Assessment of health indicators at the virgin forest park on National Taipingshan Forest Recreation Area in Taiwan

Guang-Ren Wang¹, Chao-Huan Wang²
¹ Division of Forest Protection, Taiwan Forestry Research Institute
No. 53, Nan-Hai Road, Taipei, Taiwan
² Department of Forestry and Natural Resources, National Ilan University
No. 1, Sec. 1, Shen-Lung Road, I-Lan, Taiwan

It is difficult for the field crew to precisely recognize the health condition of a tree, because tree’s health is usually jointly influenced by a lot of variables. The purpose of this research is monitoring the health condition of cypress old growth at the virgin forest park on National Taipingshan Forest Recreation Area in Taiwan. This study uses factor analysis to establish tree health indicators in order to assess and to classify the tree health condition. It has extracted 3 common factors from 11 health-related variables, and these factors have been named foliage vigor declining indicator, stem epiphyte coverage indicator and root damage indicator. The above three factors can explain 78.4% of the communalities for total variance. The result of discriminant analysis shows that the hit rate of predicted classification is very high. The hit rate using the original observed variables is 96.08%, and it represents that the constructed discriminant function has high predictability. Via the stepwise discriminant analysis, crown dieback is found to be the most important variable. If one wants to keep the hit rate over 90%, one can use 6 original observed variables. Besides, the space distribution of forest health scores is also adopted to display the fragile areas within the park. The above procedure constructing health indicators of trees can detect the area with poor health condition within the forest, and it is helpful to detect environmental problems early.

Keyword: Tree health indicator, Factor analysis, Discriminant analysis.