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Environmental Impact Analysis of Infrastructures Development and Lake Beseka Expansion on the Integrity of the Fentale-Metehara Blister Caves, Main Ethiopian Rift

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The Fentale-Metehara blisters and blister caves in the Main Ethiopian Rift are unique and spectacular geological features found in such number and extent in this area only. These features will be ideal sites for establishing a geopark. This will provide tourists more opportunities and options to visit and to be employed for the local community. Supervised classification was utilized for the decadal land use and land cover (LU/LC) mapping of the study area. To document all the blister fields in a geo-database schema Google Earth accompanied by detailed field investigation has been carried out. For mapping the geology of all blister fields a detailed field investigation was also carried out. Susceptibility to destruction of these features has been analyzed based on the frequency ratio technique and natural (topographical factors, drainage systems, Lake Beseka expansion and lava flows) and human induced (urbanization, irrigation activities and infrastructure lines) triggering factors. The total of 161 blister caves and 478 blisters were mapped and well documented. Most of the blister fields fall on high to very high susceptibility zones. It was found out that further expansion of Lake Beseka, as well as the human induced factors including infrastructure development could lead to further destruction of low to very low susceptible zones of the blister fields. The LULC analysis further corroborates this conclusion as it has been observed that the Lake Beseka, farmlands and settlements expanded at about 46.2 km², 46.6 km² and 3.3 km² area respectively during the last four decades. In conclusion, proper and well-organized documentation of the blister fields in a geo-database schema and also the high quality susceptibility zonation map, which were produced in this study, will help in the preservation efforts of these unique geoheritage resources.

Keywords: Blister; blister cave; frequency ratio; geoheritage; geopark; susceptibility