USING TERRAIN-RELATED VARIABLES TO ASSESS THE NEGATIVE EFFECTS OF TOPOGRAPHIC OBSTACLES ON TAIWAN RED CYPRESS DISTRIBUTION

Yi-Hsien Lin[1], *Nan-Jang Lo*[2], and *Kai-Yi Huang*[3]

[1] *Dept. of Forestry, Chung-Hsing University, Taiwan, R.O.C.*
[2]*Experimental Forest Management Office, Chung-Hsing University, Taiwan, R.O.C.*
[3]*Dept. of Forestry, Chung-Hsing University, Taiwan, R.O.C.*
[3]*kyhuang@dragon.nchu.edu.tw (corresponding author)*
[123]*250, Kuo-Kuang Rd., Taichung 402, Taiwan, R. O. C.*

Proposed presenter: **Yi-Hsien Lin**
Suggested topics: **Remote Sensing Applications** *(Climate/Environment)*
Presentation Preference: **Oral**

KEY WORDS: Proxy variable, Topographic sheltering index (TSI), Solar irradiance (SR), maximum entropy (MAXENT)

ABSTRACT: From a mechanistic viewpoint, it is desirable to predict the distribution of species on the basis of ecological parameters (e.g. rainfall or solar radiation) that are causal factors for their distribution. Data for such ecological factors are difficult or expensive to collect and are usually collected from a limited number of stations. Terrain-related variables are used as proxies of ecological factors in the study since data for them can be easily acquired by remote sensing. Taiwan red cypress (TRC) often form pure forests and grow in fog-forest belt with rich moisture brought by northeastern (NE) season wind but with lower solar radiation due to high humidity. TRCs grow on the north part of our study area (43,460 ha), but almost do not grow in the Huisun Experimental Forest Station (HEFS, 7,477 ha) in the south part of our study area. We attempted to determine if the NE wind blocked by topographic shelters is a key to this distribution by reversely thinking the positive effect of topographic obstacles with another case of Taiwan fir. Topographic sheltering index (TSI) and solar irradiance (SR) thus were developed and included in the predictive models using maximum entropy (MAXENT) with elevation and slope, summer NDVI, summer PCA and fall PCA. The accuracies of MAXENT with elevation plus either TSI or SR, or plus two proxies, were much better than that of MAXENT with elevation plus slope, summer NDVI, summer PCA and fall PCA. Consequently, TSI and SR incorporated into the predictive models were useful for explaining the abovementioned distribution. Moreover, the greater the TSI or the SR, the fewer TRCs grow in the study area, especially in the HEFS because of the negative effect of topographic obstacles opposite to the case of Taiwan fir. Hence, the two proxies may be vital predictors for the predictive models.