



Modeling of the potential geographic distribution of *Caragana jubata* (Fabaceae) in the mountain regions

Alina Churiulina and Maxim Bocharnikov

Department of Biogeography, Faculty of Geography, Lomonosov Moscow State University, Moscow, Russian Federation

Reliable knowledge about the spatial distribution of plant species is important for conservation of biodiversity, especially in the case of rare species of protection interest. We have made the spatial distribution mapping of the rare plant species *Caragana jubata* (Pall.) Poir. This species is a relict of the Tertiary period. It has a pan Asian and disjunction distribution. Different parts of this distribution are related to specific mountain regions: eastern part of the Tibetan Highlands, the northeast of the Himalayas, Central and Southern Tien Shan, Sayan Mountains, Stanovoy Highlands. For mapping the geographical distribution of *Caragana jubata* we were used the herbarium materials of the main collections of Russia (MWG, MW, LE, MHA, NS, NSK, TK), literary resources (monographies, books, articles, etc.) and online data (<https://www.gbif.org>, <http://www.plantarium.ru>). The total list is included 475 locations of the species, which have accurate georeferencing.

For identifying the potential habitat of the rare relict species (*Caragana jubata*) we applied the method of computer modelling which was implemented in the Maxent 3.4.0 program complex. We have made prediction maps based on the bioclimatic data – BIOCLIM. Maps have been composed for the entire area of relict species distribution and for the territory of the Stanovoy Highlands. In result of modelling in Maxent revealed that the spatial distribution of *Caragana jubata* is influenced by the complex of factors. Ones are related to monthly and annual amplitude of temperature and precipitation, which are characterizes the continentality of climate. The closest connection with species growth has the variable of precipitation seasonality during the year. The larger the value of the variable than the higher probability of finding of rare species. Statistical analysis of the results is showed a higher accuracy of the model for the entire geographic distribution (“Area Under the Curve” (AUC) – 0, 924), rather than for the part of it represented by the territory of the Stanovoy Highlands (AUC – 0, 815). We recommend to apply BIOCLIM data for small-scale modeling, but in order to improve the quality of the resulting local level model to resort additional sources (vegetation maps, a layer of absolute heights, etc.).

The study was financially supported by Russian Science Foundation project no. № 17 77-10142.

Key words: distribution modeling, climatic factors, herbarium collections, Stanovoy Highlands, relict plant species, BIOCLIM, Maxnt.