

Mapping of Land Surface Temperature Trends in the Mining Areas of Tarkwa-Prestea, Ghana

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SUMMARY

One of the emerging factors to consider in locating appropriate municipal waste disposal sites is land surface temperature (LST) due to its association with the emission of harmful gases and heat. The objectives of this study were to map, assess and discuss the trends of LST changes in the mining areas of Tarkwa, the factors involved and their applications in landfilling to reduce emission and the negative effects of temperature inversions. The main techniques applied were remote sensing, GPS, GIS and basic statistics for the data collection, processing and analysis. Five LST maps and associated statistical table(s) and graphs were derived as the main results, using Landsat8 Aerial Images (2015-2020) as main input data, and ArcGIS (10.7.1) and Microsoft Excel as software. From the results, land surface temperatures were generally on the increase from 2015 to 2020 but exhibited irregular variations at some times and places, especially in 2017 and in the northern parts of the study area, and this was attributed to intermittent farming and illegal mining activities. Other areas in the southern, eastern and north-western parts where major settlements and mining activities exist, uniform increases in LST were observed from moderate to high levels from 2015 to 2020. The results thus revealed some correlation between the LST changes observed and the land use patterns of the study area. Similar links were observed between high LST values and the relief. One application of the observations was that in the areas with uniformly increasing LST values, uncontrolled landfilling, mining and similar land uses can compound the negative effects of increasing LST through emission of unwanted gasses and particulate matter and temperature inversions. A further application or recommendation was that the land surface temperature maps developed from the study or similar ones may be used as references or criteria to check the suitability of proposed land uses or locations of development projects such as landfilling in terms of their pollution risk in association with high LST values.

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