CONSERVATION OF RED PANDA IN TRANSBOUNDARY LANDSCAPE

Zoological Survey of India,1916

Kanchenjunga (KL) is situated in the Himalayan Biodiversity Hotspot which includes Bhutan, India, and Nepal and spanning between 26°21'40.49"-28°7'51.25"N and 87°30'30.67"-90°24'31.18"E. Major part of this landscape is highly undulating, rugged and mountainous terrain including the world's 3rd highest peak, Mount Kanchenjunga (8586m asl). The habitat types ranging from Terai to the Himalayan alpine meadows which are among the Global 200 Eco-regions with tropical, subtropical, warm temperate, cool temperate, subalpine, and alpine forest types. In KL, Teesta is the major river with large basin, originated from Pahunri glacier above 7068m ASL in north and flows southward and it plays an important role in shaping the landscape.

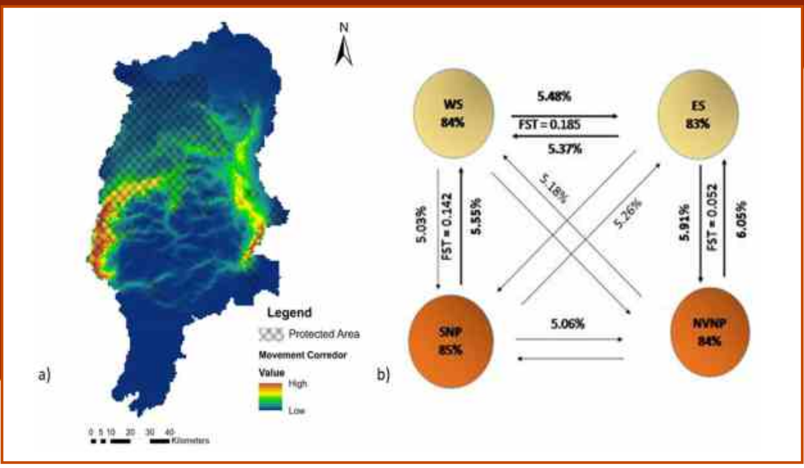
Red panda (*Ailurus fulgens*), the magnificent iconic species of Kanchenjunga landscape, is endemic to temperate conifer and cool broadleaf forest with dense bamboo undergrowth of preferring altitude range 2300 to 4000 m of eastern Himalaya. It is widely distributed in Nepal, North-eastern States of India (Sikkim, West Bengal and Arunachal Pradesh), Bhutan, Myanmar, and southwest China. Habitat loss, poaching, jhoom cultivation and developmental activities have led to the rapid decline of wild populations of red panda by nearly 50% in the last three generations, bringing it as 'Endangered' in the Red list category. In India, the red panda is protected under Schedule I of the Wildlife (Protection) Act, 1972.A majority of the protected habitats of red panda in India are less than 500 sq. km in size, and isolated, thereby increasing high risk of local extirpation due to genetic inbreeding and loss of heterozygosity. It is promising to integrate population genetics, landscape ecology and three - dimensional remote sensing data in determining the influence of the landscape features and anthropogenic activities on red panda movement and gene flow across KL-India.

Thus, to prioritize the management strategies for ensuring long term population viability of red panda, ZSI has taken a project on Conservation of red panda in Eastern Himalayas, with the aim to understand the genetic viability and wellbeingness of red panda. The prime focus of this project to study red panda in Transboundary landscape of Kangchenjunga, by explicitly quantifying the level of genetic diversity, inbreeding and the impact of landscape corridors on the fine-scale spatial patterns of genetic differentiation and gene flow among the habitat clusters supporting red panda population in KL-India.

The study highlighted here was undertaken in 10 protected areas (PAs) compassing nearly 3092.65 km^2 area which includes Singalila National Park (SNP), Senchal Wildlife Sanctuary (SWLS), and Neora valley National Park (NVNP) in the State of North West Bengal and Barsey Rhododendron Sanctuary (BRS), Maenam Wildlife Sanctuary (MWLS), FambongLho Wildlife Sanctuary (FLWLS), Pangolakha Wildlife Sanctuary (PWLS), Kanchenjunga National Park (KNP), Shingba Rhododendron Sanctuary (SRS), and Kyongnosla Alpine Sanctuary (KAS) in the State of Sikkim.

The preliminary findings predicted about 1309.54 km^2 was suitable habitat for red panda in KL-India, 1097.26 km^2 in Sikkim and 212.28 km^2 in North West Bengal which accounts about 15.57% of the total KL- India. The habitat model suggested that precipitation, temperature and vegetation associated variables, had great importance in predicting the habitat suitability of red panda in KL- India. Since the vegetation covers, and climate have direct links to the species diet, survival and reproductive necessities, these seem reasonable predictors of habitat suitability. Growth of bamboo under stories in temperate forests is highly influenced by rainfall and temperature (Rao, 1991) and red panda is exclusively canopy-dwelling species preferring temperate forests of eastern Himalayas with dense bamboo undergrowth. Therefore, rainfall, temperature and vegetation cover played significant role in predicting red panda habitat.

Explicit Bayesian and non-Bayesian clustering methods showed similar patterns to a large extent, forming four genetic populations/sub-populations (SNP,WS, ES and NVNP).Certainly, SNP and NVNP were two distinct clusters which radiated individuals in one another direction and contributing to Sikkim population. The WS population was rationally distinct from SNP, however ES and NVNP may be classified into the same clusters. The present population genetic structure and contemporary gene flow patterns in KL-India suggested that corridors among these populations were functional in the recent past. The asymmetric migration detected in the last three to five generations between the populations provided adequate evidences to exhibit a uni-directional migration of individuals in KL-India from West to East, SNP to WS and WS to ES. However, ES and NVNP had bidirectional migration. The population are supported to exist in metapopulation frame work where variability within population exceed than the between populations and the observed asymmetric gene flow among populations supported for source-sink population dynamics, where individuals have moved from more stable, relatively high-density population in to neighbouring low-density populations.



The present study has been imperative in unveiling facts, important for the conservation management of the red panda in KL-India. The study need to be replicated in KL of Nepal and Bhutan for proper understanding of genetic pattern and gene flow of red panda in the entire landscape and thus proposing conservation and management plan for red panda across the political boundaries with transboundary landscape approach for future sustenance of the species in entire distribution.

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Department of
Sciences & Technology
Government of India

Zoological Survey of India,1916

Published by:
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Prani Vigyan Bhawan, M-block,
New Alipore, Kolkata-700053

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