

From historical cartography to historical mapping: digital edition of Gaul/Raczynski topographic map of Greater Poland (1807-1812)

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Keywords: cartographic heritage, old maps, historical maps, webGIS

Abstract:

The aim of the author is to present and discuss methodological problems related to the development of old maps' digital editions on the example of the so called Gaul/Raczyński topographic map – a perfect case providing the whole catalogue of problems related to archival maps' representation in the digital form. Today, we can observe an increasing interest in spatial and digital humanities, as well as more frequent old and historical maps dissemination via web services. However, consistent methods of their depiction in the digital manner have not yet been developed. The aim of the project is not only to develop such a method, but also to indicate its perspectives and constraints in the context of its future application among the whole array of old maps. The development of map's digital edition allows the full use of such data in historical and geographical studies.

The Gaul/Raczynski map (full title: "Geographic, Military and Statistical Map of Greater Poland") named after the cartographer (Ernest Gaul) and patron (Edward Raczynski) consists of 8 sheets covering 8 districts of Poznań Department of the Great Duchy of Warsaw and its scale is approx. 1:75 000. The dates depicted on one of the sheets indicate period of its elaboration: 1807-1812. The scope of content is rather typical for a topographic map of this period, although one sheet is also supplemented by statistical values assigned to each settlement (number of inhabitants and amount of grain collected). This manuscript map was colorful, although what remains today are only its black-and-white photocopies (in two different sets) as the original was lost during the Second World War.

Providing a digital edition of an old map as a historical document requires linking at least three disciplines: cartography, history and computer sciences. "Edition" is understood by the author both as a process of providing access to the map and data derived from it as well as the final result of the work (i.e. web application with data and documentation). For historians, editing is a "critical representation of a historical document", so all actions should be scientifically justified (critical) and the edition should include the representation of the map (e.g. as map image and vector data). As for cartography, editing requires detailed studies in terms of map's scope of content and circumstances of its elaboration as well as digitization process including georeferencing and vectorisation. Finally, from computer sciences point of view, an edition is not only about providing webGIS application (frontend and backend) but also organizing spatial knowledge in the way it can be shared by different services via Internet (knowledge representation, ontologies, Semantic Web).

The edition, which is available in the form of webGIS application, consists of the following elements:

- Photocopies (scans) of both sets along with description of their physical condition, dimensions and other characteristics.
- Georeferenced and mosaicked map sheets. As the map consists of 8 independent sheets, it was necessary not only to georeference them but also combine (mosaic). Only linear transformations were used in order to show which adjacent sheets spatially match one to another and which do not without major geometry corrections. Overall results of georeferencing vary from c.a. 100 m to 450 m of RMS error per sheet with the mean of 267 m.
- Spatial database with selected elements of map content – localities (settlements), economic facilities, most important buildings, land cover, hydrography and roads. The spatial database is available through the web application (in OGC standards) as well as downloadable files (*.shp; *.mdb). All features in the database were identified with modern ones if possible. For example, historical localities from Gaul/Raczynski map were supplied by identifiers from "State Register of Geographical Names", so it is possible to trace changes of names or types of localities between present and the beginning of 19th c. Moreover, in cases of identification uncertainty, particular features were described in the documentation as well as flagged in the database.

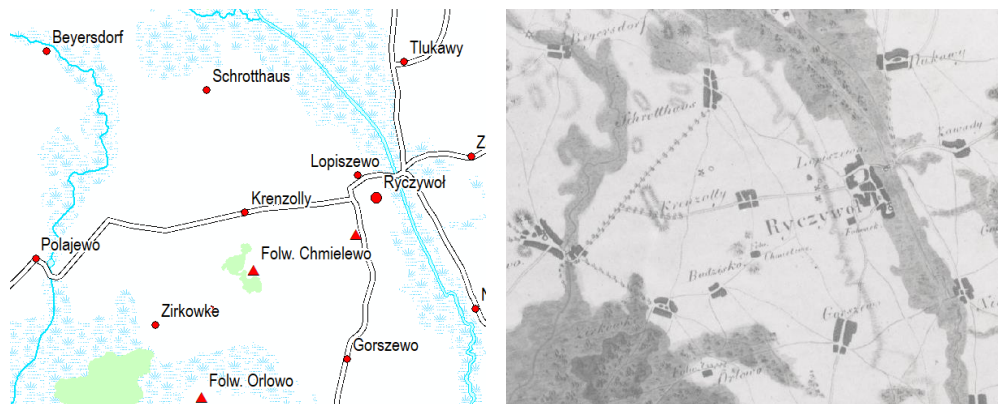


Figure 1. Selected map content in vector representation (on the left) and original map (on the right).

- Colour reconstruction which makes the black-and-white photocopy more legible and serves as a representation of original map potential colour scheme and appearance. Author decided to reconstruct original map symbology based on the studies of similar maps from this period, especially Prussian topographic maps (e.g. Gilly-Kron, Schmettau, von Stein) due to the most possible nationality of the cartographer (Ernest Gaul) as well as French (e.g. Cassini map) because of the patron's (Edward Raczynski) political contacts with Napoleonic France.



Figure 2. Proposed colour scheme of the Gaul/Raczynski map.

- Auxiliary and reference materials, such as grid lines and sheet division of the Gaul/Raczynski map, as well as reference data from the Historical Atlas of Poland (for historical data; <http://atlasfontium.pl>; accessed: 04.01.2019), "State Register of Geographical Names" (for place names) and from the polish national Geoportal (for modern topographic maps).

An important element of the edition is also to clearly indicate which components are derived directly from the source (i.e. the Gaul/Raczynski map) and which are acquired from external sources or result from data transformations and cartographic modelling. An integral part of the work is the documentation of the editing process as well as the metadata for spatial data made available in the form of OGC (Open Geospatial Consortium) services such as WMS and WFS.

Final problem is rather broad and should be posed for further studies: to what extent a digital edition of an old map with most important features stored within a database and presented via web application as well as supplemented by auxiliary data can serve as a historical map understood as a reconstruction of the past landscape?

This work was supported by the Polish National Science Centre [Grant number: 2015/17/N/HS3/01267], "Old maps' digital editions: perspectives and constraints on the example of "Geographic-Military and Statistical Map of Greater Poland" (1807-1812)."