

Biodiversity protection against anthropogenic climate change: conservation prioritisation of *Castanea sativa* in the South Caucasus based on genetic and ecological metrics

Berika Beridze¹, Katarzyna Sękiewicz¹, Łukasz Walas¹, Peter, A. Thomas², Irina Danelia³, Vahid Farzaliyev⁴, Giorgi Kvartskhava⁵, Jan Sós⁶, and Monika Dering⁶

¹Institute of Dendrology Polish Academy of Sciences

²Keele University

³Georgian Technical University

⁴Ministry of Ecology and Natural Resources of Azerbaijan

⁵Georgian Technical University, Faculty of Agricultural Science and Biosystems Engineering

⁶Poznań University of Life Sciences

February 6, 2023

Abstract

The climate drives species distribution and genetic diversity; the latter defines the adaptability of populations and species. The ongoing climate crisis induces tree decline in many regions, compromising the mitigation potential of forests. Scientific-based strategies for prioritising forest tree populations are critical to managing the impact of climate change. Identifying future climate refugia, which are locations naturally buffering the negative impact of climate change, may facilitate local conservation. In this work, we conducted the populations' prioritisation for *Castanea sativa* (sweet chestnut), a Neogene relict growing in the Caucasus global biodiversity hotspot. We generated genetic and ecological metrics for 21 sites in Georgia and Azerbaijan, which cover the natural range of sweet chestnut across the region. We demonstrated that climate primarily drives the pattern of genetic diversity in *C. sativa*, proved with a significant Isolation-by-Environment model. In future, climate change may significantly reorganise the species genetic diversity, inducing even some genetic loss, especially in the very distinct eastern fringe of the species range in Azerbaijan. Based on our combined approach, we mapped populations suitable for ex-situ and in-situ conservation, accounting for genetic variability and the location of future climate refugia.

Hosted file

Beridze et al. 2023.docx available at <https://authorea.com/users/583187/articles/622953-biodiversity-protection-against-anthropogenic-climate-change-conservation-prioritisation-of-castanea-sativa-in-the-south-caucasus-based-on-genetic-and-ecological-metrics>