Ecological Impact of Forest Fires on Chital Deer (Axis Axis) Behavior and Habitat in Ramnagar Forest Division Uttarakhand

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Abstract

The Chital deer along with other species is significantly influenced by forest fires regarding their natural behaviors and habitat adaptations. Within Ramnagar Forest Division's (RFD) Uttarakhand region of India this investigation investigates how forest fires affect Chital deer behavioral actions and range movements together with habitat selection patterns. Analyzing two different ecological regions in Ramnagar Forest Division (RFD), Uttarakhand, India whose variations include seasonal activities together with food availability and predator threats has been emphasized in this study. Research outcomes demonstrate wildlife implications related to forest fires which help guide wildlife management approaches for conservation purposes.

Keywords: Chital, field observation, forage, habitat, fire, predation, grazing, browsing.

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Introduction

The Chital deer or spotted deer (Axis axis) is an important keystone herbivore in the tropical forest ecosystem maintaining vegetation dynamics and predator prey relationships (Dave, 2008). Chital deer (axiterus ruficollis) are highly sensitive to natural disturbances causing habitat quality, particularly forest fires, and are native to the Indian subcontinent.

Vegetation structure changed and reduced availability of forage as well as increased predation risk of Chital deer (Certini, 2005) are triggered by these fires.

The Ramnagar Forest Division (RFD) spans 487.36 km² and comprises tropical deciduous forests dominated by Sal (Shorea robusta) and Teak (Tectona grandis) (Champion & Seth,

1968). It is a narrow link that is fundamental for the movement of various wildlife such as elephants (Elephas maximus), leopards (Panthera pardus), barking deer (Muntiacus muntjak), sloth bears (Melursus ursinus), wild boars (Sus scrofa) and Chital deer. Chital deer behaviour and habitat use in RFD give a uniqueness to study the ecological effects of fire to the Chital deer.

This study deals with two such ranges in the RFD: the hilly Kosi Range, with high Chital activity, and the relatively flat Fatehpur Range which has less Chital activity and is influenced to a greater extent by human interference. This study aims at understanding the behavioral changes, habitat use, and forage availability of the species before and after the forest fires and help us to know their ability to cope with environmental stressors and conservation strategies.

Review of Literature

Forest fires are a leading cause of ecological change, which causes major alteration of habitat conditions and the behaviour of wildlife. It has been found in studies that fires may decrease food availability and disturb predator prey dynamics for Chital deer (Lyngdoh et al., 2009). Soil properties are also modified by fire, and include pH and organic matter as well as nutrient content, which affects the ability of vegetation to regrow and the habitat that subsequent herbivores will occupy (Certini, 2005). The intensity, frequency, and landscape characteristics of fire affect biodiversity differently, and fire impact on biodiversity should be addressed in conservation planning (Nowacki and Abrams, 2008).

Study Area

The Ramnagar Forest Division of Uttarakhand India is a biodiversity hotspot in terms of topography and ecological richness. The Kosi Range, with its undulating terrain and dense forest cover, is a high Chital activity zone. In contrast, the Fatehpur Range, characterized by open landscapes and significant human presence, shows lower Chital density. Seasonal forest fires, driven by both natural and anthropogenic causes, frequently impact these areas, altering habitat quality and resource availability (Champion & Seth, 1968).

Methodology

Behavioral Observations

Field observations were conducted twice monthly from February 2018 to December 2019, covering pre-fire, fire, summer, and rainy seasons. Chital deer activity patterns were recorded during peak hours (early morning and late evening) using binoculars and a Nikon D3400 camera. Local guides and forestry experts provided input on optimal observation times and locations. Behavioral parameters included grazing, browsing, resting, and vigilance activity (Dave, 2008).

Forage Availability

Forage availability was assessed by measuring the biomass of grazing and browsing plants in 10×10 meter quadrats at each site. Samples were collected before and after fire events to estimate the impact on food resources. The biomass of herbs, shrubs, and grasses was measured using digital analysis of site photographs (Subbiah & Asija, 1956).

Habitat Assessment

Habitat characteristics, including canopy cover, understory density, and fire intensity, were recorded at sampling sites. Soil quality parameters such as pH, organic matter, and nitrogen content were also analyzed to assess post-fire habitat recovery (Certini, 2005). Survey of Local Communities Interviews were conducted with 200 individuals, including forest guides, gypsy drivers, and local residents, to gather insights into Chital deer activity and habitat preferences. The questionnaire focused on changes in Chital behavior post-fire, perceived threats, and community attitudes toward wildlife conservation.

Results and Discussion

Behavioral Changes

Forest fires significantly influenced Chital deer behavior. During the fire season, vigilance activity increased due to heightened predation risk in open, fire-affected areas. Grazing and browsing activities declined, particularly in the Kosi Range, where fire intensity was higher. Post-fire, Chital activity shifted toward areas with regenerating vegetation and water availability, indicating an adaptive response to habitat changes (Dave, 2008).

Forage Availability

Forage availability declined sharply during the fire season. In the Kosi Range, herbaceous biomass was reduced by 50%, while shrub biomass declined by 40%. The Fatehpur Range exhibited a 40% reduction in herbaceous biomass and a 30% reduction in shrub biomass during the fire season. Recovery was observed during the rainy season, with forage availability increasing by 60% in the Kosi Range and 55% in the Fatehpur Range, reflecting faster regeneration in flat terrain due to higher moisture retention (Subbiah & Asija, 1956).

Habitat Preferences

Chital deer showed a preference for fire-unaffected areas with dense canopy cover and abundant forage. In the Kosi Range, post-fire habitat use was concentrated around water sources, while in the Fatehpur Range, Chital activity was restricted to patches with regenerating understory vegetation. Soil quality analysis revealed that fire-induced changes in pH, organic matter, and nitrogen content affected vegetation regrowth and habitat suitability (Certini, 2005).

Community Perceptions

Local communities reported a decline in Chital sightings during the fire season, attributing this to displacement and reduced forage availability. Most respondents emphasized the need for fire prevention measures and reforestation efforts to support wildlife conservation.
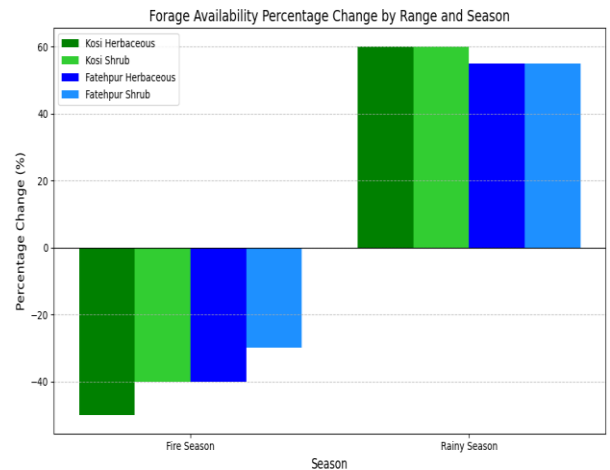
Figures

1. Figure 1: Chital herd grazing in the Kosi Range pre-fire season (2019).

2. Figure 2: Change in plant density due to forest fire (2019).

3. Figure 3: Percentage increase in different types of forage before and after the fire season (2019).

4. Figure 4: Fire-affected Kosi Range showing regenerating vegetation (post-fire season 2019).

Conclusion

This study highlights the significant impact of forest fires on Chital deer behavior, forage availability, and habitat use. Adaptive

responses to habitat changes underscore the resilience of the species but also reveal vulnerabilities to prolonged environmental disturbances. Conservation strategies should prioritize fire management, habitat restoration, and community engagement to mitigate the adverse effects of forest fires on Chital deer populations in the Ramnagar Forest Division.

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