



The role of beetle communities in past forest dynamics in a Norway spruce forest in the High Tatra Mountains, Slovakia

Nick Schafstall (1), Nicki Whitehouse (2), Richard Chiverrell (3), Helena Svoboda (4), Jan Holeksa (5), Niina Kuosmanen (1), Petr Kunes (6), Miroslav Svoboda (1), Jennifer Clear (7,1)

(1) Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Forest Ecology, Czech Republic (nick.schafstall@gmail.com), (2) University of Plymouth, Faculty of Science & Engineering, School of Geography, Earth and Environmental Sciences, Plymouth, United Kingdom (nicola.whitehouse@plymouth.ac.uk), (3) University of Liverpool, Faculty of Science & Engineering, School of Environmental Sciences, Liverpool, United Kingdom (r.c.chiverrell@liverpool.ac.uk), (4) Institute of Botany of the Academy of Sciences of the Czech Republic, Pruhonice, Czech Republic (dr.helena.svobodova@seznam.cz), (5) Adam Mickiewicz University, Faculty of Biology, Department of Plant Ecology and Environment Protection, Poznan, Poland (j.holeksa@botany.pl), (6) Charles University, Faculty of Biology, Department of Botany, Prague, Czech Republic (peter.kunes@natur.cuni.cz), (7) Liverpool Hope University, Faculty of Science, Department of Geography and Environmental Science, Liverpool, United Kingdom (clearj@hope.ac.uk)

Norway spruce is a dominant keystone species in the montane coniferous forests in central Europe, with important ecological and commercial value. Natural disturbances such as wind throws and bark beetle outbreaks have caused major losses in these forests in the last few decades and are becoming more frequent and severe. Holeksa et al. (2016) created a dendroecological dataset from the High Tatra Mountains in Slovakia, which shows several large disturbance events occurred in this region over the last two centuries. Comparing dendroecological data with fossil beetle records from sedimentary archives can provide more specific information on the nature of these disturbances. Reconstructed long-term disturbance patterns can then provide information for improved nature conservation and forest management, as they can make use of these natural factors of dynamics and resilience of the forest. From a forest hollow in the High Tatra Mountains in Slovakia, 12 cores were retrieved for a quantitative study on subfossil beetles (Coleoptera), covering the last 1400 years. Correlation and integration of the adjacent profiles was underpinned by repeatable down-core μ XRF geochemical stratigraphy (airfall Pb and other elements). The Pb profile shows patterns likely related to Europe-wide increases in airfall pollutants \sim 1000 and 200 years ago. Concentrations of lithogenic elements (K, Ti and Zr) decline from the base with reducing influence of bedrock, but show three distinct peaks in the upper 20 cm likely inwash or airfall of mineral dust. Fossil pollen and charcoal records, obtained from a parallel core, together with the fossil Coleoptera, provide a record of past disturbances that can be compared to the disturbance events recorded in the dendroecological data. A diverse community of beetles was recovered, including many species of bark beetles such as *Ips typographus* and other saproxylic taxa characteristic of dead wood habitats. Changes in the forest beetle community over the last 1000 years and their relation to disturbance events in the High Tatra Mountains in Slovakia are discussed.

Holeksa, J., Zielonka, T., Zywiec, M. and Fleischer, P., 2016. Identifying the disturbance history over a large area of larch–spruce mountain forest in Central Europe. *Forest Ecology and Management* 361: 318-327.