ABSTRACT

Understanding influences of water-energy dynamics and environmental heterogeneity on plant distribution have strong management implications for conservation of fragile mountain ecosystems. The Water-energy dynamics hypothesis was analyzed in reference to annual precipitation and potential evapotranspiration. Using generalized linear model (GAM), the maximum explained deviance could be 68% and 51% in Western Himalaya and Eastern Himalaya, respectively. Structural equation model (SEM) could explain variance of 41% and 26% for Western and Eastern Himalayas, respectively. The underestimation of SEM predictions compared with GAM results suggests greater approximation of nonlinear relationships between plant richness and the predictors of the environment Climate emerged as dominant determinant of plat richness (64.4% and 35.3% explained deviance in Western and Eastern Indian Himalayas, respectively). Climate followed by physiography, and climate along with soil; are determined to be the major determinants of plant richness in the Western and Eastern Himalaya, respectively. Climate and physiography, and soil and climate are the major determinants of plant richness in the Western and Eastern Himalaya, respectively. Precipitation emerged as the strong positive determinant in both regions Precipitation seasonality strongly determines woody species richness in Western Himalaya and herbal species richness in Eastern Himalaya; whereas, temperature seasonality inversely determines herbal richness in Western Himalaya and woody species richness in Eastern Himalaya. *Lantana camara* and *Chromolena odorata* could invade the Indian Himalaya in the future climate, while the *Cassia tora* and *Tridax procumbens* are not likely, indicating insulation of the Himalayas from invasion in this century. Moisture availability, fluctuations in seasonal solar radiation and increase in variations in day time temperature could determine their invasive potential. The range size expansion could be more prominent in *L. camara* than *C. odorata*, indicating greater invasion of *L. camara* in the future climate. The utility of models (i) GAM and SEM for determining plant richness and, (ii) GLM and Maxent for assessing future distribution of selected invasive species could provide vital information for conservation and mitigation. The future studies could attempt to integrate other variables such as community characteristics to enhance the deviance explained. It is expected that all the above important findings on determinants of Himalayan plant richness would add values to the current understanding of this mountain ecosystem.