Using cadastral cartography to recreate past landscapes: the Horta example

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1 Background

Many historical maps can be integrated within GIS to perform spatial analysis or other operations. However, even if theoretically possible, integration is often difficult due to geometrical or geographical inconsistencies which are common to many historical maps. Nevertheless, cadastral maps usually have a good level of accuracy and they also give relevant information about the land use of the rural part of towns at a detailed level.

In Catalonia, cadastral maps began being mass produced in the 1840s [1], giving researchers an open window to the past. The information they contain can be extracted by transforming manuscript maps into full blown datasets. In this case an original cadastral map depicting the town of Horta and created by Joan Serra in the year 1861 [2] is used as an example of what it can be achieved.

3D view of the recreation of Horta's land use in 1861.
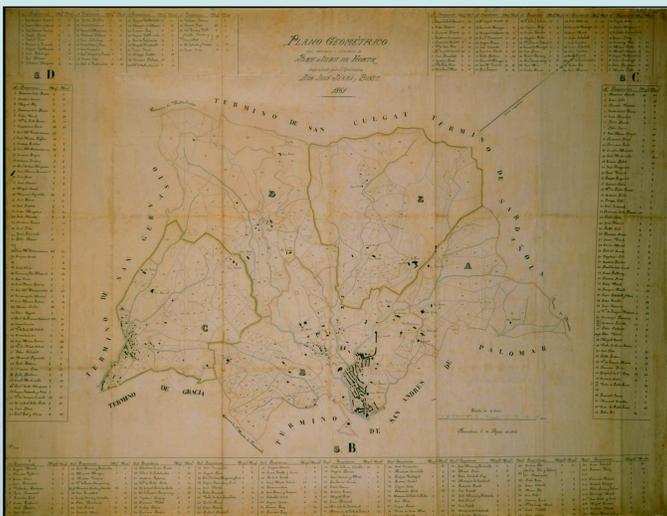
2 Methods

The steps required to extract the information contained in Catalan cadastral maps are:

1. Clean the map (legend, scale...)
2. Georeference with a 1:10,000 topographic map of the area using:
   a) Country houses
   b) Churches/shrines
   c) Street crossings
   d) Mountain summits
3. Digitise the desired features

- Punctual symbology
- Housing
- Ways/roads
- Rivers and streams
- Plots
- Perimeter
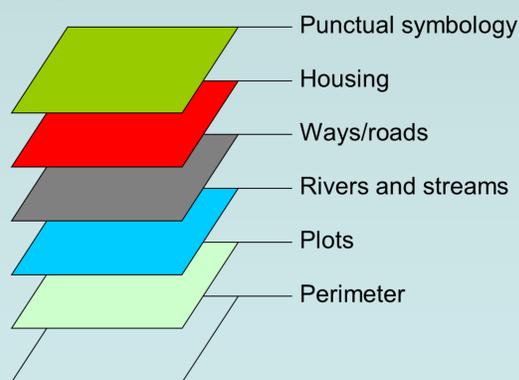
4. Overlay with a current DEM
5. Check the quality of the digitalisation by comparing it to orographic features like valleys or ridges
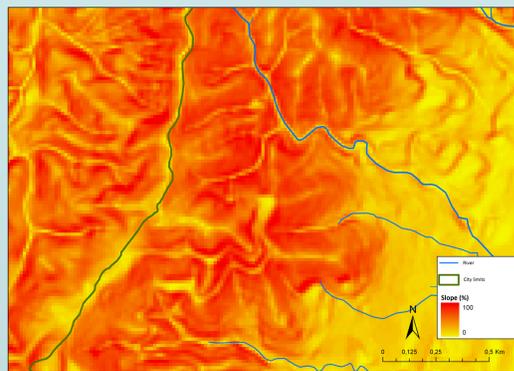
6. Link the land use information available in historical tax records with the digitised plots

3 Results

Since the original map from 1861 is planimetric it does not provide information about the terrain's altimetry. However, when linked with a DEM, a 3D recreation of the past can be created [3].

Researchers or users can navigate across the historical recreation to view and analyse different aspects of how was a certain area in the past, the altitudinal distribution of land uses or historical communication networks.

In addition to in-depth analysis performed in local GIS systems, when results are combined with distributed GIS, sharing historical findings with users worldwide is possible. For example, the Google Earth web browser plug-in was used to allow not only navigating the 3D recreation, but it also adding or removing visible layers, like where streams or paths were located, overlaid with current imagery of the area [4].

4 Conclusion

The potential output when using GIS together with historical data is almost unlimited [5]. The Horta case presented in this poster shows that integrating Catalan cadastral maps from the 19th century with GIS is possible thanks to the high geometrical quality of the charts created by surveyors 150 years ago. If all 19th century cadastral maps found in Catalonia were treated in this way a magnificent source of information would be made available to researchers from many disciplines.
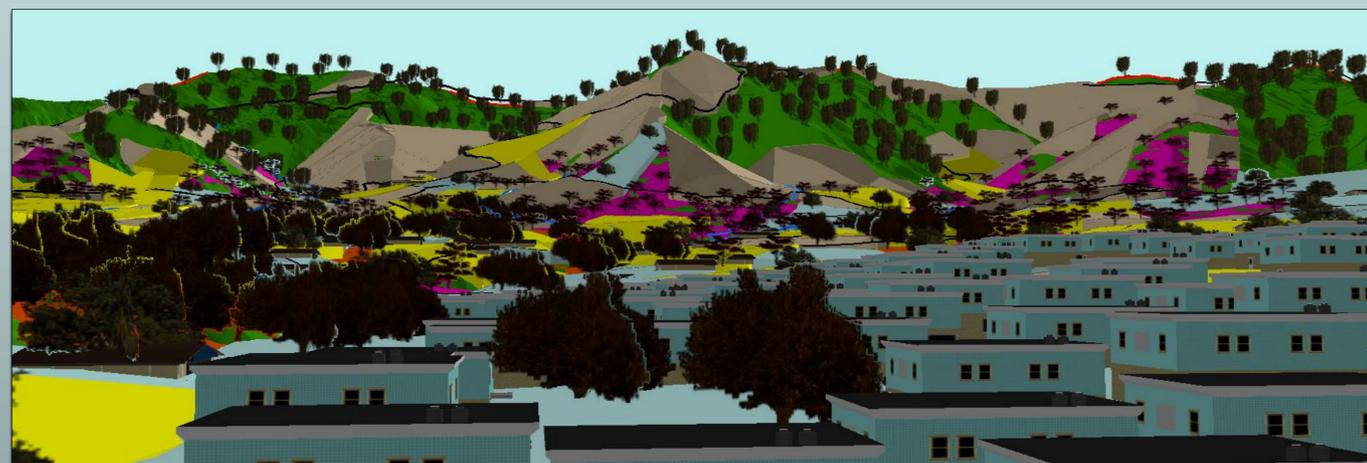
References:

[1] Nadal, Francesc; Urteaga, Luis and Muro, José Ignacio. *El territori dels geòmetres. Cartografia parcel·lària dels municipis de la província de Barcelona (1845-1895)*, Barcelona, Institut d'Edicions de la Diputació de Barcelona, 2006

[2] Montaner, Carme and Nobajas, Alexandre *Catàleg de la cartografia parcel·lària municipal de Catalunya (1849-1897) aplegada pel GEHC* Available here: http://www.gisngeo.com/gmaps/cadastre/cadastralsweb.php, 2010 [Last accessed: 11/01/2012]

[3] Orciani M., Frazzica V., Colosi L., Galletti F., 2006 Gregoriano Cadastre: transformation of old maps into Geographical Information System and their contribute in terms of acquisition, processing and communication of historical data. In *Digital Approaches to Cartographic* Heritage, Thessaloniki, 2006

[4] Nobajas, Alexandre *Recreació del l'antic municipi d'Horta l'any 1861* Available here: http://www.gisngeo.com/gmaps/gearth/horta/gearth.php [Last accessed: 11/01/2012]

[5] Knowles, Anne *Past time, past place: GIS for history* ESRI, 2002