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A Study on Blue Bull (*Boselaphustragocamelus*) Conflict in Jhalawar (Rajasthan)

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Abstract - This research paper explores the dynamics of human-blue bull conflict in the Jhalawar district of Rajasthan, India. The study aims to investigate the patterns of blue bull menace and the types of conflicts arising between humans and blue bulls in the region. Data was collected through surveys, interviews, and field observations. A sample size of 150 respondents was selected using systematic random sampling techniques. Findings reveal that habitat destruction, agricultural expansion, illegal grass collection, and overgrazing by livestock are significant contributors to the conflict. The paper suggests various mitigation strategies to reduce human-blue bull conflict, emphasizing the importance of stakeholder cooperation, government intervention, and community awareness programs.

Introduction - India boasts a diverse biological legacy, encompassing approximately 89,451 species, among which are 390 species of mammals (Kumar and Khanna, 2006). Among these, India shelters 31 species of ungulates, with 25 of them protected under the Wildlife Protection Act of 1972. Of these ungulates, six belong to the antelope family, including the Nilgai, Four Horned Antelope, Indian Gazelle, Blackbuck, Tibetan Antelope, and Tibetan Gazelle, with three species being exclusive to the Indian subcontinent (Prater, 1971).

Standing tall as the largest Asian antelope, the Blue Bull (Boselaphustragocamelus) is a frequent sight in the agricultural landscapes of Central and Northern India. However, the burgeoning population of Nilgai presents a significant challenge to farmers, often resulting in crop raids and damages across agricultural fields near protected areas (Nasim Ahmad Ansari, 2017).

Nilgai, found across India, Nepal, and Pakistan, predominantly thrives in the Terai lowlands along the foothills of the Himalayas, with substantial populations scattered across northern India. In states like Gujarat, Uttar Pradesh, Delhi, and Rajasthan, the Nilgai population has surged significantly, leading to appeals from farmers in Bihar, Chhattisgarh, Haryana, Punjab, Andhra Pradesh, and Madhya Pradesh to the government for population control measures due to crop raids and resultant food shortages. Though the estimated Nilgai population in India stands around 100,000, Rajasthan alone reported 77,737 individuals in the 2019 census. With their adaptability, Nilgai have made their presence felt in 114 protected areas across 16 states, primarily Bihar, Uttar Pradesh, Rajasthan, Gujarat, Haryana, Punjab, Madhya Pradesh, and Uttarakhand, where their populations range from 5,500 to 254,449. Nilgai's habitat extends beyond protected areas, infiltrating human-dominated landscapes and crop fields.

Scientific Classification

1. Zoological Name: Boselaphustragocamelus
2. Kingdom: Animalia
3. Phylum: Chordata
4. Class: Mammalia
5. Order: Artiodactyla
6. Family: Bovidae
7. Subfamily: Bovinae
8. Genus: Boselaphus
9. Species: B. tragocamelus

The Nilgai's scientific name, Boselaphustragocamelus, originates from Latin and Greek roots, signifying its resemblance to both cows and deer. Endowed with a robust physique and slender legs, the Nilgai flaunts distinct features like a sloping back, a white throat patch, and short manes, with males exhibiting darker coats and formidable horns. Standing tall at 1–1.5 meters at the shoulder, these antelopes weigh between 109–288 kg (240–635 lb) for males and 100–213 kg for females, making them the largest antelope species in Asia.

Distribution and Habitat: Boselaphustragocamelus is indigenous to peninsular India and the Indus division of the Indian sub-region, predominantly inhabiting arid or semi-arid ecosystems with sparse rainfall. Their habitats vary from grasslands to woodlands and brushy areas, extending from the northeast border of Pakistan to southern India, with their populations most concentrated in northern and central regions.

Behaviour: Nilgai are diurnal and gregarious animals,

typically forming small groups of up to 10 individuals, though larger gatherings may occur. Males exhibit territorial behavior, marking their domains with dung piles, while females and juveniles maintain separate interactions. Despite possessing keen senses of sight and hearing, Nilgai lack a robust sense of smell. When alarmed, they emit short guttural grunts or clicking sounds, with individuals up to 500 meters away able to hear their distinctive coughing roar.

Research into the activity patterns of Blue Bulls reveals insights into their daily routines, including resting, walking, and social behaviours. Females tend to be more active than males, with distinct peaks in activity observed throughout the day.

In essence, the Nilgai's robust presence and adaptability underscore its significance in India's diverse ecological tapestry, albeit posing challenges in managing its burgeoning populations amidst human settlements and agricultural lands.

Materials and Methods: Data collection involved surveys, interviews, and field observations. Primary data were gathered through household questionnaires to assess the causes, nature, and management strategies of human-blue bull conflict. Field observations were conducted to corroborate respondent's responses. Systematic random sampling techniques were employed to select sample villages and households. Secondary data were collected from books, research articles, and online sources to support and enrich the study's findings.

Data Collection Methods: The methodology employed for data collection centered on survey methods, integrating both primary and secondary data sources. Primary data were acquired through household questionnaires, interviews, and field observations. Household questionnaires were utilized to assess the causes, nature, and management strategies related to Human-Blue Bull Conflict in the area. Field observation served to corroborate respondents' answers, ensuring the collection of accurate and reliable information. Secondary data sources, including books, internet searches, libraries, journals, and articles, were consulted to supplement and validate the primary data.

Sampling Size and Sampling Technique: It is obvious that Jhalawar is surrounded by five Districts such as: KOTA (NW), BARAN (NE), GUNA (EAST), RAJGARH and AGAR (South). However, the extent of exposure of local people and their agricultural area to wildlife is not the same throughout the five districts rather it greatly differs from one to another. Therefore, only area with highest population of blue bull was selected using systematic random sampling technique. In addition, random sampling technique was employed to identify sample households. In this head of households were randomly selected from sample kebeles/ villages of district which were selected using systematic random sampling after the completion of preliminary survey which is helpful to identify specific villages which are highly affected as a result of the conflict with wildlife. 5% of the total households from each sample village were selected randomly. The sampling size of the study was determined based on formula adapted from Israel (1962) as follows.

n=N/1+N (e)2n=N/1+N (e)2

where; N = the total population;

n = the required sample size;

e = the precision level which is=(± 10%),

where confidence interval is 90% at p=+ 10 (maximum variability) which is=(±10%) $n=1850/1+1850(0.1)^2 = 95$.

A total of 150 respondents were selected and the questionnaire was transferred purposefully. The respondents were selected purposively based on their ability, awareness, adjacent to an area and knowledge contributes to the overall research objectives.

Data Analysis: Data analysis encompassed both qualitative and quantitative methods. Descriptive statistics such as mean percentage were used to interpret the survey questionnaire, interviews, and field observations. The findings were presented through tables, charts, pictures, and percentages, further enhanced with graphs and diagrams to provide deeper insights into the study. The methodologven components, incorporating both primary and secondary data sources to comprehensively address the research objectives.

Study Area: Jhalawar district, located in southeast Rajasthan, encompasses diverse landscapes ranging from rocky terrain to verdant forests. The district's climate is characterized by hot summers and moderate winters, with the highest rainfall in Rajasthan. Rich in flora and fauna, Jhalawar hosts various wildlife species, including blue bulls. Major economic activities in the area include agriculture, with crops such as wheat, soybean, and vegetables dominating the agricultural landscape.

Map showing the geographical location of Jhalawar (study area)

Exploring the Richness of Jhalawar: A Geographic Perspective

Nestled in the south-eastern region of Rajasthan, Jhalawar unfolds its geographical diversity and cultural richness. This plate presents an overview of the study area, encompassing

its subdivisions, terrain, climate, and vegetation.

Subdivisions: Jhalawar district is segmented into eight distinct sub-divisions, each contributing to the region's unique charm and character:

Jhalawar, Aklera, Gangdhar, BhawaniMandi, Pirawa, Khanpur,Manohar Thana, Asnawar.

Geographic Landscape: Jhalawar's landscape stands in stark contrast to much of Rajasthan, boasting rocky yet verdant terrain. Pre-historic cave paintings, imposing forts, and dense forests adorn the region. The abundance of wildlife and diverse flora lends an exotic flavour to Jhalawar.

Climate: The climate mirrors that of the Indo-Gangetic plain, with scorching summers reaching up to 47°C and chilly winters touching 1°C. Jhalawar experiences the highest rainfall in Rajasthan, averaging 35 inches annually. Monsoons bring relief with cool breezes, making September to March the ideal time to explore the region. Vegetation: The generous annual precipitation of 890mm sustains a rich variety of flora and fauna in Jhalawar. Major crops include soybean, sorghum, maize, and groundnut in kharif season, while wheat, chickpea, coriander, and mustard dominate the rabi season. Renowned for its orange, garlic, and coriander production, Jhalawar is also a hub for hybrid vegetable cultivation.

Results: During the survey, it was found that 80% of the total respondents considered Blue bulls to be a significant problem due to their destructive behavior towards farmland, exhibiting a ferocious nature.

The herd size varied widely, ranging from 15 to 93 individuals, indicating both small and large group sizes were observed. Among the respondents, 52% regarded blue bulls as dangerous. The damage caused by blue bulls to crops was extensive, with 58% of crops damaged while being consumed, 28% destroyed while the animals were sitting on the farms, and 14% disrupted while the animals passed through the fields.

Indirect evidence from the study revealed that blue bull attacks were frequent, particularly when the animals were disturbed by human activities or accidents. Otherwise, they remained calm and non-aggressive.

Furthermore, results highlighted the absence of compensation for crop damage caused by blue bulls, despite 100% of farmers acknowledging them as a threat. Government intervention in providing compensation was notably absent.

The study emphasized that blue bulls pose a significant threat to agricultural crops, particularly during the monsoon season, with habitat destruction, agricultural expansion, and overgrazing identified as primary causes of conflict. Mitigation strategies proposed include stakeholder cooperation, legislative interventions by the government, enforcement of regulations, and community awareness programs. Long-term solutions such as crop diversification and the promotion of alternative livelihoods were also recommended to mitigate conflict and conserve wildlife.

Conclusion: Human-blue bull conflict presents a complex challenge requiring multifaceted solutions. The study underscores the importance of understanding the underlying causes of conflict and implementing targeted mitigation strategies to promote coexistence between humans and wildlife. By addressing habitat degradation, promoting sustainable agriculture practices, and fostering community engagement, it is possible to mitigate human-blue bull conflict and safeguard both human livelihoods and wildlife populations in Jhalawar district.

Recommendations: Based on the study findings, several recommendations are proposed:

1. Cooperative farming practices to protect crops from raiders.
2. Provision of compensation for wildlife-induced damage.
3. Increased awareness campaigns targeting local communities.
4. Government subsidies for crop protection measures.
5. Restriction of human settlements near wildlife habitats.
6. Crop pattern diversification to minimize conflict.
7. Implementation of boundary walls around agricultural fields.
8. Establishment of rapid response teams for wildlife conflicts.
9. Support for young conservationists and local community initiatives.
10. Expansion of protected areas and buffer zones.
11. Promotion of alternative livelihoods to reduce dependence on agriculture.
12. Exploration of non-lethal methods for blue bull population control.

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