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Geodiversity estimate of a region hosting an intracontinental monogenetic volcanic field in the territory of the Arxan UNESCO Global Geopark and Zalantun Autonomous Geopark, NE China

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Arxan-Chaihe Volcanic Field (ACVF) is southwest of the Great Xing'an Range in Inner Mongolia, NE, China. This is a typical monogenetic volcanic field formed in the Pleistocene with its latest activity in a fissure eruption about 2000 years ago. The volcanic elements are the main attraction of two geoparks (Arxan and Zalantun), including fissure-aligned spatter/scoria cones and occasional maar volcanoes. Besides the young volcanic features, the region is dominated by eroded and structurally dissected exhumed Mesozoic basement rocks, such as granites and metamorphosed sedimentary rocks. The main geoeducation, geotouristic and geoconservation activities are centred along with the recent basaltic volcanic features, while the older rocks receive little or no attention so far within the conceptual framework of the geoparks. The geodiversity estimate of the ACVF is clearly incomplete. Here we present the first geodiversity estimate of the region applying the method outlined recently in Zakharovskiy & Németh (2021), combining the geomorphological and geological elements into a grading system weighting their rarity, significance, and uniqueness. To outline the geomorphological diversity, the geomorphon concept was used alongside watershed analysis of the theoretical fluvial network of the region aided by the localisation of volcanic geomorphology elements. For the geological diversity estimates, the available geological maps, field surveys and volcano geology classification were utilised. The boundaries of geoparks enclose a region of diverse geomorphological structures presented by mountain ranges, valleys, and hills with an altitude between 500 and 1700 m above sea level. Lakes are either lava-ponded lakes or crater lakes. The fluvial system contains four main rivers and their side streams located mostly in the east part of the region. Geology and geomorphology are the core parameters that generally represent geodiversity. Qualitative-quantitative assessment methods highlight the most valuable geodiversity parameters of the region, which can become potential geosites. Several methods were applied through the GIS tool using QGIS freeware. The analyses contain the distinguishing rock types, geomorphology, streams, slopes, and terrain forms (geomorphons). By calculation of those parameters, the values of geodiversity were calculated. In addition, the spatial variation of geochemistry data was entered into the GIS system to delineate geochemical patterns within the volcanic field as an additional attribute to recognise the internal diversity of the eruptive products. Our study concluded that the recent volcanic features indeed bear high geodiversity and elevated geoheritage values. However, the uplifted and structurally complicated old terrains with

mature fluvial networks provide high geomorphological diversity to the region, therefore keeping the overall geodiversity score high regardless of the relatively uniform geological assets. Well-selected geosites from those regions would serve important geotouristic and geoeducation goals and should be included in the geoconservation strategy of the region.

Zakharovskyi, V.; Németh, K. Quantitative-Qualitative Method for Quick Assessment of Geodiversity. Land 2021, 10, 946. <https://doi.org/10.3390/land10090946>