

Geospatial Assessment of Planning Schemes using GIS and Remote Sensing Techniques-A Case Study of the Tarkwa Area

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SUMMARY

Spatial Planning (SP) in Ghana is the responsibility of the Spatial Planning Unit within the Metropolitan/Municipal/District Assemblies (MMDAs). They are responsible for developing, implementing, and updating Planning Schemes (PSs). If not carried out effectively, this process can lead to geospatial inaccuracies in positions of land parcels on the ground. The geospatial errors in SP, as seen in towns like Tarkwa in Ghana, have led to a range of detrimental consequences such as unauthorized constructions, insufficient infrastructure, sanitation problems, flooding issues, health hazards, increased fire risks, higher crime rates, and the emergence of squatter settlements. Hence, this research seeks to create a geo-database for land parcels of the Tarkwa Area (TA), geospatially assess the PS and to revise the PS by re-planning to avoid the negative vices of poor planning and implementation. The geo-database was created using the raster (JPEG) format of the PS with a Cell Size of 0.64 m in ArcGIS 10 software and geo-referenced using the Geo-referencing Tool and obtained a Total Root Mean Square Error (RMSE) of 0.040 m using the Second Order Polynomial Transformation. The Editor Tool of ArcGIS 10 software was used for the digitisation of the various land uses in the PS and a digitisation error of 0.003 m was achieved. The Attribute Table of ArcGIS 10 software was used in creating the geo-database by linking non-spatial information such as land ownership to spatial information such as boundaries of land parcels. The geospatial assessment of the PS considered positions of land parcels on the PS and corresponding positions on the ground. The Analysis and Geo-statistical Analysis Tools of ArcGIS 10 were used to create buffers per standard reservations to roads and other features to ascertain whether buildings and other land uses are within the standard reservations. A buffer map was then created showing affected parcels of land to aid in the revision of the PS by re-planning. It is concluded that for the PS of the TA, a geo-database of 7 546 parcels of land has been created and the geospatial assessment yielded standard deviations of ± 35.240 m and ± 53.152 m for Easting and Northing respectively affecting the positions of land parcels in the PS. Finally, it is concluded that the PS of the TA has been revised by re-planning per the results of the geospatial assessment to provide a more realistic PS.

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