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<https://doi.org/10.23939/istcgcap2023.97.070>

STATE AND PROSPECTS OF LVIV PLANS RESEARCH

The purpose of the paper is to determine the state of research on the peculiarities of mapping and cartographic works of Lviv and, on this basis, to develop tasks for continuing such research on systematic foundations using GIS technologies. Methodology. The theoretical and methodological basis of the research was formed by modern ideas about the significance of a map as an important document of geospatial information and about cartography as a crucial method of recording the state of events and phenomena. The research methodology is based on the principles of historicism, objectivity, systematicity, and comprehensiveness. The methods used in the study include structural-functional and bibliographic analysis, analytical and comparative analysis. Results. Numerous plans of Lviv have long been the subject of research by scholars and specialists. The analysis of previous research has revealed certain gaps along with obvious achievements, primarily in the field of cartography. There is still no complete list of published and manuscript plans of Lviv, and not all periods of the city's mapping have been properly studied. Geoinformation technologies were practically not used in the analysis of the plans. The study of the accuracy of Lviv's plans using GIS tools is at the initial stage. Based on the study of the state of research on city plans, we propose the main areas of systematic investigation of the cartographic heritage of Lviv. The result of the cartographic and bibliographic research will be a bibliographic index of printed and manuscript plans of Lviv. The creation of a bibliographic index of literature on the history of mapping in Lviv will complete the historiographical research. The use of geoinformation technologies will have a decisive influence on further research of the plans. A geoportal of the city plans is currently being created. This will present available printed and manuscript plans, as well as historical reconstruction plans. The geoportal will become a high-quality source of information on ancient plans for research by specialists in various fields. It will also perform an important public function of preserving the national cartographic heritage. The scientific novelty of the research is to identify the main areas of systematic study of Lviv's plans: cartographic bibliography, historiography, creation of a geoportal, and use of geoinformation technologies. The practical significance of the research results is the generalised information on the study of the cartographic heritage of Lviv and its historiography, places of storage of ancient plans.

Key words: cartographic bibliography, GIS, research of ancient city plans, topographic plans of Lviv, thematic plans of Lviv, tourist plans of Lviv.

Introduction

Lviv is one of the few cities in Ukraine for which numerous cartographic works have been published and, most importantly, preserved. A characteristic feature of the centuries-long mapping of Lviv is that the creation of city plans took place over a long period of time and in different political conditions.

Lviv was founded by Prince Danylo Romanovych, and the first mention of the city, according to new research, dates back to 1240. [Paslavskyi, 2010]. The earliest cartographic depiction of Lviv is considered to be Angelino Dulcert's portolan of 1335. [Rovenchak, 2013]. In 1387, the Galician lands, along with Lviv, were annexed to the Kingdom of Poland. After the advent of printing in the fifteenth

century, from the beginning of the sixteenth century, Lviv appeared on numerous printed maps, mostly small-scale, made by European cartographers. From the seventeenth century, there are handwritten schematic plans of the city and its individual districts, plans of the city's fortifications, and their reconstructions. During the first partition of the Polish-Lithuanian Commonwealth in 1772, Galicia, along with Lviv, was annexed to the Habsburg monarchy. The Austrian period (1772–1918) left a particularly significant impact on the mapping of Lviv. In 1918–1939, Lviv was mapped as part of the Second Polish-Lithuanian Commonwealth. For almost half a century, during 1939–1991 (with the exception of the German occupation of 1941–1944), the mapping of

the city was carried out under Soviet rule. Since the declaration of Ukraine's independence in 1991, the mapping of Lviv has been carried out in new political and economic conditions.

The following main factors had a decisive influence on the need to provide the city with large-scale plans:

- Lviv is a large administrative and economic centre with a large population;
- Lviv as a military and strategic object;
- the needs of municipal management (designing city development plans, projects for the location of priority construction, laying of engineering networks and communications, transport routes, engineering training, land and economic development, landscaping, etc.);
- Lviv as a cultural centre with numerous historical and architectural monuments and a major tourist centre.

Researching the plans of Lviv created throughout different historical periods, with varying purposes and content, using diverse approaches and technologies, drawn with varying accuracy and measurement systems, has generated significant interest in the scientific community.

Purpose

The cartographic heritage of Lviv has been studied to a certain extent. The main places of storage of cartographic materials are known. Some information about the institutions that developed and published cartographic works and their authors has been processed. However, the conducted research on Lviv's cartographic heritage is scattered and unsystematic and does not provide a comprehensive, multidimensional picture of the city's mapping.

Therefore, the purpose of this article is to determine the state of research on the peculiarities of mapping and cartographic works of Lviv and, based on this, to develop tasks for continuing such research on systematic foundations using GIS technologies.

Methodology

The theoretical and methodological basis of the research was formed by modern ideas about the significance of a map as an important document of geospatial information and about cartography as a crucial method of recording the state of events and pheno-

mena. The research methodology is based on the principles of historicism, objectivity, systematicity, and comprehensiveness. The methods used in the study include structural-functional and bibliographic analysis, analytical and comparative analysis.

Results

For a long time, the plans of Lviv have been researched by cartographers, geographers, historians, architects, local historians, amateurs, and collectors. A great deal of factual material has been processed.

Information about ancient plans of Lviv is provided in a general overview of the history of geodesy in Poland by Professor Waław Laska (1862–1943), head of the Department of Spherical Astronomy and Higher Geodesy at the Higher Polytechnic School (as Lviv Polytechnic University was then called) [Laska W., 1907].

The cartographic bibliography of plans of Lviv is represented in the general Polish bibliographies of cartographic works. Professor Ludomir Sawicki (1884–1928) of the Jagiellonian University prepared a list of maps stored in the Military Archives in Vienna as part of his general cartographic bibliography of Polish territories. The list included 10 maps of Lviv [Sawicki, 1921]. The plans of Lviv are presented in the fundamental chronological and bibliographic review of Polish cartography of the fifteenth through nineteenth centuries by the historian of geography and cartography, professor at the University of Wrocław Bolesław Olszewicz (1893–1972) [Olszewicz B., 1930, 1931, 1932, 1998].

Ancient plans of Lviv were widely used in scientific research, especially historical research, which contributed to the overall study of the cartographic heritage of the City. Here we should mention the Ukrainian historian and professor at Lviv University Izydor Szaraniewicz (1829–1901). Another significant area of activity where city plans were in demand was architecture and urban planning. When working on the plan for the urban development of Greater Lviv, the urban architect Ignacy Drexler (1878–1930) illustrated changes in the city's territory with previously published plans of Lviv [Drexler, 1920].

The Polish engineer, architect, and historian Janusz Witwicki (1903–1946) used ancient maps of Lviv as an indispensable source when creating his Plastic Panorama of Old Lviv. In 1937, his collection

of materials included 23 ancient city plans and their fragments, including 3 plans from the seventeenth century, 11 from the eighteenth century, and 9 from the nineteenth century. In 1946, J. Witwicki was preparing to leave Lviv for Poland, but his scientific collection was officially confiscated by representatives of the Academy of Sciences of the Ukrainian SSR and transferred to the Institute of History and Theory of Architecture in Kyiv just before his departure [Plastic Panorama..., 2003; Witwicki, 1971]. Currently, the collection of J. Witwicki's materials is kept in the Zabolotny State Scientific Library of Architecture and Construction and is represented by 295 graphic documents (drawings of individual buildings). We have not found any cartographic materials in its collection.

The first in-depth scientific research on the development of mapping of Lviv, which has not lost its significance to this day, was carried out by Evanzhelina Serhiivna Havrylova (1917–1984). E. S. Havrylova defended her PhD thesis on “The Map of Lviv and its Development” (supervised by Prof. V. I. Sukhov) on March 28, 1957, at the Lviv Polytechnic Institute.

The uniqueness of this research was that there was a relatively short period in the USSR when, after the death of J. V. Stalin, from the mid-1950s to the first half of the 1960s, regime restrictions on cartographic activities were eased and a certain democratisation of society was carried out. At that time, two PhD theses on the history of cartography were defended in Ukraine, the only ones in Soviet times (E. S. Havrylova and V. P. Pavlova – “Cartographic Study of the Territory of Ukraine (Historical Overview)”, 1955). Subsequently, in the context of the global classification of cartographic materials and topographic, geodetic, and cartographic activities in general, as well as in the context of the struggle against the so-called Ukrainian bourgeois nationalism, scientific research on such issues in Ukraine ceased.

E. S. Havrylova was ethnic Russian, born in Semipalatinsk, Kazakh SSR. In 1940, she graduated from the Novosibirsk Engineering and Construction Institute named after V. V. Kuybyshev as an engineer, cartographer, and geodesist. In 1945, she came to Lviv at the place of work of her husband, who in the 1950s became the chief architect of Lviv. In 1954, she was sent to the Moscow State University

of Geodesy and Cartography for a one-year post-graduate course, where her supervisor, V. I. Sukhov, was the head of the Department of Map Compilation and Editing.

Evanzhelina Havrylova did a great deal of work to identify cartographic material on the territory of Lviv. She examined the cartographic collections of the regional state archives in Lviv and Kyiv. She studied state historical archives in Lviv and Kyiv, scientific libraries in Lviv, Kyiv, and Moscow. Evanzhelina Havrylova also researched the map repositories of the Chief Architect Office of Lviv and the authorised representative of the Main Directorate of Geodesy and Cartography in Kyiv, as well as other organisations. As a result, more than 60 maps of the city's territory created over 350 years were discovered. The pioneering work on the mapping of Lviv provides a detailed historical overview of the development of the city's maps, with research of the methods and means of their creation, as well as an assessment of the completeness of their content and accuracy. The monograph of the same name was published in 1956 on the basis of the thesis, which was dedicated to the 700th anniversary of Lviv [Havrylova, 1956]. The thesis and the monograph contain many reduced copies of city plans. Despite their low quality of reproduction and small scale, the illustrations provided give a general idea of the reproduced maps, which were also inaccessible to most readers. E. S. Havrylova's research became the source material for the further systematic study of the ancient plans of Lviv.

For 40 years after the publication of E. S. Havrylova's monograph, no generalised works on the history of the mapping of Lviv were published. Only studies of individual cartographic publications were published [Gruneweg M., 1980; Markevych, 1959]. After the declaration of Ukraine's independence, restrictions on cartographic activity were gradually lifted, maps were declassified, so-called special funds were opened, and researchers gained access to the cartographic collections of libraries and archives. All of this contributed to the intensification of research on ancient plans of the city, and their use in various fields of knowledge and practice Mapping [Gudz, Protsyk, 1999; Martyniuk, Taras, 2000; Petryshyn, 2006; Shyshka, 2011, 2012]. It is important to mention that the research on the history of the mapping of Lviv and Galicia was organized based on scientific conferences

focused on the history of cartography and historical cartography. These conferences were hosted by the Lviv branch of the M. S. Hrushevsky Institute of Ukrainian Archeography and Source Studies, which is part of the National Academy of Sciences of Ukraine. [Gudz, Protsyk, 2000; Dolynska, 2003; Ivanochko, Linda, 2004; Lisovska, 2000].

With the fall of the communist regime in Poland, interest in the study of Lviv's history was renewed [Czerner, 1998]. The city's cartographic landmarks are widely represented in the presentation publication *Lwów na dawnej rycinie i planie (Lviv on Old Engravings and Plans)* (1997). Its author, Professor Olgierd Czerner (1929–2020), an architect, founder, and long-time director of the Museum of Architecture in Wrocław, collected iconographic materials related to Lviv for many years. The published album contains reproductions of 269 prints of drawings, watercolours, and plans of Lviv. The cartographic part of the publication includes reproductions of 29 maps of Lviv, which are kept in the cartographic collections of libraries and archives. They involve the Cartography Room of the Library of the Ossoliński National Institute (Ossolineum) in Wrocław, the Jagiellonian University Library in Krakow, the Cartography Room of the National Library of Poland in Warsaw, the Military Archives in Vienna, the Military Archives in Stockholm, and the Royal Library in Copenhagen [Czerner, 1997]. The reproductions included, unlike those in the monograph by E. Havrylova's, are quite readable.

The Institute of Architecture and Design of the Lviv Polytechnic National University formed a scientific school of research on ancient plans for the purpose of studying the urban development of Lviv (M. V. Bevz, M. L. Dolynska, U. I. Ivanochko, S. M. Linda, I. V. Okonchenko, O. P. Oleshko, B. S. Posatsky). S. M. Linda, O. P. Oleshko, U. I. Ivanochko analysed 40 cartographic sources of the period under Austria's rule in a particularly detailed historical context, indicating the place of storage and the main publications about them, and the most significant urban planning transformations [Ivanochko, Linda, 2004; Linda et al., 2004]. The historical topography of Lviv from the fourteenth to the nineteenth centuries is studied by M. L. Dolynska [Dolynska, 2006].

An important milestone and, at the same time, a certain summary of the cartographic study of the

ancient plans of Lviv was the publication in 2014 of the first volume of the series of Atlases of Ukrainian Historical Cities "Lviv" [Atlas, 2014]. The review article by U. R. Kryshtalovych "Lviv in Cartographic Sources of the XIV – Middle of the XX Centuries" presents the historical development of mapping of Lviv until 1944, and describes the most important plans of the city [Kryshtalovych, 2014]. The atlas includes reproductions of 24 maps of Lviv from the collections of the Central State Historical Archives of Ukraine, Lviv, the Scientific Library of the Ivan Franko National University of Lviv, the Military Archives in Vienna, and several private collections. The city plans are mostly reproduced in full-size, with legible captions. All of this makes it easy to use the plans in scientific research and makes them accessible to the general public. The atlas also contains ten reconstructions of the maps.

The publication of a reproduction of the 1849 cadastral plan of Lviv contributed to the research of ancient plans of the city and at the same time to their popularisation [Sossa, 2021].

In 2004, Austrian historian Harald Binder founded an independent research centre in Lviv, the Centre for Urban History of East Central Europe. The task of the Centre's media archive is to collect, store, research, make available, and popularise collections and materials, including cartographic materials, via the Internet. In total, the Centre's website includes 189 images of city plans in the Maps section, including 61 maps of Lviv. Almost half of the city maps are reproduced from private collections (29), 14 maps are from the collections of the Scientific Library of the Ivan Franko National University of Lviv, and 9 maps are from the Military Archives of Vienna. Some of the maps posted on the website are kept in the collections of the State Archives of Lviv Region, the Austrian National Library, and the Central State Historical Archives of Ukraine, Lviv. The plans of Lviv presented on the website make it easy to use them for scientific research. Moreover, the brief annotations to each cartographic work, although not perfect, make this collection accessible to the public [<https://uma.lvivcenter...>].

The Lviv City Council's open data geoportal, which displays mostly current public data, also includes several city plans: Steam tram in Lviv, 1890; Cadastral plan of the city, 1849; Plan of Lviv, 1931; Overview plan of the city's sewerage network, 1942). The presented plans are georeferenced to a modern map of the city [<https://map.city-adm.lviv...>].

As part of the celebration of the 200th anniversary of Lviv Polytechnic National University in 2016, an exhibition “Cartographic Publications of Lviv” was held. The exhibition featured 55 maps and atlases of the city dating from 1635 to 2016 from the collections of the Central State Historical Archives of Ukraine, Lviv, the Vasyl Stefanyk Lviv National Scientific Library of Ukraine, and private collections. The selection of exhibits and the preparation of the exhibition catalogue prompted the exhibition organisers to rethink the development of city mapping [Sossa et al., 2016].

For a long time, the Soviet period of city mapping remained poorly studied due to the secrecy of topographic, geodetic, and cartographic activities in the USSR. The research of Soviet-era plans of Lviv was initiated by R. Sossa, who analysed them from the perspective of their intended purpose, identified the peculiarities of creating and maintaining the main types of city plans for military purposes, for the needs of the city’s economic development, for tourists and city residents [Sossa, 2020].

The research on the accuracy of ancient plans of Lviv using GIS tools is being carried out at the Department of Cartography and Geospatial Modelling at Lviv Polytechnic National University. The accuracy of the 1844 and 1931 plans of Lviv was researched using a quantitative methodology based on direct measurements of line lengths and angles between two directions on the ancient and modern plans and analysis of these measurements based on the statistical theory of errors [Holubinka et al., 2018]. Cartometric research on the accuracy of the 1894 plan of Lviv was conducted by comparing sets of identical points on the old and modern city plans. The calculated distortion parameters were visualized using the MapAnalyst software product, which provided information on the geometric accuracy of the map [Sossa, Yurkiv, 2022].

In our brief overview of the state of research on Lviv’s plans, we did not touch upon the analysis of the city’s historical plans, i. e., reconstruction plans. This is the subject of separate extensive research.

Thus, the achievements in identifying, studying, and promoting Lviv’s plans are quite significant. However, they are not complete and final¹. We do not know a complete list, especially of preserved, pub-

lished, and manuscript plans of Lviv. In general, the period under Austria’s rule of the city’s mapping is better studied, with the main focus on the analysis of the development of the city’s functional, architectural, and planning structure. The mapping of Lviv in the interwar period of 1918–1939, the period of German occupation, and the Soviet period require in-depth study. Most publications are of a cartographic nature. The use of GIS technologies for the study of city plans has not been properly disseminated. The study of the accuracy of Lviv’s plans using GIS tools is at the initial stage. It is worth noting that geoinformation technologies are rarely used in the analysis of old maps in Ukraine. There is a lack of research on the individuals and institutions involved in developing plans, including authors, cartographers, map preparation institutions, and publishers.

In our opinion, further systematic research of ancient and modern plans of Lviv should be carried out in the following main areas.

1. Cartographic bibliography. At first glance, this issue is characterised by really extensive research. The cartographic bibliography of Lviv’s plans has been sufficiently studied, but it is far from complete.

Scattered publications on ancient plans kept in the cartographic collections of archives, libraries, museums, and private collections do not provide a complete picture. Even previously created catalogues [Sawicki, 1921] need to be checked and updated, as over time, the collections of libraries and archives (almost impossible for domestic ones) receive new acquisitions (gifts, purchases, etc.). Most publications focus on specific cartographic works stored in a given map repository, rather than providing a complete list of all plans. A well-composed list of plans of Lviv from the Austrian period with their detailed characteristics lacks important information on the size and number of sheets of the plans [Linda et al., 2004].

Therefore, it becomes an important task to compile a complete bibliography of Lviv’s plans under a unified programme. The main places where city plans are stored are known (Vasyl Stefanyk Lviv National Scientific Library of Ukraine, Central State Historical Archives of Ukraine, Lviv, Scientific Library of Ivan Franko National University of Lviv, State Archives of Lviv Region, Military Archives in Vienna, Austrian National Library, National Library of Poland, Ossolineum Library in Wroclaw, Jagiel-

¹ A historical plan of a city is a plan that is created today with information about events, phenomena, or situations in the past.

lonian University Library, Military Archives in Stockholm, etc.). Private collections deserve special attention, as their contents are not always publicly available.

Under a unified, specially developed programme, bibliographical indexes of Lviv's plans kept in individual institutions should be compiled, and a general index (catalogue) should be created on their basis, indicating the place of storage and the cipher. It is also necessary to provide for the possibility of supplementing the compiled index.

Another area of cartographic bibliographic research is the systematic study (inventory) of historical reconstruction plans.

2. Historiography. The study of the state of research on Lviv's plans has shown a great long-term interest of scholars in this issue, which is expressed in a significant number of publications and other events. However, some publications are still little known and sometimes inaccessible due to their placement in non-specialist publications. In academic publications on Lviv's plans, the references in the bibliographies mostly contain a limited number of references.

Therefore, it is important to carry out an inventory of scholarly, reference, and popular publications on Lviv's plans, which will result in a bibliography of literature on the history of Lviv's mapping. Such a bibliography would include not only publications about city maps, methods and peculiarities of their creation, and places of storage, but also publications about the authors of cartographic works, institutions that performed the relevant topographic, geodetic, and cartographic works, cartographic publishers that prepared such maps, the mathematical basis of the maps, reconstruction plans, etc.

The bibliography should be structured into sections corresponding to the stages of development of Lviv's mapping: 1) Princely times (1240–1340); 2) Feudal Lviv (1386–1772); 3) The period under Austria rule (1772–1918); 4) The interwar period (1918–1939); 5) The period of German occupation (1941–1944); 6) The Soviet period (1939–1941 and 1944–1991); 7) The period of independent Ukraine (after 1991).

3. Geoportal of Lviv's plans. Presentation of all identified manuscripts and printed city plans on a special geoportal would create an invaluable source geospatial database of the city. It would need to in-

clude, if possible, all available archival cartographic materials (parts of the city, individual neighbourhoods, and buildings, utilities, etc.) by scanning them in good resolution and georeferencing them. The creation of such an electronic database will also fulfil an important public function of preserving the national cartographic heritage, as the storage of ancient maps requires special conditions and they are destroyed over time.

All maps should be integrated and referenced to the same coordinate system with a transformation accuracy and root mean square error that corresponds to the map scale accuracy. It will be important to select reliable reference points, as the period of creation of plans and maps goes back several centuries. The transformation between coordinate systems is carried out using Helmert's or Molodensky's formulas, and the accuracy of the transformation is assessed using the appropriate mathematical projections (the origin point of the coordinate system and the ellipsoid) and geodetic height and coordinate systems.

Obviously, arranging numerous city plans in chronological order alone will not be sufficient. Therefore, the entire data set should also be structured according to the thematic content and purpose of the plans (cadastral, fortification, military, infrastructure, tourist, etc.). In addition, spatial information will be incomplete without including historical reconstruction plans, i.e. plans and maps developed by contemporaries for events and phenomena of the past. Much of the visualised information about the development of the city comes from historical maps compiled by historians, archaeologists, urbanists, geographers, cartographers, and other specialists.

4. Use of GIS technologies in the research of city plans. The creation of a geoportal of georeferenced plans of Lviv makes it possible to use GIS tools for multi-thematic spatial research of the city.

The use of geoinformation technologies makes it possible to use different types of data in one environment, which makes it possible to track the development or destruction of certain territories and obtain information for analysing spatial quantitative and qualitative indicators of the objects, processes, and phenomena under research in both urban studies and spatial planning. The overlay analysis of the city's constituent parts (buildings, roads, hydrogra-

phy, green spaces (parks, squares) and agricultural plantations), urban agglomeration development, in particular from the point of view of urban planning and architecture, is effective.

Given that Lviv's plans have been created for over three centuries, they contain extremely large amounts of information about urbanised and built-up areas. Only GIS technologies can effectively process such data sets. After all, the plans show urban areas (districts, blocks, streets, squares, parcels, buildings), rural areas (settlements, courtyards, estates), fortifications (castles, towers, ramparts, bastions, arsenals), military buildings (barracks, shooting ranges, headquarters, military depots), cultural and educational buildings (schools, universities, libraries, folk houses, museums, theatres, stadiums), sacred objects (churches, synagogues, cathedrals, chapels, monasteries, bell towers, cemeteries), etc. No less rich among the elements of the geographical base are natural objects and green spaces (agricultural land, arable land, cultivated land, meadows, pastures, shrubs and forests, parks, squares, gardens), hydrographic objects (rivers, lakes, ponds, springs, swamps, canals).

Based on the created multi-temporal geospatial databases, any phenomena and events can be modelled, for example the development of industrial and residential zones, destruction of buildings as a result of military operations during the First and Second World Wars, urban greening, development of electric and sewerage networks, development of electric transport, etc.

Scientific novelty and practical significance

The scientific novelty of the research is to identify the main areas of systematic study of the centuries-old cartographic heritage of Lviv. They include cartographic bibliography, historiography, creation of a geoportal of Lviv's plans, and use of geoinformation technologies in the study of city plans.

The generalised information about the study of the cartographic heritage of Lviv and its historiography, and places of storage of ancient plans is of practical importance for researchers of the city's multifaceted history and the history of its mapping.

Conclusions

The analysis of previous research on Lviv's plans has revealed certain gaps along with obvious

achievements, primarily in the field of cartography. There is still no complete list of published and manuscript plans of Lviv, and not all periods of the city's mapping have been properly studied. The research of city plans of the period under Austrian rule is noted with a view to studying the urban development of Lviv. Geoinformation technologies are practically not used in the analysis of plans.

The paper identified the main areas of systematic study of the centuries-old cartographic heritage of Lviv. They include cartographic bibliography (creation of a bibliographic index of printed and manuscript maps of Lviv), historiography (creation of a bibliographic index of literature on the history of the mapping of Lviv), creation of a geoportal of city plans, and application of geoinformation technologies in the study of city plans.

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СТАН І ПЕРСПЕКТИВИ ДОСЛІДЖЕНЬ ПЛАНІВ ЛЬВОВА

Мета дослідження – визначення стану досліджень особливостей картографування та картографічних творів Львова і на цій основі – розроблення завдань з продовження таких досліджень на системній основі з використанням ГІС-технологій. Теоретичну та методологічну основу дослідження становили сучасні уявлення про значення карти як важливого документа геопросторової інформації та про картографію як важливий метод фіксування стану подій та явищ. Методологія дослідження базується на принципах історизму, об’єктивності, системності, усебічності. Використано методи структурно-функціонального та бібліографознавчого аналізу, аналітичний, порівняльний аналіз. Результати. Численні плани Львова здавна були об’єктами досліджень науковців і фахівців. Проведений аналіз виконаних раніше досліджень виявив поряд із очевидними здобутками, насамперед у картознавчому плані, певні прогалини. Досі відсутній повний перелік виданих і рукописних планів Львова, не всі періоди картографування міста вивчені належним чином. Геоінформаційні технології практично не застосовувались під час аналізу планів. На початковому етапі перебуває дослідження точності планів Львова з допомогою ГІС-інструментарію. На основі вивчення стану досліджень планів міста запропоновано головні напрями системного вивчення картографічної спадщини Львова. Результатом картбібліографічного дослідження стане бібліографічний покажчик друкованих і рукописних планів Львова. Створенням бібліографічного покажчика літератури з історії картографування Львова завершаться історіографічні пошуки. Визначальний вплив на подальші дослідження планів матиме застосування геоінформаційних технологій. На часі створення геопорталу планів міста, на якому будуть представлені наявні друковані та рукописні плани, а також історичні плани-реконструкції. Геопортал стане якісним джерелом інформації про давні плани для проведення досліджень фахівцями різних галузей, а також виконуватиме важливу суспільну функцію зі збереження національної картографічної спадщини. Наукова новизна дослідження полягає у визначенні головних напрямів системного вивчення планів Львова: картбібліографія, історіографія, створення геопорталу, використання геоінформаційних технологій. Практичну значущість результатів дослідження становить узагальнена інформація про вивчення картографічної спадщини Львова та її історіографія, місця зберігання давніх планів.

Ключові слова: картбібліографія, ГІС, дослідження давніх планів міст, топографічні плани Львова, тематичні плани Львова, туристичні плани Львова.