

Application of Dasymetric Mapping Approaches to Circumvent the Modifiable Areal Unit Problem (MAUP) in the Geospatial Analysis

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The arbitrary and artificial ways of demarcation of administrative boundaries (modifiable) are prone to many geospatial analyzing issues. These issues are highly correlated with the aggregated data. For an instance, in the case of Sri Lanka, the aggregated data belonged to the demarcated boundaries (hierarchical) such as Grama Niladari Divisions (GNDs), District Secretariat Divisions (DSDs), Districts, and Provinces etc. In the notion of geospatial data analysis, the analytical results (e.g. spatial patterns of phenomenon) may vary based upon the definitions of spatial units. In contrast, the resultant facets of analyses (same data) are potential to be changed due to scale (size) and zoning effects in which the aggregated data are belonged. This issue can be identified as the Modifiable Areal Unit Problem (MAUP). The MAUP exemplifies the notion of ecological fallacy. These issues are crucial in the application of choropleth mapping. Dasymetric mapping can be identified as one of the best methods of disaggregating aggregated data into fine-grain division of spatial units. In this context, the aim of this study is to apply dasymetric mapping approaches (Binary and Limiting Variable) by occupying with land use and land cover, address points ancillary data in order to mollify the MAUP. The study area of this work is Kuruwita DSD of Rathnapura district, Sri Lanka. We tried to map and to identify the spatial distribution patterns of Dengue cases in different years of Kuruwita DSD. We selected the best weighting schemas for the ancillary classes based upon the Root Mean Squared Error (RMSE) and the Mean Absolute Error (MAE) of the models. All the analyses were accomplished in the ArcGIS 3.3 environment. The analysis of the results revealed that the fine-grained disaggregated units represent much better and precise spatial distribution patterns of Dengue cases of study area. Also, this application helped to mitigate the scale and the zoning issues of MAUP by avoiding the misinterpretation of the spatial distribution patterns of Dengue cases of study area.

Key words: *Modifiable Areal Unit Problem (MAUP), Dasymetric mapping, Dengue disease alert*