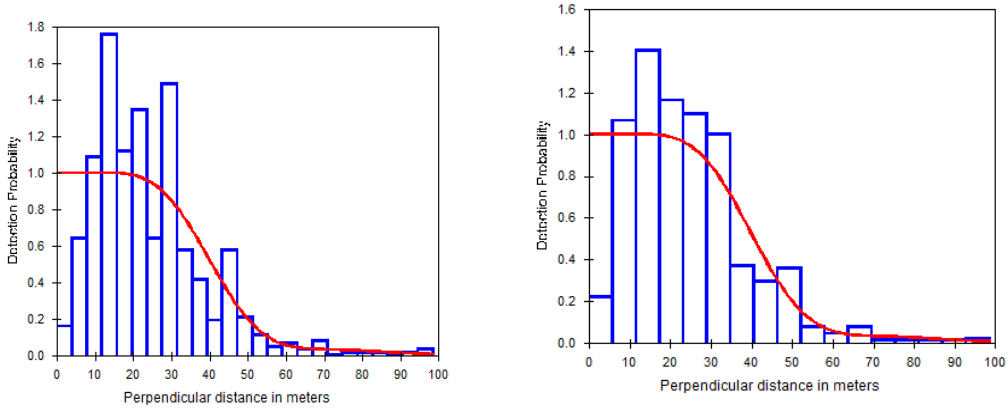

Fig. 7. Detection Probability of Overall Ungulates during May 2016

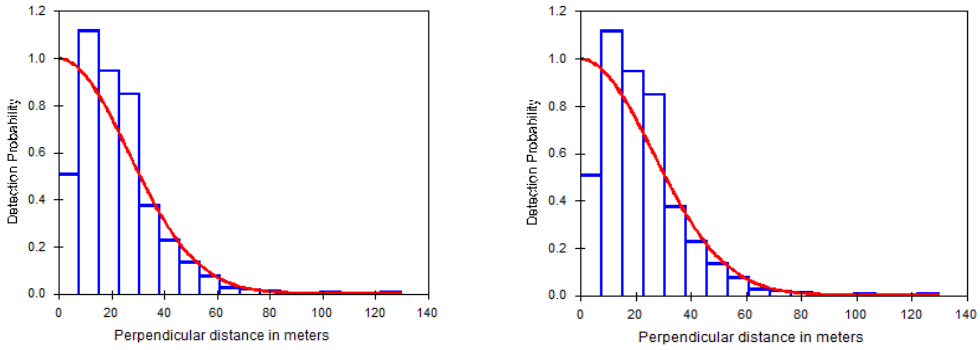

Fig. 8. Detection Probability of Overall Ungulates during Nov 2016

Conclusion

Ungulates can play a very important role maintain the population of predators. Ungulate prey depletion can be serious threat to the survival of tigers. As the poaching of ungulates on which the tiger population depends for food may be serious as the poaching of tigers themselves, strict anti poaching measures along with habitat improvement are needs to ensure the long term survival of tigers in the Similipal Tiger Reserve.

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