

## **Geosites of Lithuania as an environment for dwelling of specific biota: geo- and biodiversity interactions**

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Surface of Lithuania and surrounding countries is sculptured by five glaciations, which left behind morainic tills and melt water deposits, modified by erosion and later used for agriculture or overgrown by wild meadows or forests. The glaciations also left numerous erratic boulders and boulder fields that are declared as natural monuments in Lithuania and surrounding countries. Tens of single boulders and boulder fields are included into the Geosites database at the Lithuanian Geological Survey. Though sparse, but of high scientific value, Devonian, Permian, Triassic and Jurassic outcrops and quarries of Lithuania are variably protected.

Quaternary scientists attempted to use single erratic boulders, their fields and abundances in tills to imply glacier dynamics. Some erratics came from known localities in Scandinavia and are called indicator boulders because they show the source and directions of ice sheet movements. Huge single boulders (e.g. 7 m long and 6 m high Puntukas, Anyksciai Regional Park) and wild boulder fields are natural monuments and attractive sites for visitors. Outcrops and quarries of Devonian dolomites and gypsum, Permian limestones and Jurassic sandstones widely used for a scientific research are parts of the protected geo-diversity in the Venta and Birzai regional parks, N and NW Lithuania.

On the other hand, a large part of the c. 700 species of lichenized and allied fungi and of c. 500 bryophytes known in Lithuania are confined to natural or semi-natural (quarries) rocky habitats. Eight rock-dwelling lichen and nine bryophyte species are included in the Lithuanian Red Data Book, some of them are known from 1–2 localities or are thought to be extinct now. Besides, the recent investigations of dolomite quarries revealed them to be habitats for 7 bryophyte, 8 lichenized and lichenicolous species, previously unknown for Lithuania. One new lichenicolous species was discovered (Khodosovtsev et al., 2012). Some of the new finds are rare or absent also in the neighbouring countries.

In general, protection of geo-diversity coincides well with protection of narrowly specialized cryptogams, e.g. overgrowing of boulder fields with tall herbs and shrubs also has adversary effect on rock-dwelling lichens. Shading of Devonian outcrops and quarries by trees and shrubs may obscure rocky surfaces and destroy lichens, but favour an establishment of sciophyllous bryophytes. No doubt that cleaning of surfaces of single boulders that are well-known nature monuments prevents an establishment and growth of lichens and bryophytes. However, most of the geological monuments which are subjected to cleaning are situated in localities under strong anthropogenic impact and therefore not suitable for settlement of the rare and protected species. Though conservation conflicts arise even when protecting different species of biota, not to mention conservation of bio- versus geo-diversity, most of the conservation measures for the geoheritage in Lithuania are also suitable for rock-inhabiting lichens and bryophytes. Protection status and measures should be negotiated by bio- and geoscientists, and legislation for bio- and geo-diversity protection should be improved.

Khodosovtsev, A., Vondrák, J., Naumovich, A., Kocourková, J., Vondráková, O., Motiejūnaitė, J., 2012. *Nova Hedwigia*, 95(1-2): 211-220.