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**Dasymetric Mapping and Areal Interpolation – Definition and Purpose**

There are problems associated with mapping demographic data by administrative areal units such as census boundaries. A choropleth mapping representation gives the impression that population is distributed homogenously throughout the areal unit, even when portions of the areal unit are uninhabited. Dasymetric mapping, as a solution, is a type of areal interpolation where data from one set of geographic source zones are transferred to a set of target zones based on ancillary information used to aid the interpolation. The following application interpolates census data to a surface representation of population density (population/grid cell) based on the principles listed below.

**Dasymetric Mapping Tool - Software Capabilities and Usage**

**Input Data Needs:**

* Population Layer – Any demographic data in a geo-spatial format that has one population value representing each areal unit (polygon). (Example – US Census Data by block, block-group, tract, county, etc.)
* Ancillary Layer – A land use or land cover-derived raster layer that has been re-classified into four classes representing inhabited/uninhabited areas into density stratification. (Example – (1) High-Density Residential, (2) Low-Density Residential, (3) Non-Urban inhabited, (4) Uninhabited)

**Empirical Sampling:** Empirical sampling is used to determine the fraction of the census unit's population that should be allocated to each inhabited class for the study area. For example, the user can choose the percent cover in which the inhabited class occupies the census unit (between 70-100%). The sampling approach will take all census units (block groups) that are 80% (users choice) covered by high-density residential and calculate a population density fraction that will be used as the proxy density allocation for the high density residential class. If there are no census units that meet these criteria (i.e. 80% covered by high density residential), areal weighting is used.

**Areal Weighting:** The ‘population density fraction’ must be adjusted by the percentage of the block-group’s total area that each ‘inhabited class’ occupies. A ratio is calculated for each ‘inhabited class’ representing the percentage of area that an ‘inhabited class’ actually occupies within a block group to the expected percentage of 33.3%. The area ratio is used to adjust the ‘population density fraction’ accounting for the variation of both the population density and area for the different ‘inhabited classes’ for each block group.

**Preset Classes:** If you have a Land Use/Land Cover class that you know is “uninhabited” (for example, water, non-residential developed, uninhabited wetlands, or forest) you may “preset” these classes to “0” so no data may be distributed to these zones.

**Output:** The “Dasymetric Mapping Tool” outputs a raster grid named “Dasy\_rast” representing population/grid cell. This data has been transferred from the source population data (census) to the target land use/land cover data zones by means of areal interpolation. The grid cell size can be determined by the user and is dependent on the scale you and the input data available. There is no limit to how small the grid cell size can be, however computation time may be affected.

**Symbolization:** The raster grid named “Dasy\_rast” will have a field that has all of the new density values. The field is named “NewDensity” and the user must modify the symbolization to visually represent the results. The recommended symbolization is to use the ‘classified’ data range with the desired amount of classes. Another recommended option is to exclude all of the zero values by going to Classification – Data Exclusion Properties. Enter “0” into the exclusion value field and choose your legend properties for all zero values.

[For Full Equations: see research by Jeremy Mennis (click)](http://astro.temple.edu/~jmennis/research/dasymetric/dasydetails/dasydetails.htm)

**Further Questions Please Contact:**

**Mike Gould – USGS**

[mgould@usgs.gov](mailto:mgould@usgs.gov)

* + 1. -- or --

**Rachel Sleeter - USGS**[rsleeter@usgs.gov](mailto:rsleeter@usgs.gov)

650-329-4373