Update 1:

Project: Safeguarding Mountain Biodiversity: Investigating and promoting sustainable conservation of endangered tree line species of Nepalese Mountain.

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 Remote sensing based preliminary survey: The land use and landcover maps from LANDSAT and the Google Earth Images from 1984-2020 of Annapurna region were used to select the appropriate tree line transect. This remote sensing-based method is supplemented by the active discussion with Annapurna Conservation Office and its unit (local) offices, and district forest office of Kaski district. Moreover, the research articles, books on the tree line study of Nepal were also used to select the study area. Following these methods, the following transect is selected for the field level inventory.

Research Transect name: Mardi Himal Transect

District: Kaski, Pokhara Location: Korchon Area, Annapurna Conservation Area, Nepal Latitude: 28.43 Longitude: 83.93

System random sampling method is followed to determine the sample points for the study. Once the research transect was finalized, the maximum possible points within the transect are laid by using QGIS. Then these maximum possible points were filtered based on the environmental predictors like landcover (class-forest), slope (less than 30 degrees), near to walking trail (50-150m) and elevation of tree line ecoregions (3500-3950m). The slope and distance to walking trail is considered for safety reasons and approachability to the research plot. Then three tree line ecoregions were determined based on the elevation of the area and 15 random plots were selected in each eco-region by using random plot generator in QGIS. The brief methodology for the study area selection is presented in **Figure 1**.

2. Plot selection and field level inventory: In total 45 circular plots of 25 m diameter will be studied by using a ground-based LiDAR instrument i.e. mobile laser scanner. It provides 3D points of all trees within the range of 100 m, accuracy of 1-3m. Later the software LIDAR 360 will be used to analyze the plot and derive the tree attributes like DBH, tree height, canopy cover and above ground biomass. In the field additionally, the DBH by diameter tape, name of the species, and number of the trees for each species will be recorded. Similarly, the area of tree cut, deteriorated species and number of trees will be recorded along with the GPS location. A brief description of field inventory is depicted in Figure 2. Similarly, the selected plots are depicted in Figure 3.

Reason for reducing number of plots and measurement technique: The reason for reducing number of increasing number of plots is due to the increase of the plot diameter from 10 m to 25 m. The plots represent the equal number of plots for each tree line ecoregions i.e. 15 plots for at tree line, above tree line and below tree line. Similarly, the use of LiDAR instrument will be for the first time in the tree line of Nepal with close coordination of Forest Research and Training Centre, Government of Nepal. This will enhance the efficiency of data collection and produce better estimation of mountain forest.



Figure 1: Methodology for study area selection and plot selection.



Figure 2: Field study description



Figure 3: Selected plots in the study area.

Research permit process: We have applied for the research permit process at the Department of National Park and Wildlife Reserve, Kathmandu. A research permit is very vital to undertake any activities in conservation area and parks. We hope to receive the permit by mid-August.

Field data collection date: We will start the field inventory from the last week of the August or early September as it is rainy season in Nepal. After finishing the field inventory, the community discussions/workshops and KII will be carried out.