



Application of advanced data mining tools for better defining the geoheritage values of volcanic fields

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Geoheritage is the representation of those components of the physical constitution of the Earth that are of significant value to humans. How to assess and compare the value of geosites between communities is a complex and difficult task that geoheritage studies address to target.

In New Zealand's largest city, Auckland, the growing urbanisation and industrial expansion make it difficult to protect the geodiversity that once existed within the volcanic field on what the modern city expanded since the end of 19th century.

The objective of this work is to find key concepts and factors existing in the scientific literature with special relevance to the volcanic geoheritage and find relationships between the current geoheritage theories and assessment methods. The objectives of geoheritage studies differ greatly and the evaluation strategies vary even within the smallest scales. In consequence, numerous assessment methods have evolved in the past decades through case studies that mainly aim to advance the growth of individual geoparks. To date our findings indicate that the number of assessment methods have dramatically increased and became too complex over the last decade. While these studies use a range of statistical analytic tools less attention has been paid to the benefits of Geographical Information Systems and new internet based tools as methods more applicable to extracting communities' values towards a geosite. New, mostly internet-based data mining techniques and algorithms such as latent Dirichlet allocation, automate the process of extracting topics and analysing topic evaluation trends. The acquired data sets are easily integrated into Geographical Information System facilitating visualisations for interpretation, analysis and evaluation.

Evaluating the shortcomings and understanding global trends on volcanic geoheritage is necessary to develop a precise method for assigning values to geosites/volcanic features in a market-driven environment such as Auckland and also justify using more simple data-mining tools and GIS methods to objectively and independently determine values associated to geosites. A robust geospatial application directs more attention toward the high educational and scientific value of these volcanic features and serves as an instrument for decision makers.