

The aim of this project is to reconstruct the postglacial history of six forest tree species growing in the forests of the Caucasus. An integrative approach using analytical tools of population and landscape genetics, statistic phylogeography and species distribution modelling will be applied to spatio-temporal analysis and quantification of the influence of the past geological events and ecological factors on current patterns of population structure and genetic diversity of six forest tree species of the Caucasus in refer to the possible climatic challenges faced by these species and consequences for their genetic structure and distribution dynamics.

There are regions on Earth, in which concentration of life forms, species and genetic diversity, and endemism is exceptionally high. For those areas, a concept of *hotspots of biodiversity* was developed to disseminate the idea of the biodiversity and its high relevance for supporting the global ecosystem. Presently, this idea constitutes a leading paradigm for global conservation strategy. The Caucasus is one of the 36 *hotspots of biodiversity* noted worldwide. However, the Caucasus not only harbours endangered endemic plants but it is also the centre of origin and diversity of some plant taxa and along with the neighbouring Fertile Crescent, it represents domestication site for many plants. The Caucasus, and precisely the Colchic and the Hyrcanian forests constitutes one of the three priceless refugia for the relicts of the Arcto-Tertiary flora. Finally, the Caucasus hosted Pleistocene forest refugia in which survived the species of the modern Caucasian conifer and mixed forests and some divergent lineages of the European species. However, despite being so exceptional, it is at the margins of the scientific interests. Consequently, our current knowledge does not extend much beyond general facts related with the biogeography of the region, and the evolutionary history of the plants, the causal role of the past geological and climatic changes is insufficiently recognized.

The last glaciation that ended roughly 10 000 year ago, thought very remote, was the important factor for current distribution of many plant and animal species and affected profoundly genetic structure of their natural populations. Phylogeography that uses genetic markers and advances statistical methods can reconstruct the changes in ranges of plants and animals that were induced with the last glaciation. Investigations conducted in frame of this project aim at defining the refugial areas in the Caucasus region. Refugia are the geographic locations with suitable environmental conditions in which plants and animals could survive hard conditions of the glacial period. These areas are also the origins of the postglacial recolonization after ending of the glacial period. Using genetic and statistical methods of phylogeography the postglacial migration routes for the Caucasian fir, oriental spruce, Scots pine, sweet chestnut, oriental beech and black alder will be reconstructed in this project. Comparative analysis of those species will enable to find congruent and divergent phylogeographic patterns that will be used in discussion on evolutionary consequences of the last glacial cycle for genetic structure and variability of the natural populations of tree species in the Caucasian forests.

The obtained results will certainly improve our knowledge on evolutionary mechanisms and factors of great biodiversity noted in the Caucasus region. They will be also important for the development of efficient and scientifically-based conservation strategy for the region.