Quantifying habitat change of the Red Panda (*Ailurus Fulgens*)

Background

Habitat loss has been identified as the largest threat to the survival of Red Pandas, yet the extent and rate of habitat loss remain unknown[1,2,3]. range-wide species protection plan is urgently needed to help effectively conserve Red Pandas[1,3]. Without knowledge of the location of the most threatened areas of habitat, any plan would be limited in its effectiveness. In my dissertation, I will quantify habitat change within Red Panda habitat and help identify priority areas for Red Panda conservation. To do this I plan to use a MAXENT distribution model, published in 2018, and freely available remote sensing datasets (Hansen Forest Loss and MODIS land cover classification).

Photo Credit: The Red Panda Network

Research Questions and Hypotheses

RQ1: What is the extent of habitat loss across the Red Pandas' Predicted Range?
H1: Forest loss and rate of loss have generally increased in predicted Red Panda habitats.
H2: There will be significant differences in the magnitudes and rates of forest loss in different designated areas (e.g., countries and protected areas).

RQ2: What land-use change factors are driving habitat change?
H1: Habitat conversion will be predominantly from forest to grassland, agriculture, and urban land uses.

RQ3: What are the conservation implications of habitat loss?
H1: Habitat patches are becoming more fragmented over time, with habitat loss creating more isolated Red Panda patches throughout the range.
H2: Red Panda habitats furthest from human settlements will have undergone the least habitat loss.

Methods

- In the Google Earth Engine, I plan to create my own area polygons based on the Thapa *et al* MAXENT paper[1] OR use the shape files created by Thapa *et al* - if the authors are willing to share this with me.
- I will use the Google Earth Engine and freely available remote-sensing datasets to explore habitat change over time in Red Panda habitats. Remote-sensing products such as Hansen Forest Loss and MODIS land cover classification will also be used. Other time series data sets such as WorldPop and FiRMS may also be used to explore population change and wildfires. Statistical models will be created to test the significance and effect size of habitat change over time.
- I will identify key areas for protection with help from conservation experts and the protected planet dataset.

Expected outcomes

I hope to identify hot spots of habitat loss and key areas that are not currently protected. I would also like to explore what drives this change, e.g. human or wildfires or landsides. My main take away messages will be % habitat loss, the potential drivers of this loss, and what this means for the conservation of Red Pandas. I hope to talk to conservation scientists at the Red Panda Network, IUCN and RSPB to determine the most useful form which to present my results. An ideal outcome would be that my results are utilised to help conservation planning for Red Pandas.

Additional to this dissertation, I would like to develop a Google Earth Engine app that can be used by conservation practitioners to explore both the Red Panda MAXENT map and the Hansen dataset.

Images for Context

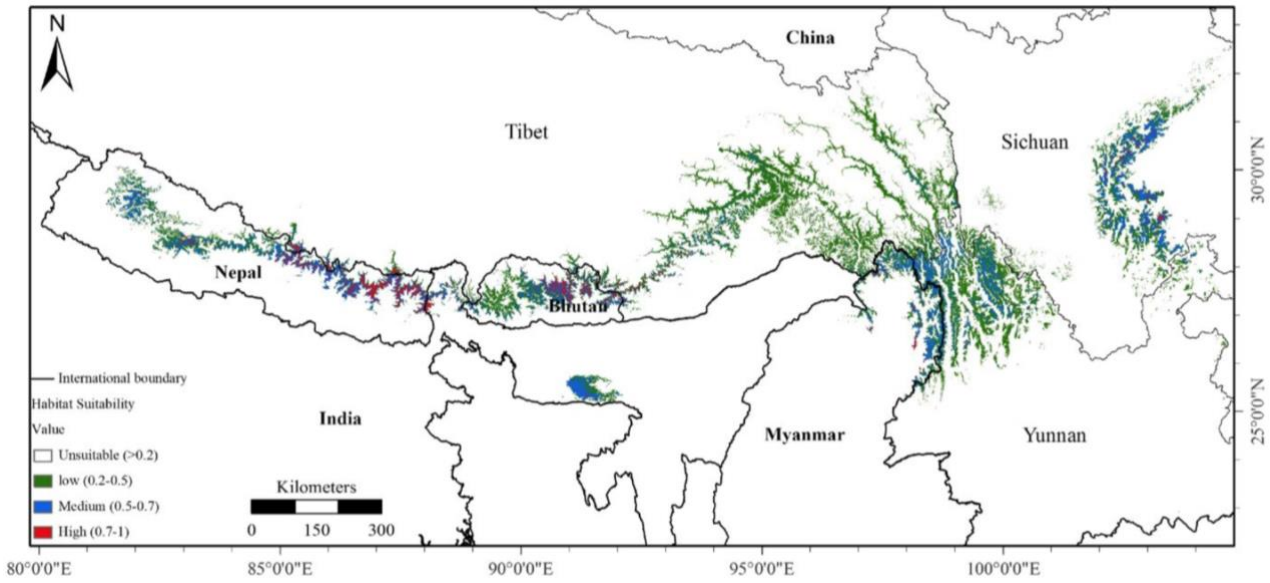

Figure 1: Output of the MAXENT model for Red Pandas from Thapa *et al*

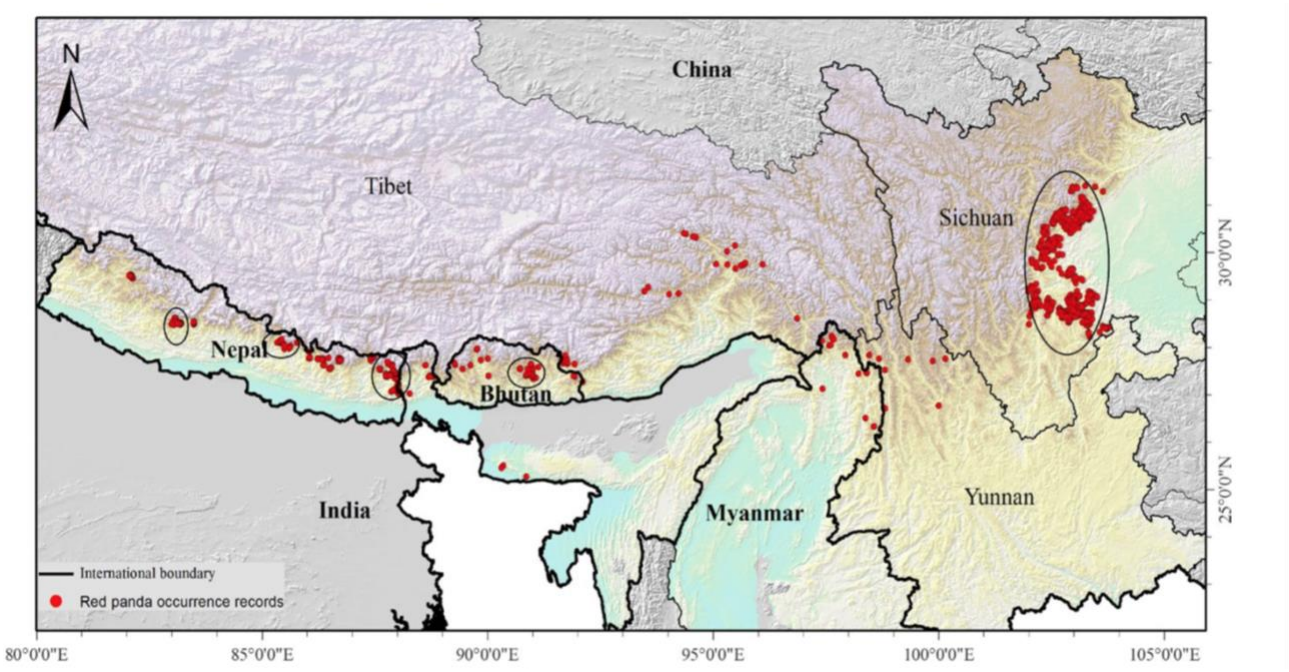

Figure 2: Occurrence records of Red Pandas from Thapa *et al*

Relevant References

1. Thapa A, Wu R, Hu Y, Nie Y, Singh PB, Khatiwada JR, et al. Predicting the potential distribution of the endangered red panda across its entire range using MaxEnt modeling. Ecol Evol. 2018 Nov 1;8(21):10542–54.

2. Chettri N, Shakya B, Thapa R, Sharma E. Status of a protected area system in the Hindu Kush-Himalayas: An analysis of PA coverage. Int J Biodivers Sci Manag. 2008 Sep 1;4(3):164–78.

3. Glatston, A., Wei, F., Than Zaw & Sherpa, A. Ailurus fulgens (errata version published in 2017). The IUCN Red List of Threatened Species 2015: e.T714A110023718. IUCN; 2015.