

# Spatial Determinants of Forest Landscape Degradation in the Kilimanjaro World Heritage Site, Tanzania

Eveline Aggrey Enoguanbhor<sup>1</sup>, Evidence Chinedu Enoguanbhor<sup>2</sup> , Eike Albrecht<sup>1</sup>

<sup>1</sup> Department of Civil Law and Public Law with references to the European Law and Environment, Brandenburg University of Technology, Cottbus – Senftenberg, Germany;

<sup>2</sup> Applied Geoinformation Science Lab, Department of Geography, Humboldt University of Berlin, Germany; evelinemwambene@yahoo.com (E.A.E.); albrecht@b-tu.de (E.A.); enoguanbhor.ec@gmail.com (E.C.E.)

Received: 29 June 2022; Revised: 25 August 2022; Accepted: 20 September 2022; Published online: 3 October 2022

**Abstract:** Forest degradation occurs in natural World Heritage Sites (WHS) in the Global South despite the implementation of various strategic policies and the World Heritage Convention (WHC) on forest protections of the sites and this poses challenges to improve natural heritage sustainability. The current study aims to investigate spatial determinants of forest degradation in the Kilimanjaro WHS, Tanzania, to support strategic policies for forest landscape protection and natural heritage sustainability. Using remotely sensed, Digital Elevation Model, and tourism location data, we performed the supervised classification of satellite images, Digital Elevation, Euclidean distance, and linear regression modeling to identify spatial determinants of forest degradation. Our key findings indicated that while spatial determinants vary with different locations, human (tourism) activities e.g., developments of campsites, picnics, tourist routes, the historical site, and attraction areas are associated with forest degradation in the southern parts of the site. In addition to human activities, natural factors such as low levels of elevation and degrees of slope are associated with forest degradation at the site. However, in the northwest and southwest of the site, high degrees of slope are associated with the degradation. Our findings showed that while bare land surface encroached the primary forest with about 2.88%, moorland vegetation encroached the primary forest with about 16.95%, indicating a large degradation of the primary forest with about 19.83% for the past four decades. The information provided in this study is crucial to support site managers and decision-makers in strategic policies and WHC implementations on forest protection for natural heritage sustainability.

**Keywords:** Forest degradation, montane primary forest, spatial determinants, natural heritage sustainability, World Heritage Site, Kilimanjaro.

**Citation:** Enoguanbhor, E. A., Enoguanbhor, E.C., & Albrecht, E. (2022). Spatial Determinants of Forest Landscape Degradation in the Kilimanjaro World Heritage Site, Tanzania. *Central European Journal of Geography and Sustainable Development*, 4(2), 5-23. <https://doi.org/10.47246/CEJGSD.2022.4.2.1>

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