

A Geo-Spatial Approach to Resolving Illegal Mining Activities in Ghana

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SUMMARY

The dynamics of the earth's surface are shaped by a number of key processes, including changes in land use and land cover (LULC) caused by anthropogenic factors. The environmental effects of this phenomena, which is happening at an astounding rate, has drawn the attention of geoscientist globally. Around the world, mining operations and related activities modify land use and land cover (LULC). This study's goal is to assess the spatiotemporal effects of illegal mining operations in the Eastern Region of Ghana. Deforestation, soil erosion, water and soil contamination have all been triggered by the mining enterprises, both large and small. From 2007 to 2022, historical LULC changes in the research area using the spectral bands of Landsat and Sentinel images were analyzed to determine the temporal and spatial extent of environmental degradation due to mining activities.

Thermal emission rates, DEM analysis and analyzing climate data within the study area was also explored to quantify the extent at which illegal mining activities have altered the bio-physical nature of the environment. Following that, a CA-Markov model was applied to forecast future LULC changes based on recent changes. The study's findings indicate a loss in vegetative cover, increase in thermal emissions, pollution in water bodies and an exponential expansion in urban developments, particularly those near mining concessions. Additionally, the predictive time series analysis revealed that, in the absence of growth restrictions, urban expansion is expected to triple in 2049. This can be mostly ascribed to the expansion of mining operations in recent and upcoming years. Planning officials, decision-makers, and environmentalists in the community may find the debate and findings of this study interesting as they attempt to view the harm done to the environment and society as a whole.