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Gully Initiation on the Quartzite Ridges of Ibadan, South West, Nigeria

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Gullies are morphological evidences that reflect the impact of environmental changes on landscape. In an attempt to emphasize the importance of topography on gully initiation and development in an area of uniform geology, this study examined the morphological characteristics of hillslope and the role of topographic mechanism in gully initiation on a quartzite terrain of Ibadan, South western Nigeria. Four prominent quartzite ridges exist in Ibadan namely Mokola, Mapo, Eleyele and Ojoo, each of which except the latter is characterized with significant gully systems. Field measurement was carried out to determine the gully morphological characteristics such as length, width, depth, area and depth of gully head, width/depth ratio, gully sinuosity and gully shape while Digital Elevation model (DEM) was used to examine the slope-area relationship. The slope-drainage area threshold was established for each of the gully systems.

The average gully density of the study area is $2.48\text{km}/\text{km}^2$ and the gully frequency is 9.72 gullies/ km^2 . Although an investigation into the variation of the gully morphology and initiation show that human activities and vegetation are contributory factors to their development. However, topographic characteristics exhibit a dominant role in the gullying process. The ridges were observed to trend in NNW-SSE direction with slope angles ranging between 5° and 30° . The inverse relationship derived between the topography and gully dimension ($r = 0.462$), suggested that gully initiation processes are dominant on gently sloping ridges due to extensive surface area on a deeply weathered regolith that enhances fluvial processes of material detachment on the one hand and anthropogenic conditions on the other hand. Thus, further geomorphological assessment of landform units in Ibadan is necessary with a view of identifying potential geomorphic risk prone areas, an essential component of risk management for dense urban areas of the tropics.