Influence of pedological and hydrological factors on the spatial distribution of European beech (Fagus sylvatica L.)

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Climate changes are gaining in importance in the last few decades, have a global effect on vegetation and forest cover, which leads to major transformations in landscape structures, especially on forest cover, which could be major challenge for biodiversity. Except climate changes, huge influence on species distribution, especially forests species, has soil and hydrological characteristics of environment. In order to make forests more resilient a significant number of studies are being conducted in order to better tackle the issue of adaptation to the new and expected conditions. European beech is the predominant deciduous species in the forest communities of Europe. It requires moderate humidity and acidity of the soil, which makes it the most represented forest tree species in the region.

Some of the best tools to predict potential spatial distribution of the species in future are Species Distribution Models (SDMs). SDMs are relate to an entire set of statistical correlative approaches that extrapolate that is associated with the presence and / or absence of a kind and project their relationship with these data to different locations and / or time periods. In other words, they use habitat data for places of origin (presence) of a kind to predict a variable, for a location where the environmental conditions are suitable for that species to exist, and also where that species can be expected.

In our study BIOMOD2 distribution model was used. It offers the possibility to run 10 state-of-the-art machine learning techniques to describe and model the relationships between a given species and its environment. It is an attempt to define the ecological niche of a particular species using environmental variables (temperature, precipitation, ...) with the potential use of making future projections under climate and land use change scenarios. The aim of this research was to test if the prediction model has a greater capability when soil and hidrologycal characteristics of environment are included in modeling, in comparison to just climatic variables. Results are shown that value of Receiver operating characteristic (ROC)

and True Skill Statistics (TSS)are higher when soil and hidrologycal characteristics are included. (Higher number of ROC and TSS meaning that model is more predictive). Without this parameters results are >0.7 for ROC and >0.6 for TSS, versus >0.91 for ROC and >0.75 when we use environmental characteristic of the site. Creation of accurate models may halep in better forest management and planning in general, or for some specific purposes like selection of pre-adaptive genetic material for establishing new forests, which is successfully implemented in Hungary.