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Habitat preference and distribution of Himalayan Red Panda (*Ailurus fulgens fulgens*) in Ilam, Eastern Nepal

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In Nepal, red panda has been sparsely studied, although its range covers a wide geographical area. The current study was conducted in two community forests of Ilam district with the objective of examining the present distributional status and determining the habitat utilization of the species. Extensive field surveys were conducted to estimate species distribution by presence-absence of the species in the study site. Primary data was recorded from 12 transects during the field survey. The study revealed uneven distribution of red panda in the study site that may be due to the altitudinal and geographic variations, availability of food sources, bamboo cover and distance to water resources. The logistic regression model demonstrated the presence of bamboo, elevation, and above ground biomass the significant determinants associated with red panda habitat. We recorded the presence of red panda within the elevation range of 2200 to 2600 m.a.s.l. in broad-leaved mixed forest with abundant bamboo in the understory at our study site. Mass flowering and die-off of bamboo, landslides and anthropogenic threats like livestock grazing, and ringal bamboo cutting, were found to be the serious threat associated with red panda habitat. The study strongly recommends conservation managers, policy makers and concerned stakeholders to mitigate the existing threats and human-induced activities on the red panda habitat.

Key words: Bamboo, conservation, disturbance, habitat management, threats, water.

INTRODUCTION

Red pandas (*Ailurus fulgens*) are endangered small mammal species and are a subject of global conservation concerns (Choudhury, 2001; Williams, 2004; Bista et al., 2017; Panthi et al., 2019; Thapa et al., 2020). They are listed in the IUCN Red list and included in the Appendix I of the CITES and are one of the legally protected mammal species in Nepal (Glatston et al., 2015; Bista et al., 2017; Panthi et al., 2017; Acharya et al., 2018). They are the only living member of the genus *Ailurus* and family Ailuridae with two sub-species: *A. fulgens fulgens* (Himalayan Red Panda) and *A. fulgens styani* (Chinese Red Panda) (Choudhury, 2001; Bhatta et al., 2014; Hu et al., 2020). Nepal is mainly home to the subspecies *A. fulgens fulgens* (Thapa et al., 2018; Hu et al., 2020). Red pandas can be found in the mountainous regions of the eastern Himalayas, spanning from western Nepal to

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northeastern India, Bhutan, China, and northern Myanmar (Glatston et al., 2015; Panthi et al., 2019). Thriving predominantly in high altitude environments, red pandas typically inhabit elevations ranging from 2,200 to 4800 m above sea level (m.a.s.l.) across their range countries (Roberts and Gittleman, 1984; Choudhury, 2001; Bista et al., 2017; Panthi et al., 2019). However, sightings have been reported even at lower elevations, such at 2210 m.a.s.l. in Ilam district of eastern Nepal (Bista et al., 2017).

The red panda is a herbivorous mammal from the order Carnivora and is native to the eastern Himalayan broadleaf and coniferous forests (Pradhan et al., 2001; Panthi et al., 2012; Thapa et al., 2018). This species is renowned for its specialized habitat and dietary preferences, with bamboo constituting a primary component of its diet (Yonzon and Hunter, 1991; Panthi et al., 2012; Sharma et al., 2014). Red pandas prefer mature forest habitats in close proximity to water sources (within 100-200 m), characterized by tree canopy cover (>30%), bamboo cover (>37%), and a preferred bamboo height of 2.9 m (Williams, 2004; Bista et al., 2017). Across various forest types, red pandas display a preference for steeper slopes and areas abundant with fallen logs, tree stumps, shrubs, bamboo culms, and aspects facing north, north-west, and south-west (Zhang et al., 2008; Dorji et al., 2012).

With less than 10,000 mature individuals remaining worldwide, red pandas are on the verge of extinction in the near future (Dorji et al., 2012). Estimates of the total red panda population in Nepal ranges between 237 and 1061 individuals (Bista et al., 2017; Acharya et al., 2018). The Population and Habitat Viability Assessment (PHVA) workshop in Nepal recognized 11 sub-populations of red pandas, estimating the total population to be 317 individuals (Bista and Paudel, 2014). They are found in 24 districts across Nepal (DNPWC, 2018). Throughout their range, red pandas face several natural and anthropogenic threats, with Bhutan, India, and Nepal posing the most significant risks to their survival compared to other countries (Thapa et al., 2020). Natural challenges to red panda include bamboo die-off, mass flowering of bamboo (DNPWC, 2018), forest fire, and the impacts of climate change (Bhatta et al., 2014; Bista et al., 2017; Thapa et al., 2020). Similarly, habitat degradation, infrastructural expansion, deforestation, predation by feral dogs, and the construction of roads and trekking trails contribute to habitat fragmentation and disturbance, disrupting the habitat requirements of red pandas (Williams, 2004; Dorji et al., 2012; Bista and Paudel, 2014; Panthi et al., 2019; Dendup et al., 2020; Thapa et al., 2020; Lama et al., 2020; Subedi et al., 2022).

While a majority of the studies on red panda have been focused within the protected areas, more than two-third of their potential habitat lies outside the protected areas in Nepal (Bista et al., 2017; Gyawali et al., 2022). However, comprehensive information regarding habitat preferences, distribution, population ecology, genetics, and conservation threats to red pandas remain limited (Bhatta et al., 2014; Panthi et al., 2017; Lama et al., 2020). With this background, our study aims to build understanding on distribution and habitat requirements of Himalayan red panda from its eastern distribution range. We intend to (a) document red panda distribution, (b) habitat preference, and (c) identify possible habitat variables affecting distribution in the eastern Nepal. Understanding the impact of habitat use and distribution is important to conservation managers in planning effective conservation plans and mitigating the effect of development.

MATERIALS AND METHODS

Study area

Geographically, Ilam (26°40' – 27°06' N, 87°36' – 88°15' E) is the eastern district of Nepal, bordered by Panchthar in the North, Jhapa in the south, West Bengal of India in the east and Dhankuta in the west. It lies to the south of the Mahabharata range and west of the Singhalila range. The study sites Singhadevi community forest and Chitrehile community forest lie within the Suryodaya Municipality Ilam, to the east of the district headquarters (Figure 1). The forest area is surrounded by Singhalila National Park of India in the east, Chipchipe community forest Mai-Jogmai in the west, Magma monastery in the north, and village area in the southern part. The study area is a part of the PIT (Panchthar-Ilam-Taplejung) forest corridor, a red panda forest in eastern Nepal which contains 20% of the potential red panda habitat and supports 25% of the red panda population in the country with an estimated 100 individuals (Williams, 2004; Bista and Paudel, 2014; Lama et al., 2020). The conservation of this region is of utmost importance, not just for red pandas, but also for other endangered species like the clouded leopard *(Neofelis nebulosa)*, Himalayan thar *(Hemitragus jemlahicus)* and Chinese pangolin *(Manis pentadactyla)*. Additionally, it supports a diverse bird population (Williams et al., 2010). The research site is characterized by a temperate broad-leaf ecosystem with the dominance of plant species, such as *Symplocos ramosissima*, *Lithocarpus pachyphylla, Machilus edulis, Persea odoratissima, Rhododendron,* and *Arundinaria* (ringal bamboo) species.

Data collection

A preliminary survey with the local communities, forest guardians, and other stakeholders was conducted prior to our study to identify potential red panda habitats at the study site. In September 2019, a comprehensive field study was conducted to assess the suitability of habitats for red pandas. Across the study area, 12 different transects, each spanning 1 km, were laid out. The locations for laying out the transects were identified randomly to ensure unbiased sampling throughout the study area. Transect walks were conducted during favorable weather conditions to maximize sighting opportunities and to ensure safety. Each transect was walked by a team consisting of two trained observers equipped with binoculars, GPS devices, cameras, and field notebooks. We recorded evidence of red panda presence using indirect evidence such as droppings, footprints, and foraging signs as well as direct sightings while walking along the transects. Furthermore, we gathered presence data opportunistically when encountered beside established

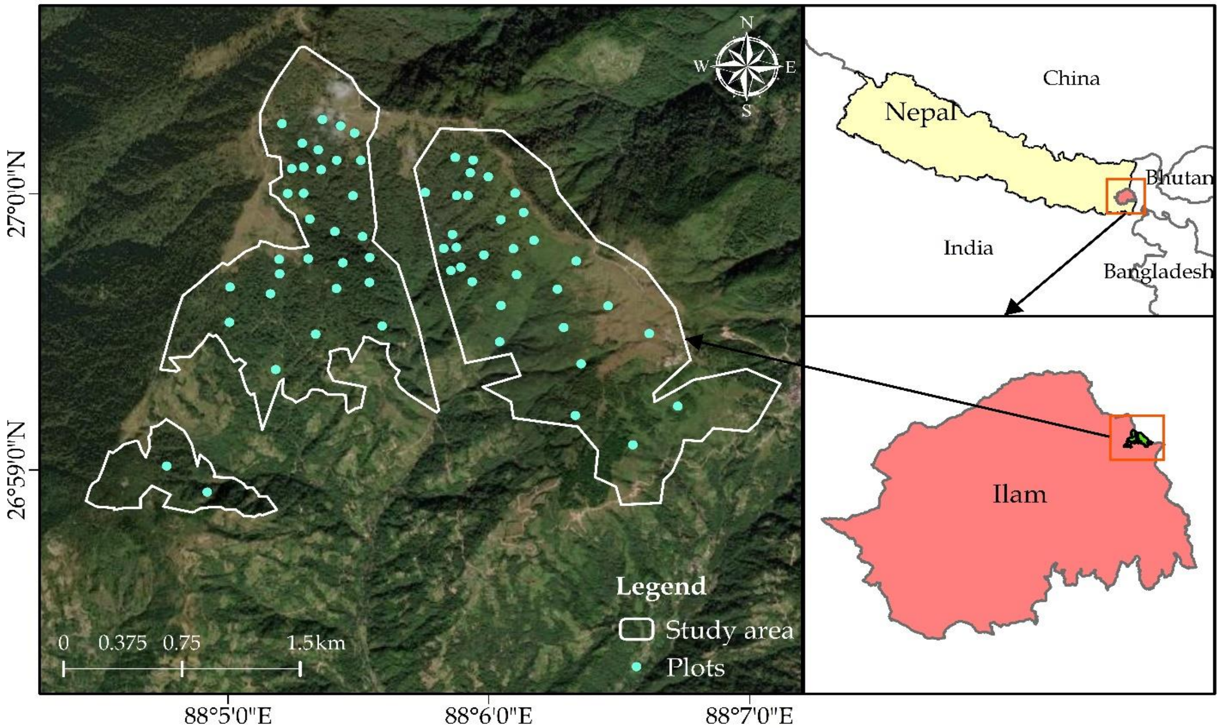

Figure 1. Map of Nepal showing Ilam district and the study site.
Source: Authors.

transects.

Along these transects, 64 circular plots were positioned, spaced at approximately 200-m intervals, to gather data. Within each plot, careful observation of sightings and signs of red pandas was done to determine presence/absence of red panda, thus creating 39 presence and 25 absence sites. Additionally, circular sample plots were used to study the vegetation composition to collect data on the suitability of the habitat for red panda. These plots comprised three concentric circular plots, a larger plot of radius 10 m (area = 314.28 m^2) for trees, and smaller sub-plots of radii 3 m (area = 28.28 m^2) for shrubs and bamboo, and 1 m (area = 3.14 m^2) for herbs were laid (MoFSC, 2015). Habitat parameters such as the presence/absence of bamboo, elevation, and distance to water sources were also recorded for each plot during the field survey. Also, information on the disturbance factor seen in the plot was recorded using a 3-point Likert scale (1 = low, 2 = medium, 3 = high). The slope of the study area was determined using the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) and Digital Elevation Model (DEM). Similarly, the nearest distances to the roads and human settlement of the plots were estimated using Open Street Map. For above ground biomass (AGB), ICIMOD AGB data of Nepal was used (ICIMOD, 2015). The habitat parameters and their sources are illustrated in Table 1.

Data analysis

Logistic regression was conducted using a binomial distribution to model red panda habitat utilization based on habitat and disturbance covariates (Tollington et al., 2015). Descriptive statistical analyses, including correlation and measures of central tendency, were employed to assess data quality and the variables were checked for autocorrelation. Using the least correlated variables all habitat parameters, a logistic model was constructed. The model was built by logistic regression using a binomial distribution to model influencing covariates on the distribution of the red panda. To investigate the best-fit model, we performed multi-model inference using a dredge function in the MuMIN package in R (Barton, 2023). We then examined the fit of candidate models by selecting the lowest Akaike's information criterion corrected (AIC_c) for small sample sizes, and final model sets were restricted to $\Delta AIC_c<2$ for habitat-use variables (Bolker et al., 2008; Harrison et al., 2018). Equations 1 to 5 (Dinerstein, 1979; Lama, 2019; Joshi et al., 2023) were used to assess habitat characteristics.

$$\text{Density of species} = \frac{Total\ no\ of\ individuals\ of\ a\ species}{Total\ number\ of\ plots\ surveyed * Area\ of\ the\ plot} \times 100 \quad (1)$$

$$\text{Relative density of species} = \frac{Density\ of\ species}{Total\ Density} \times 100 \quad (2)$$

$$\text{Frequency of a species} = \frac{No.\ of\ plots\ on\ which\ a\ species\ occurs}{Total\ number\ of\ plots\ sampled} \times 100 \quad (3)$$

$$\text{Relative Frequency of species} = \frac{Frequency\ of\ a\ species}{Total\ frequency\ of\ all\ species} \times 100 \quad (4)$$

$$\text{Relative dominance of a species} = \frac{Total\ basal\ area\ of\ a\ species}{Total\ basal\ area\ of\ all\ species} \times 100 \quad (5)$$

Table 1. Habitat parameters used in the binomial distribution/logistic regression model and their sources.

Habitat parameter	Variable category	Data source
Presence or absence of red panda	Categorical	Field survey
Elevation	Continuous	Field survey
Slope	Continuous	Calculated using ASTER DEM (resolution 30 m) downloaded from the NASA Earthdata website (https://www.earthdata.nasa.gov/)
Above ground biomass	Continuous	AGB data in Nepal 2015 by ICIMOD (https://doi.org/10.26066/rds.23172)
Presence or absence of bamboo	Categorical	Field survey
Distance to road	Continuous	OSM 2023 (https://www.openstreetmap.org/)
Distance to water source	Continuous	Field survey conducted in Sept 2019
Distance to human settlement	Continuous	OSM 2023 (https://www.openstreetmap.org/)

The total basal area of a particular species is the sum of the basal area of all trees of that species which was calculated using Equation 6.

$$Basal\ Area = \frac{\pi d^2}{4} \tag{6}$$

where *d* = diameter at breast height. The important value index (IVI) was then computed by summing relative density, relative frequency, and relative dominance (Equation 7) (Dinerstein, 1979; Chakraborty et al., 2015; Chhetri and Shrestha, 2019; Lama, 2019).

$$IVI = Relative\ density + Relative\ frequency + Relative\ dominance \tag{7}$$

RESULTS

Red panda distribution in the study area

Overall, evidence of red panda was recorded from 11 out of 12 transects during the field survey. Other than the separate block of Singhadevi Community Forest, the evidence of red panda presence such as droppings and footprints (Figure 3) were observed in 39 out of 64 sample plots in both the community forests between 2237 and 2597 m altitude with an average elevation of 2409 m (Figure 2). The descriptive statistics for the habitat parameters are presented in Table 2; whereas the distribution of presence/absence of red panda in relation to habitat parameters is as shown in Figure 4.

Habitat preferences

Seven different types of habitat parameters were observed in the study area, including the presence or absence of bamboo, elevation, distance to road, slope, Above Ground Biomass (AGB), distance to settlement, and distance to water source to predict habitat preferences. Our analysis revealed that the "bamboo + elevation + AGB" is the most predictive model, as it has the lowest delta AICc value and height AIC weight and confirms that it is the best model to describe the probability of red panda occurrence (Table 3). These models indicate that the presence of bamboo, elevation, and AGB are significant habitat factors influencing red panda distribution, with distance to water source also potentially playing a role. In contrast, models involving other factors like distance to settlement, road, slope, or their combinations received substantially less support and are less likely to provide an accurate explanation for the distribution of red pandas in the study area.

The presence of red panda increased with an increase in elevation and AGB. Similarly, the presence of bamboo was also found to significantly affect the presence of red panda. Other covariates such as distance to water source, road network, and distance to human settlement did not significantly influence the occurrence of the species. Although a negative correlation was observed between red panda presence and distance to the water source and settlement, the effect was not found appreciable (Table 4).

Conservation threats

During the field observation, indicators of potential threats were noted and rated on a 3-point Likert scale. Among these factors, the average scores reveal the severity of disturbances, ranking them from lowest to highest average score. Livestock grazing (mean 2.32) was identified as the major risk to the red panda population, followed by bamboo die off (mean 2.11), and landslide (mean 2.05). The other factors such as forest fire, rural road/trekking trail, solid waste, and direct/indirect signs of other wildlife were considered to pose considerably less threat to the red panda population. Figure 5 describes the conservation threat posed by different factors.

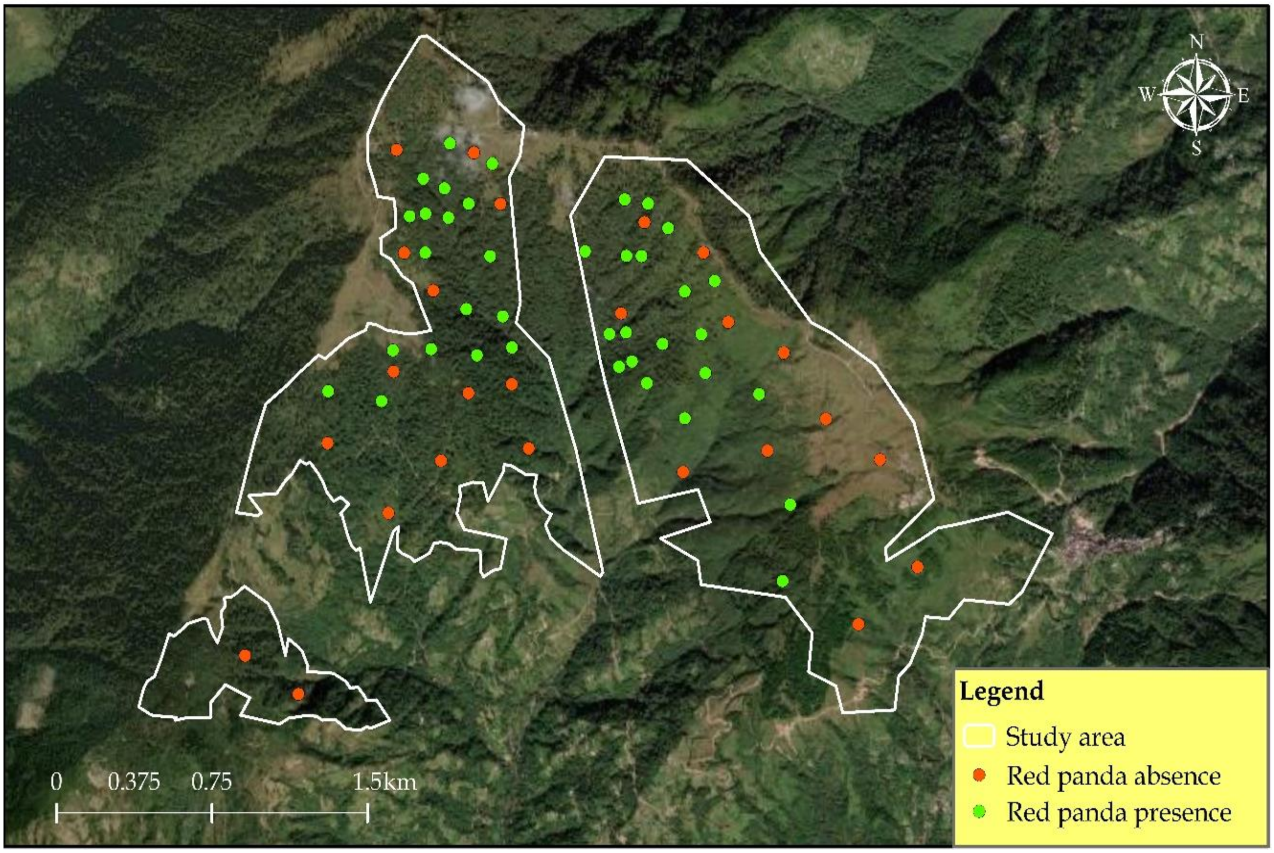

Figure 2. Distribution or presence/absence of red panda within the study site.
Source: Authors.

Figure 3. Pellets of red panda observed in the field at (27.00147° N, 88.09851° E).
Source: Authors

Table 2. Descriptive statistics of the habitat parameters.

Habitat parameter	Max	Min	Mean	Standard deviation
Elevation (m.a.s.l.)	2597.00	2237.00	2416.68	105.80
Slope (°)	44.75	5.00	22.43	8.63
AGB (tons)	11.13	0.00	1.75	0.79
Distance to road (m)	620.00	20.00	274.09	168.49
Distance to water source (m)	315.00	5.00	109.25	75.19
Distance to human settlements (m)	2500.00	500.00	1318.25	338.68

Source: Authors.

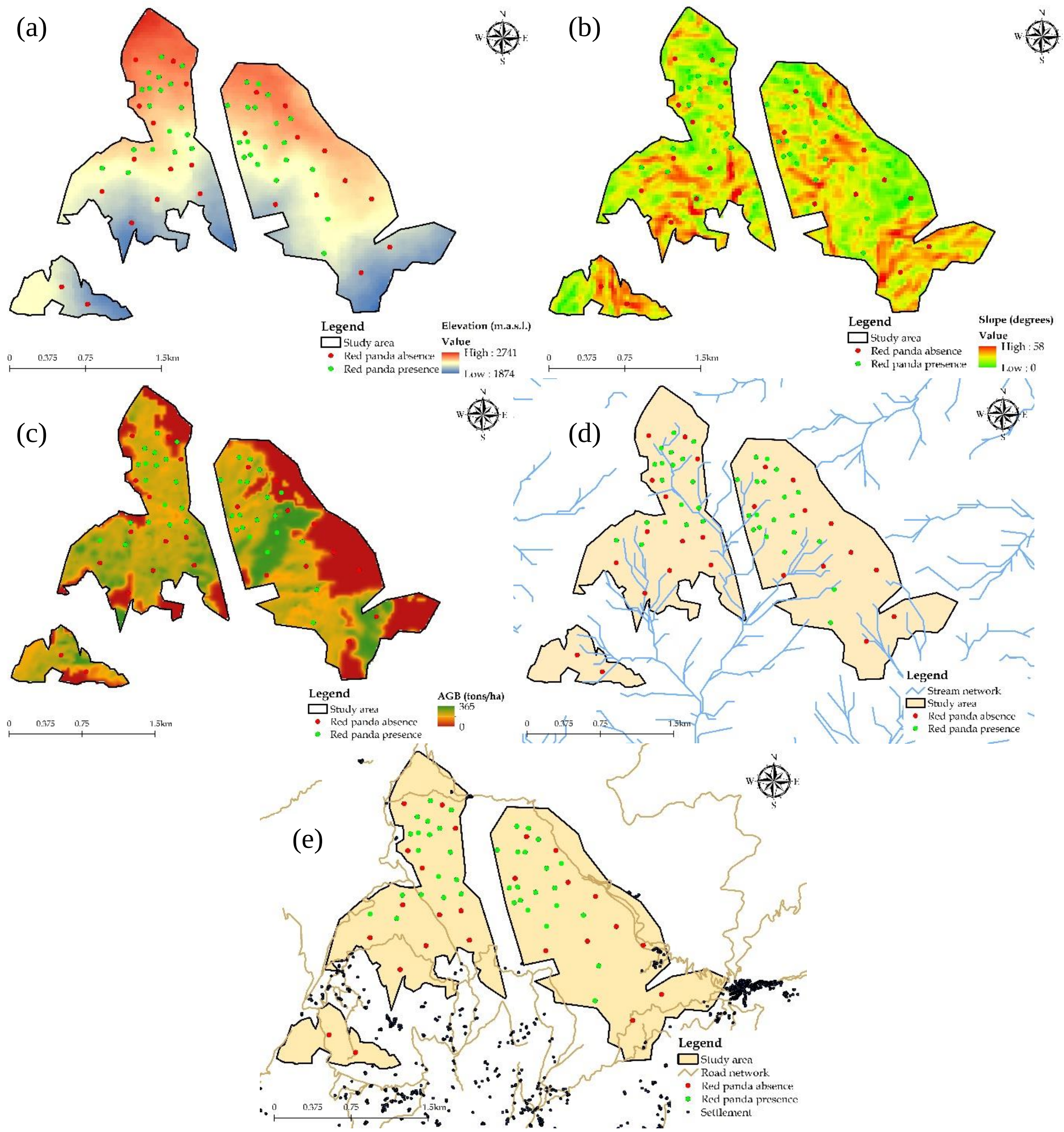

Figure 4. Distribution of presence/absence of red panda in relation to different habitat parameters: (a) elevation; (b) slope; (c) AGB (Above Ground Biomass); (d) water source; (e) roads and settlements.
Source: Authors.

Table 3. Summary of model-specific logistic regression (binomial distribution) models showing, degree of freedom, AICc, delta AICc, and model weight for habitat covariates influencing red panda distribution.

Model	*df*	AIC_c	ΔAIC_c	Weight
Det ~ elevation + AGB + bamboo	59	68.27218	0	1
Det ~ elevation + slope + bamboo	59	73.56507	5.292883	0.005027
Det ~ dist_settlement + bamboo + AGB	59	74.25142	5.97924	0.002531
Det ~ AGB + dist_water + bamboo	59	74.27897	6.006782	0.002462
Det ~ dist_water + bamboo + elevation	59	74.69787	6.425684	0.001619
Det ~ bamboo + dist_road + dist_water	59	74.7219	6.449719	0.001581
Det ~ slope + AGB + bamboo	59	74.72749	6.455302	0.001572
Det ~ bamboo + dist_road + slope	59	74.84413	6.571942	0.001399
Det ~ dist_settlement + dist_water + bamboo	59	76.04996	7.777775	0.000419

Source: Authors.

Table 4. Summary of logistic regression.

Coefficient	Estimate	Std. error (*SE*)	*t*-value	*p*-value
Intercepts	0.017	0.10	0.17	0.86
Elevation	0.227	0.06	3.40	0.001**
Slope	0.026	0.06	0.43	0.664
AGB	0.136	0.64	2.10	0.039*
Bamboo	0.392	0.12	3.12	0.002**
Distance to road	0.131	0.08	1.61	0.111
Distance to water	0.034	0.65	-0.52	0.601
Distance to Settlement	0.017	0.62	-0.27	0.782

Source: Authors.

IVI of trees species in red panda habitat

A total of 19 tree species were recorded in 64 plots in the red panda habitat. Important tree species and IVI were *S. ramosissima* (82.2), *L. pachyphylla* (78.1), *M. edulis* (39.5), *Litsea salicifolia* (29), *Rhododendron griffithianum* (11.7) and so on as shown in Figure 6.

DISCUSSION

Preference for higher bamboo coverage

Red panda's major diet consists of bamboo leaves and shoots, which account for more than 80% of the total food types (Panthi et al., 2017). Studies conducted in the past across Nepal (Panthi et al., 2012; Sharma et al., 2014) and Bhutan (Dorji et al., 2011; Dendup et al., 2017) have consistently demonstrated significant correlations between the existence of red pandas and environments characterized by an abundance of understorey vegetation primarily consisting of bamboo. Red pandas prefer locations with large trees, bamboo cover, and proximity to water sources, which may be beneficial in the sense of saving energy (Pradhan et al., 2001; Bista et al., 2017). In our study too, 65% of the detection was recorded in the location where the bamboo presence was recorded.

Preference for mid-elevation

Red panda inhabits eastern Himalayan temperate broadleaved forests with bamboo in the understory with an altitudinal range preference of 2200 to 4800 m (Yonzon and Hunter, 1991; Chakraborty et al., 2015; Bista et al., 2017). However, habitat requirements for the red panda vary across different landscapes. This suggests that factors such as topography, local microclimatic conditions, availability of resources, and anthropogenic factors significantly influence the distribution of red pandas (Bhatta et al., 2014). Evidence of red panda's presence was observed between 2200 and 2600 m elevation in our study. Red pandas preferred the middle elevation range at our study site because the lower area was disturbed due to its proximity to the livestock and human settlement. Similarly, the upper region was less favored, probably because it is characterized by open grassland, limited vegetation,

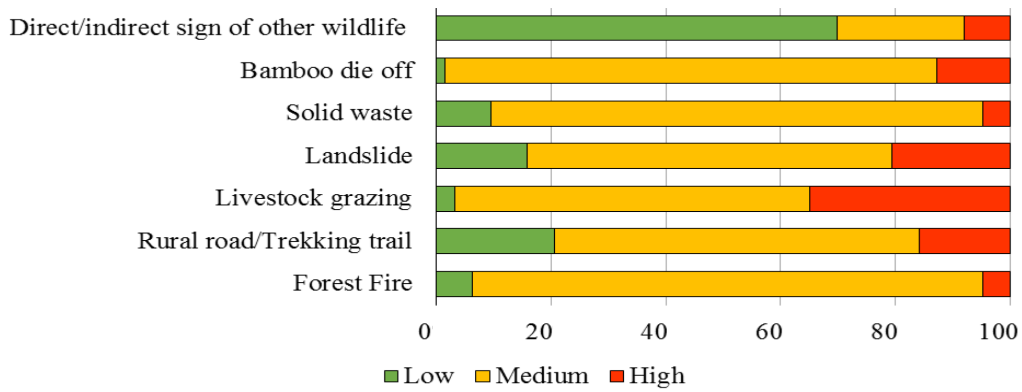

Figure 5. Conservation threat posed by different factors on red panda population.
Source: Authors.

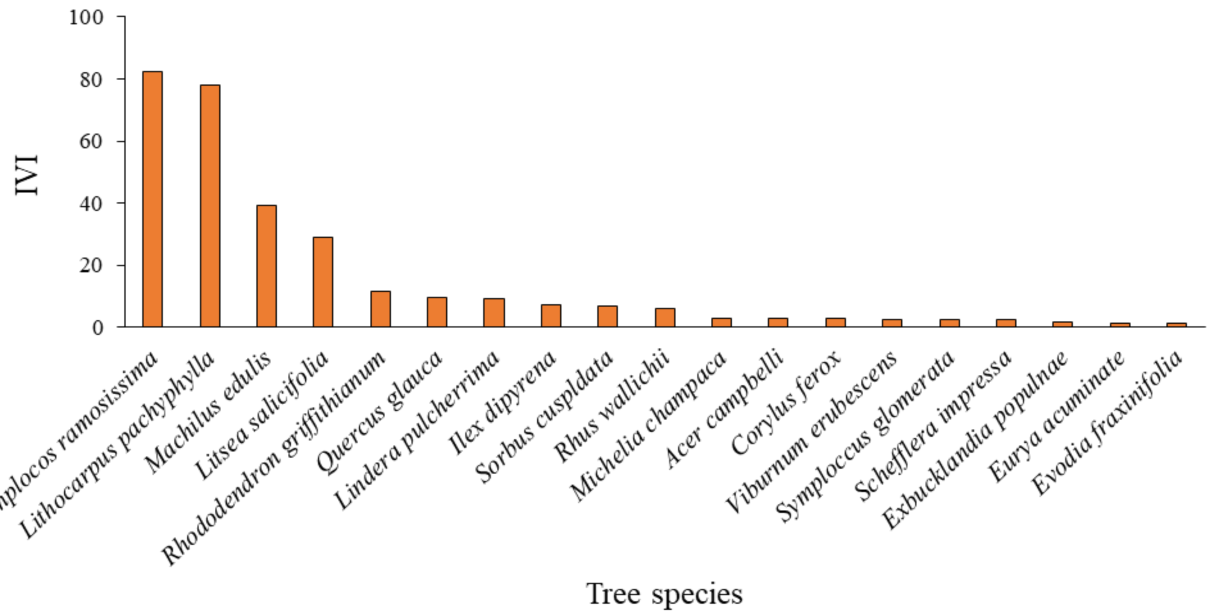

Figure 6. IVI of tree species in red panda habitat
Source: Authors

steep slopes, and unfavorable habitat conditions lacking bamboo and forest cover. In our study with the increasing elevation, the detection rate of red panda also increased with the forest cover altitude. This finding is parallel with the study of Gyawali et al. (2022) conducted in the Bhojpur district; while Lama (2019) observed the preferred elevation between 3000 to 3400 m in the Simsime community forest of Taplejung district in eastern Nepal.

Preference for above ground biomass

The distribution of red pandas is affected by above-ground biomass, which includes the vegetation and trees in their habitat. Bhatta et.al. (2014) also mentioned that the red panda preferred the dense coverage in Jumla. A study on plant preferences of red pandas found that forests with a high preferred plant distribution are positively related to the abundance of red pandas in their native habitat (Roka et al., 2021). Above ground biomass, including tree for resting and bamboo for foraging is an important factor in red panda habitat preference (Thapa et al., 2020).

Preference for water sources

The observations encompassed distances ranging from 5 to 315 m from the nearby water sources (streams, rivulets). Similar studies carried out in the Chitwan-Annapurna Landscape of Nepal have shown that the ideal distance to water is between 100 and 200 m (Bista et al., 2017) and research conducted in Jumla district of western Nepal by Bhatta et al. (2014) reported a range of 5 to 350 m from the water resources. Despite other studies (Bhatta et al., 2014; Bista et al., 2017; Dendup et al., 2017) mentioning that proximity to water sources significantly influences red panda habitat selection, we found that the distance to water sources did not emerge as a significant factor in our study. Gyawali et al. (2022) in Bhojpur district of eastern Nepal also reported a negative association between distance to water source and red panda habitat. This lack of significance may be attributed to the abundance of water sources throughout the study area, ensuring that red pandas had easy access to water regardless of their proximity to any specific source. While the accessibility of water sources plays a crucial role in habitat preference for red pandas, our findings suggest that red pandas may not exhibit a strong preference for habitats close to water sources in areas where water is plentiful.

Relationship with other habitat parameters

No significant correlations were found between presence/absence of red panda and slope, distance to road, or distance to settlements. Approximately 50% of red panda presence was observed in areas with moderate slopes (15°-30°), while only 25% occurred in steep slope areas (>30°). Additionally, the presence of red panda was more in plots farther away from both roads and human settlements. This might have been possible because red pandas are shy and elusive in nature (Panthi et al., 2017), so they try to avoid possible threats and anthropogenic disturbances in their habitat.

CONSERVATION IMPLICATIONS AND RECOMMENDATIONS

The strong correlation between red panda presence and bamboo coverage, elevation, and above ground biomass highlight their significance in the conservation of the species. The vulnerability of red panda has been related to habitat loss caused by a mass flowering of bamboo followed by a forest fire in previously occupied regions (Williams et al., 2010; Sharma et al., 2014). Thus, efforts directed towards preserving this specific vegetation can subsequently contribute in protecting red pandas. Similarly, the prioritization of habitats near water sources (Dorji et al., 2011; Panthi et al., 2019) suggests conservation efforts should not only focus on vegetation but also consider preserving water sources within red panda habitats to ensure their continued presence in these areas.

In addition, findings on elevation shed light on the sensitivity of red panda toward changes in altitude. To escape direct sunlight in the summer, they go down to the forested area by the stream, and in the winter, they move higher to enjoy the direct sunshine (Panthi et al., 2012). This shows their preferences are in mid-altitude; so there is a risk of being affected by anthropogenic activities (Yonzon and Hunter, 1991; Gyawali et al., 2022). Conservation measures that mitigate disturbances in lower and upper elevation areas maintain suitable territory and may alleviate some of the anthropogenic threats. Several studies have documented the detrimental effects of livestock grazing on red panda habitat (Sharma et al., 2014; Acharya et al., 2018; Lama et al., 2020; Bista et al., 2021). Livestock grazing not only diminishes the amount of available forage for red pandas, but their movement leads to soil compaction and the formation of gullies (Dendup et al., 2017; Lama et al., 2020). The trampling caused by livestock grazing results in a significant reduction in bamboo seedlings (Panthi et al., 2017; Dendup et al., 2020). Therefore, we recommend that more attention should be given to mitigate the impact of livestock and human-induced activities on red panda habitat through the auspices of the Division Forest Office Ilam, Singhadevi, and Chitrehile community forest management committee, Suryodaya Municipality, and other concerned stakeholders.

We suggest enacting laws that permit the presence of livestock in meadows rather than forests containing understory bamboo (Panthi et al., 2019). We also recommend prohibiting the collection of fodder and fuelwood from the core habitat of red pandas. Similarly, the development of infrastructures like rural roads and electric transmission lines causes habitat loss and degradation which are the main causes of the decline of the red panda population in Nepal (Williams et al., 2010; Bista et al., 2017; Panthi et al., 2017; Acharya et al., 2018). In our field observation, we noticed construction of rural roads and trekking routes had negatively impacted vegetation which may lead to habitat fragmentation, change in migration patterns, and even local extinction of the species in the future.

The study site is situated adjacent to the Indo-Nepal border and is at a high risk of poaching and illegal trade. The open border of the country further increases the severity of this threat. While the occurrence of regular poaching of red panda in Nepal is low, cases of red pandas being smuggled, killed, and trapped have been reported in the country (Bista and Paudel, 2014). Red pandas are highly captivating species to witness in their natural habitat. They present great potential for ecotourism (Williams et al., 2010; Panthi et al., 2019) which can offer additional sources of income and employment opportunities for the local people, such as nature guides and tour operators. These practices are gaining popularity in the PIT corridor, Western Nepal, and in the study site as well. However, it is crucial to ensure that wildlife-based tourism is developed and promoted in a scientific and standardized manner, to minimize the long-term impact of tourism activities. The implementation of these approaches will help to effectively manage both the local community and wildlife, creating a mutually beneficial situation. In addition, there is a crucial need to conduct detailed studies on habitat requirements and ecological necessities of the species across various regions of the country. This will ensure better habitat management and aid in sustainable red panda conservation efforts.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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