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STUDY OF RELIGIOUS AND OTHER OBJECTS ON HISTORICAL AND MODERN MAPS OF THE TERRITORY OF POLOTSK REGION WITH THE USE OF GEOINFORMATION SYSTEMS

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The article presents the results of continuing work on the formation of information layers of different objects (e.g. religious objects, inns, etc) on the territory of Polotsk and surrounding territories on historical and modern maps.

Introduction. Historical maps are a unique source of information about the natural and socio-economic conditions of a population of a certain historical period. Analyzing historical maps for certain historical dates, a series of different historical maps can help to assess the living conditions of the population and development of territories and their consequences, study the principles of settlement, the past of modern settlements, to estimate the rates of their development, to study known trends of historical periods on the example of a particular region.

Polotsk is the oldest city in Belarus and therefore is a very interesting target of historical research. At the same time, a number of historical cartographic materials are known to this territory. Among them are two plans of Polotsk from 1579, the plan of Polotsk from 1707, the reconstruction plan of the 16-17th centuries, the plan of 1779, the recovery plan of the city of 1778, two plans of the 18th century, a number of plans and maps of the 19 – 20th centuries, as well as the frescoes in the Vilna church of St. Francis and Bernardine depicting Polotsk of the middle of the 16th century [1-3]. This cartographic material allows tracing the development of the city and its environs for a long period, with a sequence of historical maps at fairly uniform time intervals.

Paper [11] presents general principles for analyzing historical maps on the territory of Polotsk and its environs, the procedure for the formation of a spatial raster base, the method of georegistration and transformation, the results of studying some changes in the area of Polotsk, etc.

One of the most time-consuming and critical steps is georegistration and transformation of the original raster data. The creation of a raster spatial base was performed earlier and presented in [11]. The presence of a spatial raster base - a series of georegistered historical maps – makes it possible to expand the research to study individual groups of objects, for example, religious objects (churches, cemeteries), inns, etc.

Methods of research. Current work involves historical maps for an area of approximately 500 km² (20 x 25 km) near the city of Polotsk. The maps of 1790, 1861, 1910, 1939, 1989 and 2015 as well as the plans of Polotsk of 1707, 1778, 1838 are used. OpenStreetMap [4] data as well as Public land-information map of the Republic of Belarus [5], Public cadastral map of the Republic of Belarus [6] are used as modern cartographic data. Historical maps are taken from the Internet [7–9]. Scale range of maps of 18 – 20 centuries is 1: 84 000 – 1: 200 000.

Current study involves the following steps. First of all, a spatial raster base is created. The work is carried out using QGIS software. Maps are registered in WGS-84 coordinate system. OpenStreetMap [11] data is used as a base map.

In the following step, digitizing of objects of interest is carried out. For this purpose, vector layers were created for the following raster maps: 1790, 1861, 1939 and 1989. The following vector layers are formed:

- polygonal (settlements, forest, hydrography),
- linear (road network) [11],
- point layers: temples and sacred objects and inns.

Then the joint analysis of multilayers, qualitative and quantitative data analysis are done.

Results. Religious objects (temples, prayer houses, churches) are subject to digitizing and accounting at the point layers "churches". There is a number of churches which were skipped.

Polotsk is constantly expanding its urban area. Therefore, it is impossible to avoid violating the cultural layer. So in the microdistrict "Airodrome" during the construction of communications the builders came across an old cemetery. The "Mikhailovskoye" cemetery, where St. Michael's Church was located, was previously in this place. During the First World War about five thousand soldiers and officers of the Imperial Army were buried here. In the 1920s the church and cemetery were demolished due to the expansion of the airdrome. This airdrome was established in 1916 during the First World War, next to the Mikhailovsky and military cemeteries. "To the north-west of the town between Zapalotse and Pahirshchyna a big cemetery was located. It derived its

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name from a cemetery church in honour of Michael the Archangel. The cemetery was Uniat. It is known that a timber church was already here in the XVII century. In 1811 stone church in a Baroque style was built. In the early XX century that was the biggest Christian cemetery in the town" [10]. (*the translation is ours - Dzmitry Kalugin, Maryna Valoshyna*)

In Ekimany there was a church of St. George the Victorious (1737-1950s).

The inn is a room for lodging with a courtyard for horses and carriages of travelers, usually with a tavern. The inns were usually located on the most important transport routes. In the vicinity of Polotsk there were several such yards too. In Figure 1 there is a fragment of the map of 1861. A circle with flags near the village of Kozyi Gorki shows the location of the inn existing at that time. In addition, on the fragment there are churches marked as a circle with a cross and a shaded circle with a cross, defining timber and stone churches respectively. Figure 2 shows the fragment of the map of 1861 with inns (marked with an asterisk) near Polotsk.



Fig. 1. Fragment of the map of the 1860s (Schubert maps)

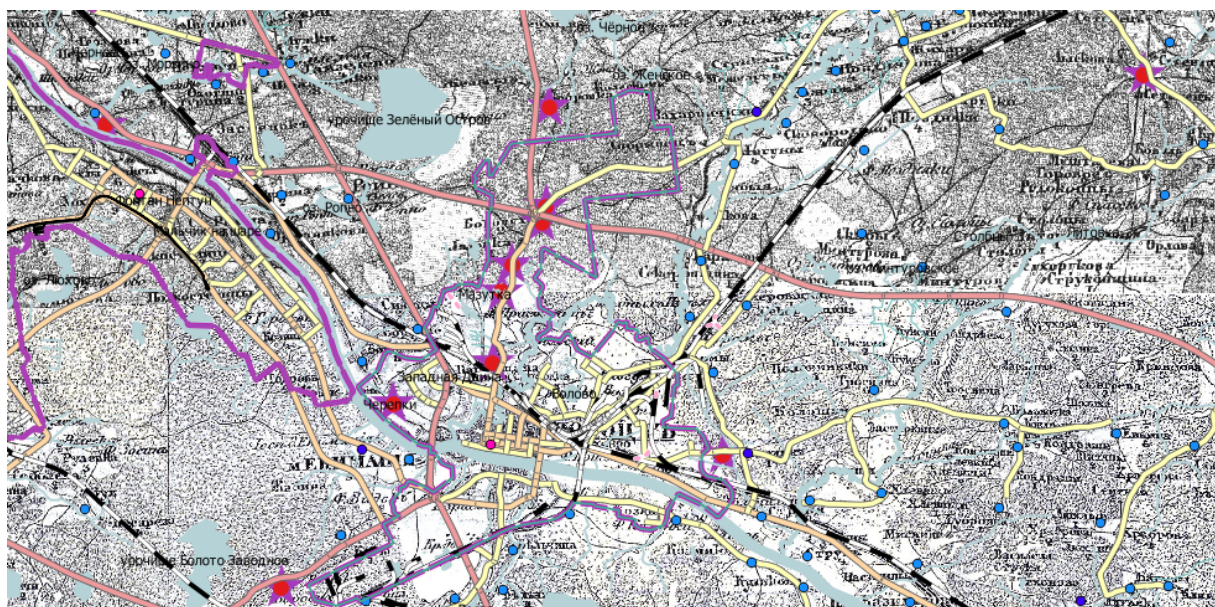


Fig. 2. Map of inns located near Polotsk

Discussion and conclusion. The system of symbols on historical maps allows performing an analysis of the availability and location of various objects. So, on the maps of Schubert there are settlements, grounds, temples and signs of sacred images, factory buildings, roads, road structures, water objects and structures on them, bridges, geodetic points, borders, etc. Types and categories of mentioned objects are also presented and therefore can be analysed.

When analyzing historical maps, it should be remembered that the map is the result of the work of a cartographer and has a subjective nature. In addition, the order of mapping, designing, generalization principles, projections, coordinate systems, symbols, manufacturing technology are significantly different for different historical periods and historical maps. And one should keep it in mind when reading a particular map and conducting joint analysis of maps of different historical periods.

Conversely, the analysis of different historical and modern maps makes it possible to study the principles of drawing up maps of a certain time period in more details.

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