HERBIVORE ABUNDANCE IN KANHA TIGER RESERVE

Short Note on Report "Status of Ungulates in Tiger Habitats of India"

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Herbivore Abundance in Kanha Tiger Reserve

Kanha is one of the finest protected areas not only in India but also in south-east Asia. The tiger reserve is among the first nine tiger reserves launched under the ambitious conservation scheme "Project Tiger" in April, 1973. The tiger reserve is situated in the Mandla and Balaghat districts of Madhya Pradesh in India. The tiger reserve (2074 sq. km.) consists of two conservation entities, namely, the core zone (917.43 sq. km.) and the buffer zone (1134 sq. km.). The remaining area of 22.57 sq. km., not included in the core, but technically still a national park, is occupied by villages. Kanha tiger reserve forms part of an eco-region renowned internationally for its rich floral and faunal attributes. Presently, besides a viable population of tigers and a small population of the endangered hard ground barasingha, a wide spectrum of plant and animal species considerably add to the significance of this landscape.

As per the 2025 report titled "Status of Ungulates in Tiger Habitats of India" released by the Wildlife Institute of India (WII), Dehradun, Kanha Tiger Reserve has recorded the highest population of ungulate prey species among all tiger reserves in the country. It is also heartening to note that Kanha has substantial population of a variety of prey species signifying successful conservation of various habitat types over a large area. The report highlights key figures that emphasize the rich prey base crucial for sustaining a thriving tiger population.

The Kanha management has adopted an adaptive management strategy, often described as "learning by doing", for wildlife management in the protected area. Over the past several years, it has undertaken a wide range of wildlife management practices to protect and enhance wildlife habitats, aiming to support and increase prey populations of various ungulate species. These managerial interventions were deemed necessary to sustain the gradually increasing populations of tigers and their co-predators. The long-protected Kanha wildlife habitats have morphed into excellent natal areas for predator species, particularly tigers and leopards, resulting in satisfactory recruitment into their populations.

These wildlife management practices include year-round stringent protection against all inimical factors, relocation of forest villages from the core zone, reclamation and integration of old village sites into surrounding grassland habitats through the eradication of weeds (lantana and other small weed species), removal of brushwood species, restocking of grasslands, establishment of exclosures to reduce grazing pressure, creation of connectivity between

grasslands, development of swamps and wallows for barasingha, and construction of water holes. Prey populations have responded positively to these management practices, exhibiting satisfactory trends within their ecological amplitudes.
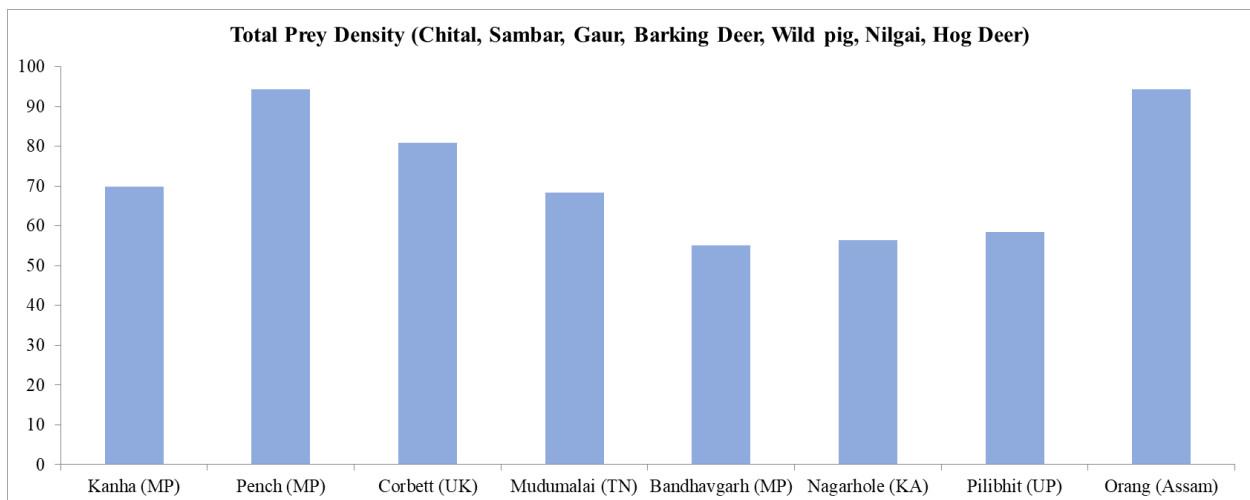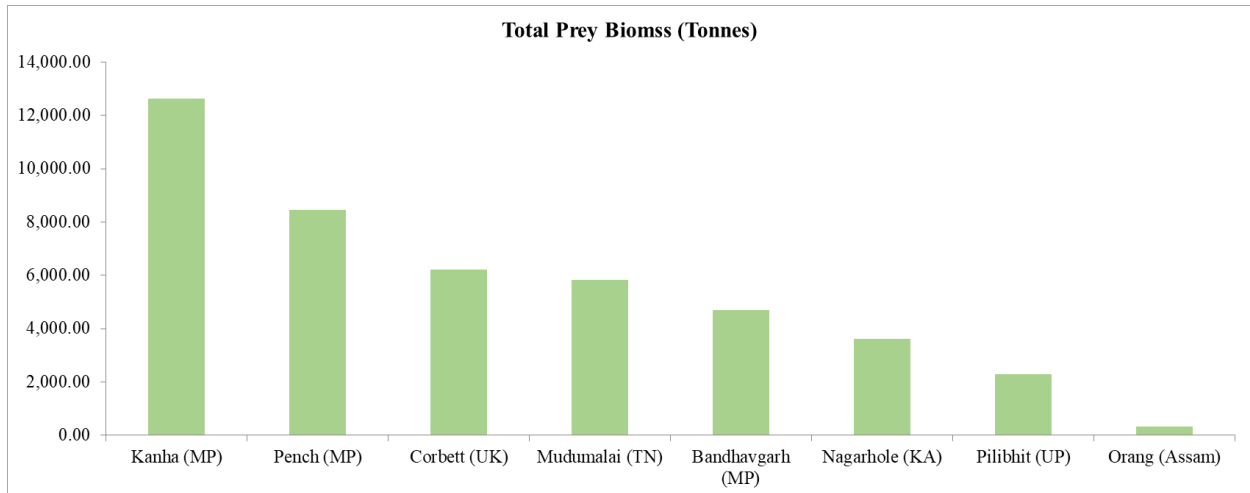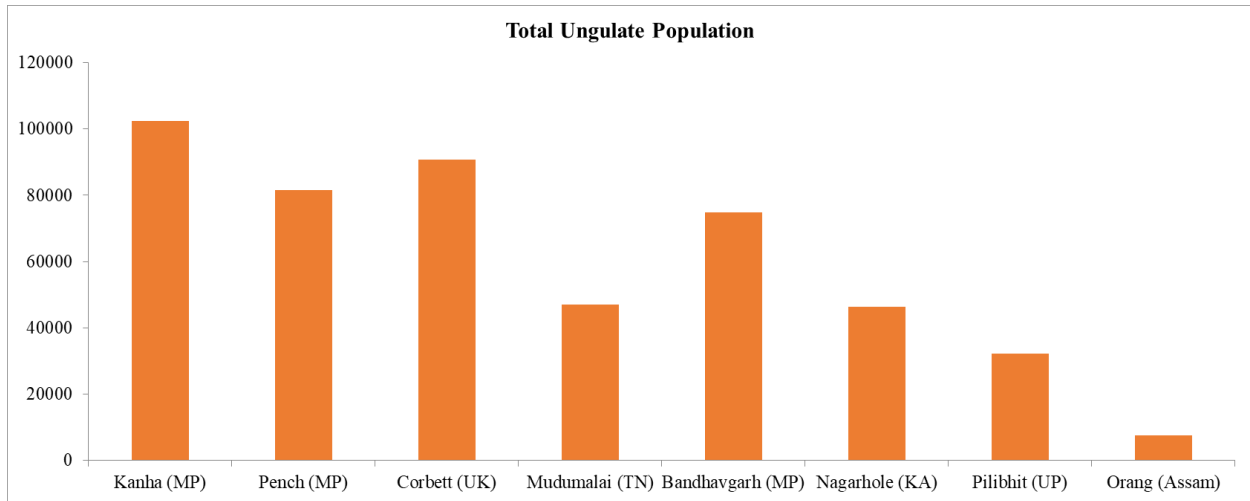
A deeper understanding of ungulate populations provides vital insights into the health and carrying capacity of protected areas. This note examines tiger reserves with total ungulate density greater than 50 per sq. km.

Name of Tiger Reserve	Total Suitable Habitat used for analysis (sq. km.) (obtained using GIS)	Total Prey Density	Total Prey Biomass per Unit Area (kg/ sq. km.)	Total Ungulate Population	Total Prey Biomass (Tonnes)
Kanha (MP)	1,467.00	69.86	8,602.15	1,02,484.62	12,619.35
Pench (MP)	866.00	94.22	9,759.70	81,594.52	8,451.90
Corbett (UK)	1,121.00	80.93	5,534.95	90,722.53	6,204.68
Mudumalai (TN)	688.00	68.30	8,484.40	46,990.40	5,837.27
Bandhavgarh (MP)	1,357.00	55.15	3,453.25	74,838.55	4,686.06
Nagarhole (KA)	820.00	56.44	4,403.05	46,280.80	3,610.50
Pilibhit (UP)	550.00	58.42	4,174.35	32,131.00	2,295.89
Orang (Assam)	80.00	94.35	4,198.20	7,548.00	335.86

- Species-wise prey densities (Chital, Sambar, Gaur, Barking deer, Wild pig, Nilgai, Hog Deer) have been sourced from the WII report "Status of Ungulates in Tiger Habitats of India".
- Biomass values per individual are used for estimation: Chital–50 kg., Sambar–185 kg., Gaur–650 kg., Wild pig–70 kg., Barking deer–30 kg., Nilgai–150 kg., Hog deer–40 kg.

- Kanha Tiger Reserve boasts the highest ungulate population (102,485) among India's major tiger reserves. This substantial population reflects Kanha's exceptional carrying capacity and the presence of diverse habitats that support a rich prey base.

- With its vast forest area under outstanding management, Kanha sustains an abundant ungulate population, reinforcing its role as a high-quality predator habitat. The reserve's extensive landscape offers varied ecological niches, ensuring optimal prey distribution across different areas.

- Kanha's prey density (69.86/km²) is particularly significant, as it supports high ungulate numbers over a large and heterogeneous terrain. This distribution pattern ensures stable prey availability across the ecosystem, rather than causing localized overcrowding.

- Kanha exemplifies ecological richness and balance, with a biomass density of 8,602.15 kg/km². Over its 1,467 sq. km. expanse, the total biomass surpasses 12.6 million kilograms, highlighting not just the highest biomass weight of prey in India but also the quality of available forage and habitat.

- The reserve holds nearly 50% more total prey biomass compared to many other tiger reserves, underscoring its ability to sustain a larger and more stable prey base for predators like the tiger.

- What sets Kanha apart is the presence of large-bodied ungulates such as gaur (6.42/km²) and sambar (8.21/km²), along with smaller prey species like barking deer. These species contribute substantially to total biomass, fulfilling the high-energy dietary needs of apex predators. The reserve's grassland-forest mosaic provides nutritional richness and ensures a spatially distributed prey base, reinforcing Kanha's reputation as a biologically thriving and meticulously managed ecosystem.
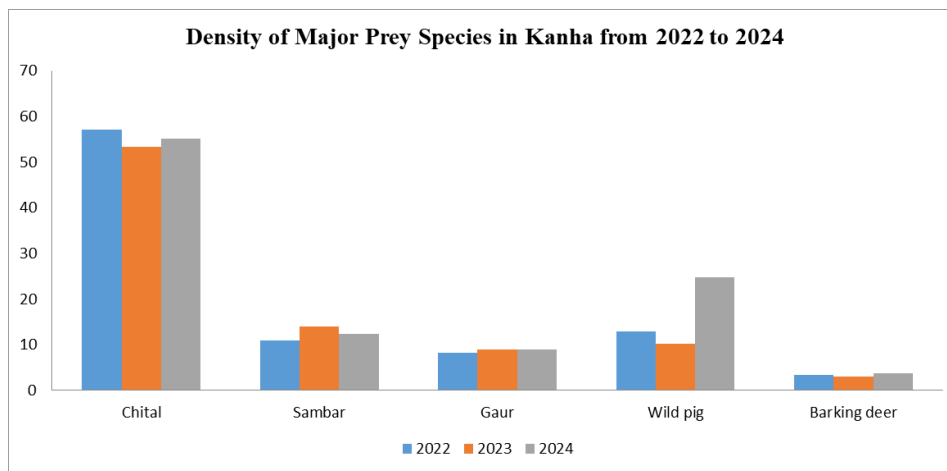
Total Ungulate Population

Total Prey Biomss (Tonnes)

Total Prey Density (Chital, Sambar, Gaur, Barking Deer, Wild pig, Nilgai, Hog Deer)

Phase-IV Monitoring:

The tiger reserve has also adopted Phase-IV monitoring protocol since winter 2011. The exercise is carried out during peak summer and winter every year and involves monitoring of tigers and prey species. The previous population estimates of ungulate species under the Phase-IV monitoring are as under:

Ungulate Species	2022	2023	2024
Chital	57.15	53.37	55.17
Sambar	11.00	13.98	12.42
Gaur	8.27	9.03	8.97
Wild pig	12.83	10.23	24.70
Barking deer	3.34	3.07	3.67

Source: WII, Dehradun

Key Conservation Strategies Enhancing Ungulate Population Growth:

- **Habitat Management:** Beyond grassland and water conservation, Kanha has employed holistic habitat management strategies to provide a sustainable environment for ungulates. Key habitat improvement initiatives include - seasonal removal of invasive weeds, promoting native plant growth, grassland relief exclosures, forest understory restoration, maintaining optimal food availability without habitat depletion and systematic removal of encroaching brushwood, improving grazing areas for herbivores.

- **Waterhole Management during Dry Seasons:** Seasonal water bodies act as essential lifelines for Kanha's wildlife, particularly in critical dry periods. To mitigate seasonal water shortages, strategic water management initiatives have been employed. Key measures include: creating artificial waterholes in crucial habitats prone to drought, deepening and desilting of tank to improve water retention and installing solar-powered borewells for a sustainable and non-intrusive water supply.

- **Stringent Protection:** A strong conservation framework is incomplete without effective protection measures. Kanha has significantly strengthened patrolling, surveillance, and community engagement programs, ensuring minimal human interference in the reserve. Key protection strategies include: Round-the-clock Forest patrolling using MSTrIPES mobile tracking via foot, elephant, and vehicle patrols, community awareness initiatives educating locals about wildlife conservation and rapid response teams addressing potential human-wildlife conflicts. This stringent protection mechanism safeguards ungulate populations from threats such as poaching, habitat encroachment, and disturbances, helping maintain a stable predator-prey equilibrium.

  The forest guards, along with patrolling watchers, conduct regular patrols in their respective beats and adjoining areas using the M-STrIPES Patrol App. This technology-enabled monitoring ensures systematic data recording, enhances protection measures, and supports effective management of wildlife and habitat within the tiger reserve. The total patrol effort of 88600 km. and the patrol intensity of 42.19 per sq. km. in the month of April, 2025 is one of the highest, if not the highest, in the country.

- **Village Relocation for Habitat Restoration:** Kanha's ecosystem has undergone remarkable ecological restoration, partly facilitated by voluntary village relocations. Human settlements within the reserve historically led to habitat degradation, resource competition, and disturbances to wildlife. Through planned relocation, several villages within Critical Tiger Habitat (CTH) were shifted outside the protected zone, enabling grassland and forest regeneration. The evacuated land has been transformed into thriving wildlife habitats, allowing ungulate populations to expand freely without interference from agriculture or livestock grazing. This transition has also reduced poaching risks, ensuring a nutritionally rich and undisturbed prey base for predators.

- **Grassland Corridor Creation for Ungulate Movement:** Ungulates rely on open grasslands for foraging, breeding, and seasonal migrations. Recognizing this necessity, Kanha has actively developed and linked fragmented grasslands, creating continuous corridors that facilitate unrestricted movement of prey species. These corridors ensure that species such as barasingha, chital, and gaur have access to well-connected foraging grounds. The strategic integration of grasslands with forested patches has promoted prey stability, strengthened nutritional productivity, and ensured even population dispersal throughout the landscape. These proactive interventions prevent ungulate population declines due to water scarcity, ensuring prey species remain well-distributed across the reserve instead of clustering in limited locations, which could lead to overgrazing and habitat degradation.

- **Internal Ungulate Translocation for Population Balance:** To maintain population stability, Kanha has successfully implemented internal translocation programs, ensuring equal prey distribution across its vast landscape. Targeted translocations involve - moving surplus prey populations (such as chital) from high-density zones to areas with lower prey numbers, repopulating newly developed grasslands, fostering better prey dispersion and reducing localized overpopulation stress, preventing resource depletion. This approach optimizes predator-prey dynamics, ensuring Kanha remains a biologically functional and ecologically resilient hunting ground for tigers.

As the Banjar Valley portion of Kanha Tiger Reserve was developed earlier, the prey density in this region has historically been much higher than in the Halon Valley. Accordingly, habitat corridors and internal translocation strategies have been employed to augment prey populations in the Halon Valley. These efforts are yielding positive results, as both prey and predator densities are showing a steady increase in the Halon landscape.

- **Staff Training:** Field staff is imparted regular and systematic training to enhance their skills in wildlife monitoring. As a result, the data collected during surveys accurately reflect ground realities, thereby improving the reliability of population estimates. The team of the Wildlife Institute of India, Dehradun, extends technical support for long-term monitoring, further strengthening the scientific rigour of the process.

Conclusion:

The comparative analysis of ungulate populations across eight major tiger reserves highlights that, Kanha Tiger Reserve stands out for its ecological depth, diversity, and sustainability. With the largest total ungulate population spread across a vast and heterogeneous landscape, Kanha demonstrates an exceptional capacity to support apex predators like the tiger over the long term.

Its high biomass, coupled with the presence of large-bodied prey species such as gaur and sambar, contributes to a nutritionally rich prey base. The balanced distribution of prey, rather than concentrated density, reflects stable habitat conditions, continuous management interventions, and strong ecological integrity.

Even though the buffer zone of the tiger reserve is highly fragmented, with a number of land use types, consistent protection and effective management interventions have led to a noticeable increase in the chital population within this area.

The excellent scientific management whereby prey species growth has kept pace with growth in predator species has made Kanha one of the rare high density tiger reserves with relatively low man-animal conflicts, thus, providing a model of socially responsible wildlife conservation.

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