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Methods for Master Thesis: Final Task.

Assessing average soil fertility per land cadastre in Hiiu county

1. Background

- Problem to solve: to find out and display the average percentage level of soil fertility for each land cadastre (parcel) in Hiiu County.
- Reason: for visualisation purposes and for creating a data table of different measurements per land cadastre for statistical analysis.
- How: the problem is solved using geostatistical techniques within ArcMap, with the calculations added to the cadastral shapefile.
- Tools: clip, intersect, dissolve
- Processes: calculate geometry, field calculator, summarize (statistics)

There are two ways of doing this. This method clips the 'average fertility soil map' at the end of the process by the areas surveyed. This way, non-surveyed areas such as lakes are not removed from full polygons, which makes further analysis of full polygons possible (such as to work out the percentage of lakes per polygon).

2. The Data

- Already clipped Hiiu County Soil Map. This shapefile includes surveyed areas only, so closed areas, such as the city of Kärdla are not included.
- Already clipped Hiiu County Cadastral (land parcel) map.
- Already clipped Hiiu County one polygon map

3. Instructions

1. Unzip the files
2. Open ArcMap locate the unzipped files and import them
3. Right click 'Hiiu_Cadastre' layer > click menu and select Add Field > name 'Cad_Area' and choose Float > right click new 'Cad_Area' column and select Calculate Geometry> Area

and ensure that Estonian Coordinate System of 1997 is the coordinate system and Square Metres is the measurement > Ok > exit attribute table.

4. Right click ‘Hiiu_Soils’ layer > click menu and select Add Field > name ‘Soils_Area’ and choose Float > right click new ‘Soils_Area’ column and select Calculate Geometry > select Area and ensure that Estonian Coordinate System of 1997 is the coordinate system and Square Metres is the measurement > Ok > exit attribute table.
5. Intersect soil map by cadastral map: Click Geoprocessing > Intersect > Input Features: ‘Hiiu_Soil_map’ (top), ‘Hiiu_Cadastres’ (bottom) > Name output feature class ‘Hiiu_Cadastres_Soils’ > ‘OK’.
6. Right click new ‘Hiiu_Cadastres_Soils’ layer and Open Attribute Table. Click menu and select Add Field. Name field ‘Inter_Area’ (float).
7. Right click ‘Inter_Area’ column and select Calculate Geometries. Choose Area and ensure that Estonian Coordinate System of 1997 is the coordinate system and Square Metres is the measurement.
8. Divide new intersected polygon area by original cadastral polygon area: Add Field > Name field ‘Rel_Area’ (float) > Right click ‘Rel_Area’ column > Field Calculator > Make formula ‘Inter_Area/Cad_Area’ > OK
9. Weigh Fertility value by relative area: Add Field > Name field ‘Rel_ Fertility’ (float) > Right click ‘Rel_Fertility’ > ‘Field Calculator’ > Make formula ‘pot_fertility*Rel_Area’ > OK
10. Calculate fertility per cadastre: right click ‘Rel_Fertility’ > Summarize > Select 1. TUNNUS, 2. ‘Rel_Fert’ (SUM) 3. Name output ‘Cadastre_Fertility.dbf’ > OK > OK
11. Right Click ‘Hiiu_Cadastres’ layer > Join and relates > Join > 1. TUNNUS 2. ‘Cadastre_Fertility.dbf’ 3. TUNNUS (keep all records) > OK
12. Right click ‘Hiiu_Cadastres’ layer > Data > Export Data > name file ‘Hiiu_Cadastres_Soil_Fertility’ > OK > OK.
13. Check attribute table of ‘Hiiu_Cadastres_Soil_Fertility’ layer.
14. Geoprocessing > Dissolve > Input feature: ‘Hiiu_Soil_Map’, Output feature: ‘Hiiu_Soil_Dissolve’ > OK
15. Geoprocessing > Clip > Input Features: ‘Hiiu_Cadastres_Soil_Fertility’, Clip Features: ‘Hiiu_Soil_Dissolve’, Output Feature Class: ‘Hiiu_Cadastre_Soil_Map_Surveyed’ > OK
16. Overlay the ‘Hiiu_Cadastre_Soil_Map_Surveyed’ layer on top of basic ‘Hiiu _County’ layer polygon.

17. Display using appropriate symbology for average cadastre fertility percentage: right click the ‘Hiiu_Cadastre_Soil_Map_Surveyed’ layer > Properties > Symbology > Quantities > Field Vale: ‘Sum_rel_fe’ > Choose an appropriate colour scheme > OK
18. Display the ‘Hiiu_County’ polygon and choose a grey display colour for no data.
19. Go to layout view > File > Page Setup > Landscape > OK
20. Add a title, north arrow, scale and legend to the map, as in the image below.
21. Click ‘file’ and ‘Export Map’. Choose a .png file with 500 dpi resolution.