Project Update: February 2018

The first update summarised the collection of occurrence points of 146 for *Neopicrorhiza scrophularifolia*, 80 for *Nardostachys grandifolia*, 60 for *Dactylorhiza hatagirea*, 64 for *Aconitum spicatum*, 59 for *Valeriana jatamansii* and 115 for *Paris polyphylla*. We tried to incorporate maximum number of occurrence points to build a robust model with the reduced spatial auto-correlation. With the extensive survey of published reports, literature along with the field visit updated in 1st RSG update, we validated and georeferenced the occurrence points. In total, we gathered occurrence points of 103 - *Neopicrorhiza scrophularifolia*, 88 - *Nardostachys grandifolia*, 83 - *Dactylorhiza hatagirea*, 58 - *Aconitum spicatum*, 70 - *Valeriana jatamansii* and 128 - *Paris polyphylla*.

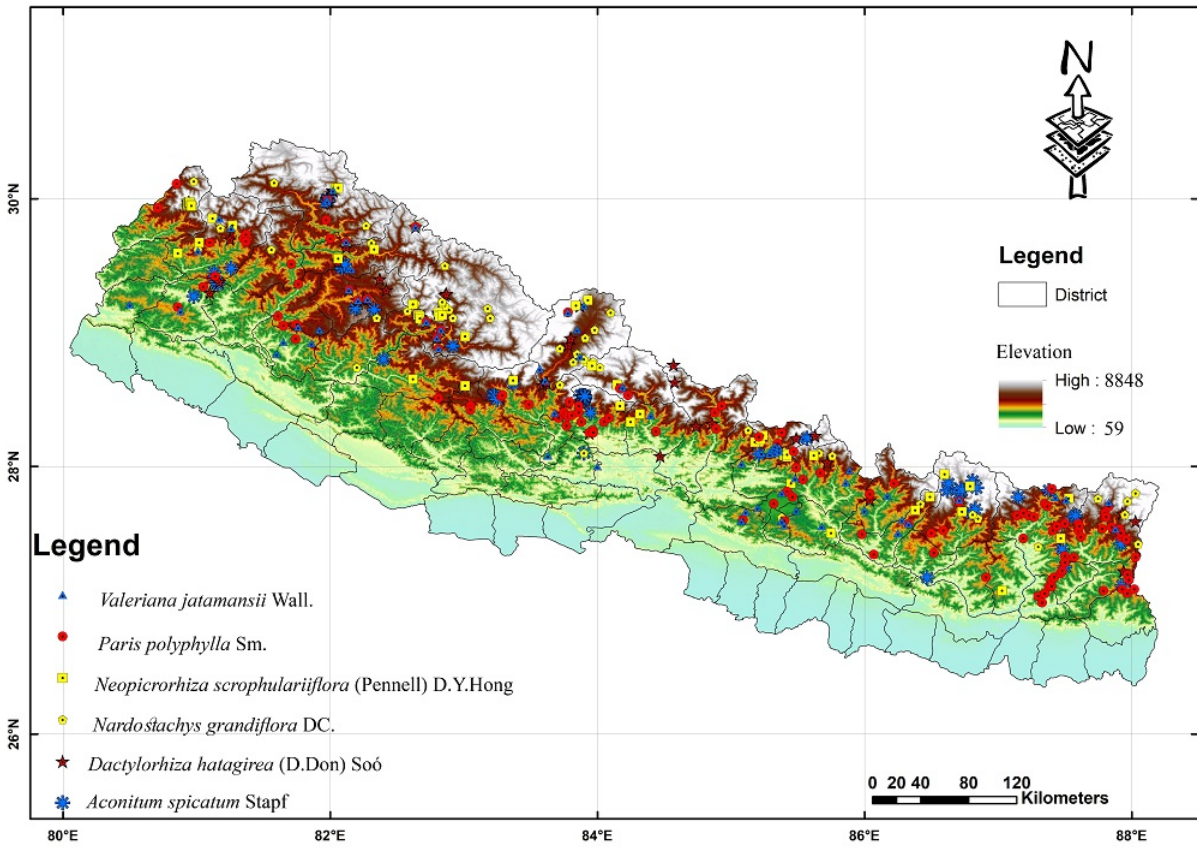

Figure 1: Map of Nepal showing distribution of six highly traded MAPs indicating their respective GPS locations.

Preliminary mapping: The foremost important part is mapping the distribution of focal species based on the gathered occurrence points (Figure 1). The focal species distributes widely in hilly and middle mountainous region from east to west.

Initial model building: The databases of occurrence of highly traded prioritised MAPs was prepared through the field survey, herbarium records, expedition reports, local floras, published articles, etc. Information from the herbarium specimen collection was used with caution to prevent geo-coding errors, confused taxonomic status and morphological characters (Rana et al. 2017). The presence occurrence points was checked in different spatial grids (10 min, 4 min, 2 min and 30 sec) to prevent from spatial autocorrelation removing the duplicate occurrence points. Finally the occurrence points from 4 min grid were chosen for initial model building. For initial

model building, we used the current bioclimatic variables (1950–2000) downloaded from www.worldclim.org/bioclim (Hijmans et al. 2005) at the spatial resolution 2.5 arc~seconds with the same extent, resolution and cell size. The subsets of 19 bioclimatic variables were used to run the model. The other topographic variables, LULC will be used in final model building. For this purpose, we used MaxEnt 3.3.3k (Maximum Entropy) developed by S. Phillips and colleagues freely available at http://www.cs.princeton.edu/~schapire/maxent/ (Phillips et al. 2006). The current suitability of the six highly traded MAPs are presented in Figure 2.

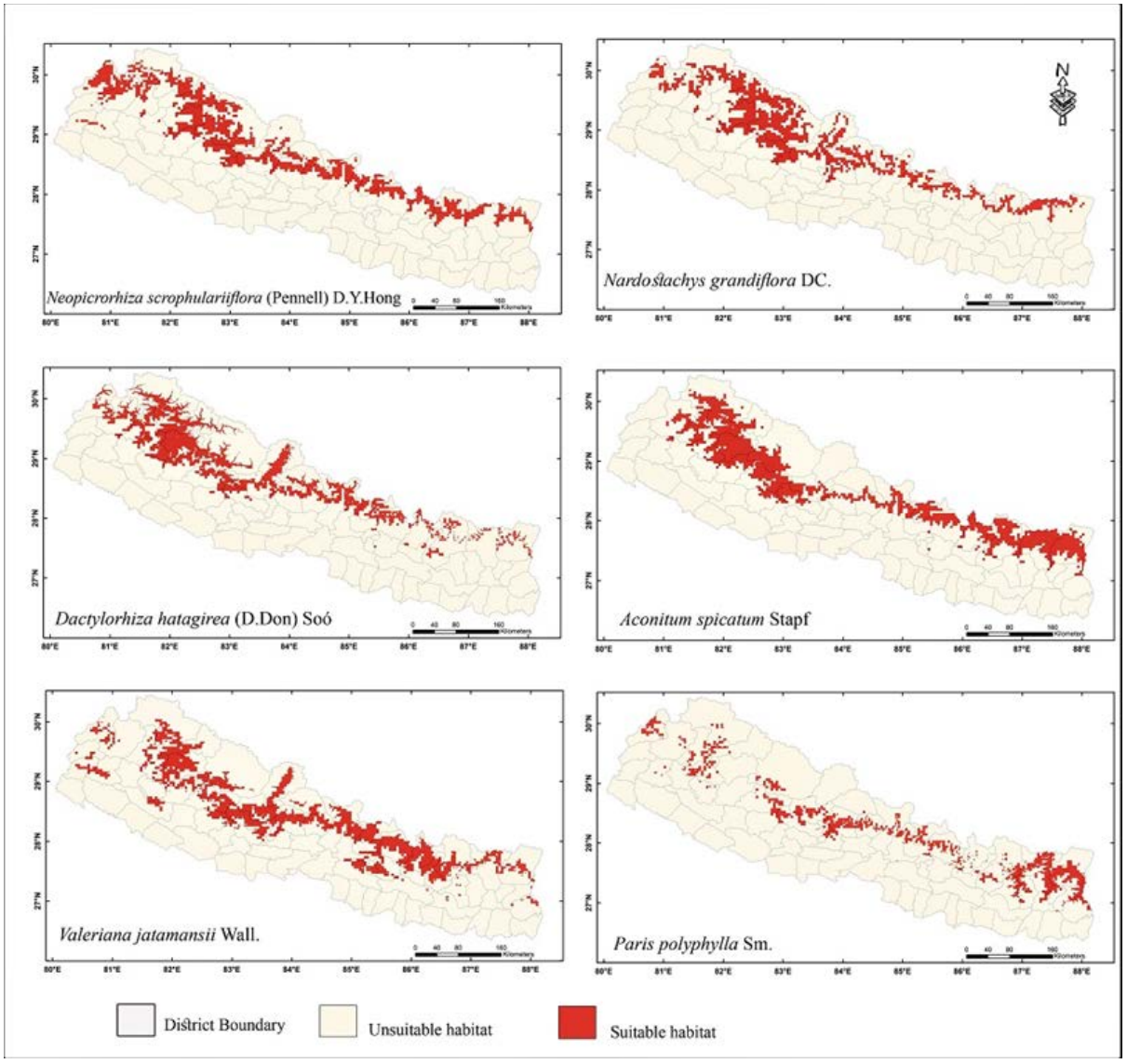

Figure 2: Projected habitat suitability of six highly traded MAPs under current bioclimatic scenario (1950 – 2000).

These maps were obtained after reclassifying the MaxEnt output map with thresholds value "Maximum training sensitivity plus specificity" provided by MaxEnt result. We used ArcGIS 10.2.1 with the extension Spatial Analysis (ESRI) to reclassify habitat suitability as 0 (unsuitable – Beige colour) and 1(suitable – Red colour) i.e. below threshold considered as unsuitable whereas, above considered as suitable habitat. Finally we used the pixel counts of suitable habitat to estimate the projected suitable area of focal MAPs (estimated from the total area of Nepal 1, 47,181 km^2). The projected suitable area are found to be maximum for *Aconitum spicatum* (26113.75

km^2:17.74%) and least for *Paris polyphylla* (12493.6 km^2: 8.49%). Likewise, *Valeriana jatamansii* – 25194.91 km^2 (17.12%), *Neopicrorhiza scrophularifolia* – 23032.87 km^2 (15.65%), *Nardostachys grandifolia* – 21145.51 km^2 (14.37%) and *Dactylorhiza hatagirea* – 20458.44 km^2 (13.9%) are currently projected suitable areas. These suitability areas can be changed when used with the robust model calibration.

After this, we will be developing a robust initial model that uses the predictive variables and use that model to forecast the suitability in future (2070) under suitable climate scenario Global Circulation Models of different 4 trajectories. This result will leads to analyse the niche conservatism and species extinction risk. Based on these results, we will carry out the socio-economic/ecological survey, ground-truthing of the MAPs and so on.